EXHIBIT GS-1

GEORGE SADOWSKY

Contact Information Redacted

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PROFESSIONAL BACKGROUND

INTERNET CORPORATION FOR ASSIGNED NAMES AND NUMBERS (ICANN) (2005–2018)

Chair, Nominating Committee (2005-2008). Chaired nominating committee from 2005-2007, and advised the new Chair in 2008. The Nominating Committee is independent of ICANN and has responsibility for the entire cycle of candidate recruitment, evaluation, and selection for positions on the ICANN Board as well as within its supporting organizations.

Member, Board of Directors (2009-2018). Chaired Board CEO Search Committee in 2011-12 and in 2015-16, leading to selections of Fadi Chehadé and Göran Marby as ICANN CEOs. Chaired Board Working Group on Nominating Committee Reform, and the Compensation Committee. Member of the Finance Committee, Structural Improvement Committee, Organizational Effectiveness Committee, and Risk Committee. Worked to establish Board Working Group on Trust and became its first Chair. Took strong interest in state of readiness for launch of new gTLD program and voted against it as premature. Contributed strongly toward issues regarding domain name industry economics, including registrar-registry overlapping ownership, economic effects of introduction of new gTLDs, and availability of data for future industry analysis.

WORLD WIDE WEB FOUNDATION (2009–2012)

Consultant to startup foundation conceived by Tim Berners-Lee, the co-inventor of the World Wide Web. Contributed to exploration of technical developments for exploiting the shift to mobile networking. Participated in missions to Ghana to explore education initiatives and to Burkina Faso for study of the potential use of mobile networking for anti-desertification activities. Contributed to the development of the initial Web Index. With UNDP and Rockefeller Foundation support, was the lead author and editor of *Accelerating Development Using the Web: Empowering Poor and Marginalized Populations*.

INTERNEWS NETWORK (2001–2007)

Executive Director, GIPI. The Global Internet Policy Initiative (GIPI) was a joint initiative of the Center for Democracy and Technology and Internews Network to assist countries in redefining and evolving their policy environment so that the benefits of the Internet, as well those deriving from related ICTs (Information and Communication Technologies), can be more rapidly and more fully realized by all sectors of the society. At its height, GIPI projects were operating with full time local coordinators in, Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, India, Indonesia, Kazakhstan, Kyrgyzstan, Nigeria, Russia, Serbia, Tajikistan, Vietnam, Ukraine, and Uzbekistan. Worked with a policy expert and field manager to direct the activities of these projects, including field visits, discussions with government officials, and talks in various venues. Had administrative, budgetary, and fund raising responsibility for the initiative.

Senior Technical Adviser, dot-GOV program, managed by Internews on behalf of USAID. dot-GOV is a government-to-government program for helping developing countries in the area of telecommunications policy, and is part of a larger initiative called dot-COM, reflecting USAID's

move to centralize its assistance programs in the area of ICTs (Information and Communication Technologies). Participated in project formulation; backstopping; and management of conferences, workshops, and presentations to funders and review bodies as well as technical supervision of experts in the field in multiple countries.

Principal Investigator, National Science Foundation Grant SCI-0451384. Worked on the grant planning the extension of high speed networking to higher education institutions in Africa.

Consultant to New York University, USAID, the World Bank infoDev Program, Russell Sage Foundation, Spencer Foundation, Waitt Family Foundation, Markle Foundation, United Nations Development Programme, UN ICT Task Force, PriceWaterhouseCoopers, and the Government of Switzerland.

NEW YORK UNIVERSITY (1990–2000)

Academic Computing Facility (1990-1999). Developed the Academic Computing Facility from a relatively narrow, technical, systems-driven support organization into one with effective distributed managerial leadership and strong customer orientation serving the majority of the university community. Specific initiatives accomplished included establishing an arts technology studio and technical support group, support for humanities computing, expanding distributed support services, networking student residence halls, establishing an Information Services group for managing and evolving the campus electronic information space, establishing a Center for Applied Parallel Computing, establishing a multi-access Help Center, and establishing an Innovation Center for faculty exploration and development. Reorganized staff structure and physical plant, and an active program of courses, workshops, seminars, and colloquia was initiated. Actively involved in a faculty process of planning for academic computing, contributing ultimately to the restructuring of information technology as a whole at NYU, resulting in the creation of the Information Technology Services Division at NYU.

Network Services (1999-2000). Managed the expansion of the campus network including the collection of servers providing basic network services such as e-mail, Web services, FTP, and related services; the NYU-NET backbone and linkages to Internet providers; and additions and changes to the network infrastructure through the specification and installation of vertical and horizontal transmission media in university buildings and all residence halls. Proposed and enforced security policy and management of security events.

NORTHWESTERN UNIVERSITY (1986–1990)

Director of Academic Computing and Network Services. Responsible for management and technical leadership of centrally funded University computing and network facilities for instruction and research, with $8 million budget. Directed Vogelback Computing Center, microcomputing activities and laboratories, and the Chicago Computing Service. Responsible for Microcomputer Product Center, including retail computer sales operation and computer repair service grossing $6 million. Responsible for relationships with customers, suppliers, departments, and professional and undergraduate schools. Reorganized separate computing support groups into unified academic computing organization, reducing overall staff and budget by 15-20% while redirecting resources and focus toward workstation computing and creating groups for networking and advanced technology. Directed networking group in establishing fiber-based initial campus backbone and Internet and other external links, as well as installation and support of multiple local area networks. Directed study leading to internal and external program review and long term planning for exploitation of information technology within the University.

Consultant to the National Academy of Sciences, the United Nations and other organizations involving international consulting missions, authorship of official publications, computer-related strategic planning, and economic modeling and simulation.

UNITED NATIONS (1973–1986)

Technical Advisor in Computer Methods. Coordinated an international team of computer specialists responsible for technical implementation and support of computer based projects in 75 countries. Responsible for project formulation, selection and direction of field experts, preparation of system specifications and requests for proposals, evaluation of vendor proposals, on-going vendor relations, and local and foreign training of national candidates. Field missions to and work in more than 35 countries included project formulation, training, computer installation, hardware, software, and environmental trouble shooting, preparation of technical reports, and negotiations with client governments and equipment suppliers. Responsible for post-enumeration technical support of 1982 Chinese Population Census. Initiated use of microcomputer systems in developing countries in 1979, with multi-level support strategy.

Adviser to Director of Statistical Office. Initiated design of an on-line information system for international statistics, introduced text editing and photocomposition methods, and collaborated in the establishment of a bibliographic information system.

Consultant for government, research, and social service agencies. Evaluated requirements for computer installation and use for research and administrative applications. Selected and installed microcomputer systems and software. Trained staff members in procedures and operations.

THE URBAN INSTITUTE (1970–1973)

Senior Research Staff Member. Participated in the design and construction of a DECsystem-10 based interactive system for the implementation and simulation of socioeconomic microanalytic models of the U. S. household sector, with economist Guy Orcutt and others. Responsible for analysis, design, and programming of the simulation system and for substantive research in formulating model processes and policy experiments. Work resulted in book and Ph.D. dissertation, “MASH: A Computer System for Microanalytic Simulation for Policy Exploration.”

Consultant to Statistics Canada on production and dissemination of 1971 Population and Housing Census data and for design of an interactive economic information system, to the Inter-American Development Bank for an evaluation of proposed expansion of computer facilities and applications, and to the Institute for Social Research, University of Michigan for computer department reorganization.

THE BROOKINGS INSTITUTION (1966–1970)

Director, Computer Center, and Senior Fellow. Created computer center. Designed physical facilities and installed IBM 7040 computer system. Recruited and trained programming and operating staffs. Participated in Brookings research involving quantitative and computational methods. Developed data documentation and retrieval system for survey data files. Directed research on high level language structures for social science computing. Directed the creation of the 1966 and 1967 Survey of Economic Opportunity Research Files for the Office of Economic Opportunity. Planned and participated in training programs and seminars for technical and research staff. Directed selection of, conversion to, and installation of a Digital Equipment PDP-10 computer system, and established a social science research computing consortium.

PRIVATE CONSULTING (1962–1965)

While in graduate school at Yale, was a consultant to government agencies and research projects. Introduced the use of computers for revenue estimation in the Office of Tax Analysis of the U. S. Treasury Department and developed a large computer-based microanalytic simulation model to analyze the revenue and distributional effects of preliminary versions of the Revenue Act of 1964. System was used by Treasury and Congressional committees to help design provisions in final bill. Performed programming for the Brookings Institution for studying the structure of the Federal Individual Income Tax and the effects of the Revenue Act of 1964. Conducted tax analysis and revenue estimation seminar for state tax officials for U. S. Treasury and consulted for taxation agencies in Maryland, Indiana, and Georgia. Participated in computer based legislative redistricting study for Federal Court in Connecticut. Collaborated with Yale faculty members in psychology, physics, economics, and psychiatry, applying statistical and computational methods to empirical data.

YALE UNIVERSITY (1962–1963)

Manager of Operations of Yale Computer Center and Research Assistant in Economics. Administered operations and activities of Center containing IBM 709, 1401, 1620 and 610 computers. Supervised operations and applications programming staff, participated in operating system development, consulted with faculty and student users, taught courses in programming.

Faculty member, Economics Department and Cowles Foundation. Performed research on and programming of voluntary prepaid medical care plan, linear programming models of economic growth, and other projects. Advised faculty and students on statistical and computational methods applied to economic research.

COMBUSTION ENGINEERING, INC., APPLIED MATHEMATICIAN AND PROGRAMMER (1958–1962)

Applied mathematician and programmer for Nuclear Division. Supervised computing group, responsible for use of IBM 704, 7070 and 1401 computers by physicists and engineers. Developed an automatic operating system for the IBM 704, did systems programming, wrote assembly and utility programs. Developed reactor physics, engineering, and statistical programs. Conducted in-company training programs in computer programming and numerical methods.

Concurrently lecturer in the Department of Statistics, University of Hartford.

EDUCATION

M.A. AND PH.D. IN ECONOMICS, YALE UNIVERSITY (1963–1966)
Studies included economic theory, industrial organization, statistics, econometrics, mathematical economics, and gaming and simulation.

GRADUATE STUDY IN MATHEMATICS, HARVARD UNIVERSITY (1957–1958)
Graduate student in mathematics, teaching fellow, and freshman adviser at Harvard College. Courses concentrated on classical analysis, numerical analysis, probability, and statistics.

A.B. MATHEMATICS, CUM LAUDE, HARVARD COLLEGE (1953–1957)
Honors thesis studied analytic solutions of the heat equation in an infinite medium.

OTHER PROFESSIONAL ACTIVITIES

Advisor to Chair of the Nominating Committee, Internet Corporation for Assigned Names and Numbers (ICANN) (2008).

Chair of the Nominating Committee, Internet Corporation for Assigned Names and Numbers (ICANN) (2005, 2006 and 2007); the Elections Committee of the Internet Society (2004-2005); the Nominations Committee of the Internet Society (1997-1998 and 2003-2004); and organizer of a session at the annual conference of the Association for Computing Machinery 1972 session (1972).

Co-Chair of INET'98: The Global Summit, Geneva, Switzerland (21-24 July 1998); NYSERNet '92: Network Access for All: Learn, Teach, Collaborate (1992).

Co-Director of "Extending the Tajik NREN (National Research and Education Network) into the Regions" (2010-2017).

Consultant to the Canadian Government; Cornell-National Institute of Dental Health microanalytic simulation project; Inter-American Development Bank on statistical data collection and dissemination on the Internet; Government of the Bahamas, to United Nations for projects in Cambodia and Myanmar, and to United Nations, UNICEF, and UNDP on attachment to and use of the Internet; the Swiss Government; the Telecommunications Program, International Science Foundation; The United Nations Development Program; The United States Congressional Budget Office; the United States Department of Treasury; the World Wide Web Foundation program on use of the mobile web for society.

Director of the NATO Project, Real-Time Videoconferencing for International Cooperation of EAPC Countries with the National Academy of Sciences of Belarus and Regional Offices, with the National Academy of Sciences in Minsk.

Member of the Internet Hall of Fame (since 2013); the Governing Board and Executive Committee, ECFiber (East Central Vermont Fiber Initiative (2013-2018); the Board of Directors, Internet Corporation for Assigned Names and Numbers (2009-2018); the Public Interest Registry Advisory

Council (2008-2009); the Panel of Advisers, U.N. Global Alliance for ICT and Development (G@ID) (2006-2009); Internet Governance Forum Advisory Committee (2006-2009); the President's Council for Information Technologies, Office of the President, Sofia, Bulgaria (2004-2011); the Board of Directors, PEOPLink (2003-2008); the Audit Committee of the Internet Society (2002-2003); the Board of Directors, and Secretary, Digital Policy Institute (2002-2005); the Conference Committee, Session Chair, Stories from Developing Countries, and co-organizer, Advanced Technology Workshop, INET 2001, Stockholm, Sweden; the Elections Committee of the Internet Society (2001-2003 and 2005-2006); the Advisory Committee to the Markle Foundation on its representation of the U.S. not-for-profit sector to the G-8 and the Dot Force (2000-2002); the Conference Committee and Program Committee, INET 2000, Yokohama, Japan; & Coordinator to the Technical Advisory Panel, infoDev Program, The World Bank (1999-2002); the Conference Committee, INET'99, San Jose, California (1999); the Program Committee, 1997 Telecomm Asia, International Telecommunications Union; the University Executive Forum (formerly Apple University Consortium), representing New York University (1997-2000); the Board of Directors, AppliedTheory Corporation, Inc. (1996-2002); the Board of Trustees of the Internet Society (1996-2004); the Technical Advisory Panel, infoDevProgram, The World Bank (1996-2002); the Conference Committee & Organizer, Internet Society Network Training Workshop, INET '95, Honolulu (1995); the Conference Committee & Organizer, Internet Society Network Training Workshop, INET '94, Prague (1994); the Program Committee & Organizer, Internet Society Developing Countries Workshop, INET '93, Stanford University (1993); the Board of Trustees, CREN (Corporation for Research and Educational Networking -- formerly Bitnet, Inc.) (1992-1995); the Statistics of Income Consultants Panel, Internal Revenue Service (1992-1995); the Board of Directors, New York State Education and Research Network, Inc. (1990-2000); the Advisory Board, European Quantum Internet Alliance, Technical University of Delft, Netherlands; the Advisory Group, Tsinghua Institute for Internet Governance, Tsinghua University, Beijing, China; the Association for Computing Machinery; the Board of Advisers, Bridge to Asia; the NYU Edgar Project Advisory Committee; the Physics Action Council, Working Group on Data Networking, UNESCO; the Planning Committee, Internet and Jurisdiction Conferences; the Selection Committee for New Inductees, Internet Hall of Fame; the Steering Committee, Markle Foundation and UNDP's Global Digital Opportunity Initiative; the Steering Committee, National Bureau of Economic Research Workshop Series on the Computer and Applied Econometrics; the Woodstock Internet Caucus.

Moderator of "Legal Aspects of Governance of Critical Internet Resource Functions"; and organizer of "Evolution of the Root Server System"; "The Big Picture: The Evolving World of Cybercommerce in Europe and in the United States," International Cyberlaw & Commerce Conference: Conceptual Issues Across Borders, New York County Lawyers' Association and Maison Francaise, New York University, New York, N.Y. (23 April 1998).

Participated in Mission for USAID to Madagascar to plan how to connect five major universities to the Internet (April 2000); for USAID to Bamako, Mali, to plan the campus network and interconnection to the Internet for the University of Mali (September 1999); for USAID to the University of Ghana at Legon to assess communications infrastructure and plan for Internet connectivity for the University (May 1996); to and work in more than 50 developing countries on behalf of the United Nations, UNDP, UNFPA, USAID, Sida, and other organizations.

Organizer of the "International Perspectives on the State of Internet Governance," State of the Net Conference (20 January 2016); and Chair of "Issues Regarding the Mobile Internet," Internet Governance Forum, Sharm el Sheikh, Egypt (December 2009); and Co-Director of NATO Advanced Networking Workshop, The Impact of ICT on Reduction of Disaster Outcomes in Central Asia, with TARENA, Dushanbe, Tajikistan (30 April-2 May 2009); the W3C Workshop,

"Africa Perspective on the Role of Mobile Technologies in Fostering Social and Economic Development," Maputo, Mozambique, (1-2 April 2009); and Panelist of the Internet Governance Forum, Athens, Greece (2006); "The Internet and the Public's Health in the Developing World" with Julia Royall, sponsored by the Harvard University School of Public Health and the Rockefeller Foundation, Cambridge, Mass. (31 May 2000); the Internet Society Workshop on Network Technology, INET '96, Montreal (1996); & Initial Chairman of SICSOC (Special Interest Committee for Social and Behavioral Science Computing) of the Association for Computing Machinery (now SIGCHI); the Plenary Session, "Promoting Cybersecurity and Trust".

Participant in the United Nations Advisory Group on the Use of the Internet for Terrorism; the Internet Governance Forum 2008, Hyderabad (2008).

Proposal Reviewer of the National Science Foundation.

Senior Advisor on Global Internet Policy for the Center for Democracy and Technology.

Special Advisor to Nitin Desai, U.N. Seretary-General's Special Adviser for Internet Governance.

Vice-Chair of the Economic Opportunities Commission, World Information Technology Forum (WITFOR) (2009).

Vice-President for Education, The Internet Society (1998-2001); Conferences, The Internet Society (1996-1998).

PRESENTATIONS

"The DNS: History and Current Issues." Plenary presentation, UADOM Eastern Europe DNS Forum, Kiev, Ukraine, 2 December 2016.

"Where have we come from? Where are we going?" Plenary presentation, African Internet Forum and AFRINIC Meeting, Gaborone, Botswana, 10 June 2016.

Plenary panelist, "Philosophical Thinking on Internet Development: A Dialogue Between Internet Pioneers," and Speaker, "Cyberspace Governance Forum." World Internet Conference: Wuzhen Summit. Wuzhen, China, 17-18 December 2015.

"Computer Based Income Tax Analysis and Revenue Estimation: A Historical Perspective," FTA Revenue Estimation and Tax Research Conference, Federation of Tax Administrators, Tampa, Florida, 29 September 2015.

Panelist, "2015: A Year of Change for Internet Governance." 2015 Canadian Internet Forum, Ottawa, Canada, 10 June 2015.

"Internet Governance and a New Social Contract, "New American Foundation, New York, 26 March 2015.

"Creation of the APNIC Cooperation SIG," APRICOT Conference, Fukuoka, Japan, 3 March 2015.

"What's New with the Internet?" Norman Williams Public Library, Woodstock, Vermont, 17 February 2015.

Panel member, "Building Sustainable and Collaborative Internet Governance Ecosystem," World Internet Conference: Wuzhen Summit, Wuzhen, China, 21 November 2014.

Panelist, "Internet Governance: Challenges, Issues and Roles: A Taxonomy Discussion, WSIS+10 High Level Event, Geneva, Switzerland, June 2014.

"Internet Governance Issues," Moldova ICT Summit 2014, Chisinau, Moldova, 14 May 2014.

"The Ever Changing World of the Internet: Security in the Digital World," CEENET Workshop, Tbilisi, Georgia, 4 December 2013.

Acceptance speech, Induction into the Internet Hall of Fame, Berlin, Germany, August 2013.

"Russia, ICANN and the New gTLD Program," Moscow, 12 December 2011.

"The I* Organizations and Their Contributions to Development," (organizer, chair, and panelist); "Enhanced Intra-Stakeholder Diversity and Intra-Stakeholder Balance in Multi-Stakeholder Internet Governance," (panelist); "Internet Governance for Mobile Internet," (chair), IGF 2011, Nairobi, Kenya, 27-30 September 2011.

"Thoughts Regarding Multistakeholderism," Meeting of the UN Commission on Science and Technology for Development, Geneva, 24 May 2011.

"Comments on Social Media," 3rd IJMA-MENA Conference, Damascus, 27 March 2011.

"Public and Private Partnership Prospects," ICT4All Forum: Tunis+5, Tunis, 10 November 2010.

"Internet Governance Viewed Through Different Lenses, With Emphasis on the Lens of Economic and Social Development," IGF 2010, Vilnius, Lithuania, September 2010.

"Global Trends in New TLDs," 3rd International Conference for ccTLD Administrators and Registrars of CIS, Central and Eastern Europe, Samara, Russian Federation, 8 September 2010.

"PKI in a Context of Internet Evolution," Arab Forum on e-Transactions, Security and the Public Key Infrastructure. Tunis, 26 January 2010.

"Preserving an Open Internet in the Face of Terrorism," OSCE National Expert Workshop on Comprehensive Approach to Cybersecurity Addressing Terrorist Use of the Internet, Cybercrime and Other Threats." Zagreb, Croatia, 23 November 2009.

Discussant, "Corporate Governance as Internet Governance: A Corporate Law and Operational Analysis of Key ICANN Functions," "IGF (Internet Governance Forum), Sharm el Sheikh, Egypt, November 2009.

"Greening the Internet (or rather "Greening ICT)," IGF (Internet Governance Forum), Sharm el Sheikh, Egypt, November 2009.

"Some Implications of Mobile Access for Development," Digital World Forum, European Commission, Brussels, 30 September 2009.

"Telecommunications and the Internet: Similarities and Contrasts," RANS (Russian Association of Network Service Providers) Semi-Annual Conference, Moscow, 2 September 2009.

"Implications of Communication Mobility and the Mobile Web for Development," WITFOR 2009 Conference, Hanoi, Vietnam, 27 August 2009.

"Preserving an Open Internet in the Face of Terrorism," OSCE National Expert Workshop on Combating Terrorist Use of the Internet. Belgrade, Serbia, 25 February 2009.

"How to Take Your Internet Further," and "Challenges Facing Internet Operators in Developing Countries," Internet Governance Forum, Hyderabad, India, November 2008.

Specific ICT Problems for Remote Regions," NATO Advanced Networking Workshop on Difficult Access Scenarios: Possible Responses. Nakhchivan, Azerbaijan, 19 June 2008.

"Emerging Technologies: Future of the Internet," 3rd Global Knowledge Partnership Conference, Kuala Lumpur, 13 December 2007.

"ICT and Global Development: History, Economics and Politics," Stevens Institute of Technology, Hoboken, New Jersey, 19 November 2007.

Workshop chair, "Critical Internet Resources: the Root Server System," and workshop presenter, "International Cooperation on the Capacity Building of Information Security," 2nd Internet Governance Forum, Rio de Janeiro, 14 November 2007.

"ICT Security for Development," CEENET Policy Conference, Ohrid, Macedonia, 14 September 2007.

"Changing Internet Policy: Experience from 17+ Countries," RANS Semi-Annual Conference, Moscow, 12 September 2007.

"Thoughts on Internet Governance," RANS Semi-Annual Conference, Moscow, 11 September 2007

"The Role of ICT in the Creation of Wealth in Developing Countries," IFIP WITFOR 2007 Conference, Addis Ababa, 23 August 2007.

"ICT for Shaping the Future of Education in Africa," IFIP WITFOR 2007 Conference, Addis Ababa, 22 August 2007.

"Information Security in an Academic Environment: Setting the Framework for Discussion," *Fourth CEENet Workshop on Network Policy,* Istanbul, Turkey, 28 April 2006.

"Issues in Internet Governance and their Relationship to Economic and Social Development," Evans School of Public Affairs, University of Washington, 21 October 2005.

"Information Security," Kiev Technical University. Ukraine, 1 June 2005.

"Extending High Bandwidth Internet Connectivity to the African Research and Education Community," IEEAF-Internet2 Workshop, Arlington, VA, 5 May 2005.

"Reflections on the Internet Governance Issue," Ministry of Communications and Information Technology, New Delhi, 29 April 2005.

"The Digital Divide and Internet Governance," EliteX 2005 Conference, New Delhi, 27 April 2005

"Digital Convergence and Policy Implications," USAID DOT_COM Technical Advisory Group Seminar, Washington, October 2004.

"GIPI and Internet Policy," National Conference on Policy and Internet Development in Vietnam. Hue, Vietnam, 18 December 2004.

Intervenant, "Quelle gouvernance de la société de l'information?" Université d'été de la Communication, Hourtin, France, 25 August 2004.

"Some Aspects of ICT and Development," Ministry of Communications and Information Technology, New Delhi, 4 June 2004.

"Technology Convergence and Implications for Development Aid," USAID/ANE ICT Coordinators Workshop, Athens, 20 May 2004.

Panelist, "How the Internet can Foster Democracy," Opening Plenary Session, INET'04, Barcelona, 10 May 2004.

"Rethinking Internet Governance: Developing Country and Civil Society Participation," INET'04, Barcelona, 13 May 2004.

"Reflections on Internet Policy with Reference to Vietnam," 3rd Meeting of the GIPI Policy Coordinating Committee, Hanoi, 6 April 2004.

"The Importance of Policy for ICT in Developing Countries," *Workshop on Global ICT Education Program,* Massachusetts Institute of Technology, 30 October 2003.

"Changing Internet Policy: Experience from 17 Countries," *South African Internet Forum,* Pilanesberg, South Africa, 11 April 2003.

"A Perspective on the Digital Divide and the Role of Policy," School of Public Policy, Georgia Institute of Technology, 18 November 2002.

"Role of the Internet and Broadband in Bridging the Digital Divide," *AFCOM 2002: The Eleventh Annual Africa Telecommunications and Information Technology Conference,* Herndon, Virginia, 11 November 2002.

"Communities, Commerce and Content on the Internet," *IITC: International Information Technology Conference 2002* (keynote speech), Colombo, Sri Lanka, 7 October 2002.

"Factors Affecting the Future Evolution of the Internet," *IITC: International Information Technology Conference 2002* (tutorial session), Colombo, Sri Lanka, 6 October 2002.

"Challenges for Today's Internet," *Seize the Internet: CARNET Users' Conference* (keynote speech), Zagreb, Croatia, 25 September 2002.

Panelist and chair, *Who Represents the Internet User*, (closing plenary session), and session chair, *Stories from Developing Countries*, INET 2002, 21 June 2002.

"Où doit aller l'ISOC," ISOC Francophonie 2002, Montréal, Québec, 14 June 2002.

"Communities, Commerce, and Content on the Internet," *M.E.N.A. Regional Telecommunications Regulatory Workshop,* Rabat, Morocco, 11 April 2002.

"Internet Regulatory Issues," *M.E.N.A. Regional Telecommunications Regulatory Workshop,* Rabat, Morocco, 11 April 2002.

"A Policy Agenda for Countries in Transition to Bridge the Digital Divide," (keynote speech), *eDevelopment in Southeast Europe: 3rd Regional Information Society Forum,* Sofia, Bulgaria, 27 March 2002.

"Internet of the Future: Policy Implications for Developing Nations," *USAID Workshop on Rural Internet Connectivity,* New Delhi, 29 November 2001.

Panelist, "Creating Online Communities of Medical Knowledge and Trust: Tales from Two Continents," INET 2001, Stockholm, Sweden.

"ICTs (Information and Communication Technologies) and Development: An Overview," (keynote speech), *Regional Meeting of Resident Representatives: Information and Communications Technologies (ICT) for Development Workshop,* Tbilisi, Georgia, 22 April 2001.

"The Potential of the Internet for Education," (keynote speech), *Bulgarian Internet Fiesta*, Sofia, Bulgaria, 1 March 2001.

"Quelques Aspects sur le Développement de l'Internet," (keynote speech), *Conférence Annuelle Sous le Thème: Internet et Commerce Electronique,* Tunisian Internet Week, Tunis, Tunisia, 9 November 2000.

Panel moderator and presenter, "Distance Education: Hope or Hype," *World Bank infoDev Symposium: Information and Communication Technologies for Development and Poverty Reduction,* Cairo, Egypt, 10-11 October 2000.

"Factors Affecting the Future Evolution of the Internet," 6th CEENet Network Training Workshop, Budapest, Hungary, 20 August 2000.

"The Evolution of NYU-NET in the Context of Regional and National Networking in the U.S.A." NATO Advanced Networking Workshop: 2nd CEENet Workshop on Network Management, Ohrid, Macedonia, 17 June 2000.

Panel member, *The Internet and the Public's Health: Impact on Individuals, Communities, and the World,* Harvard School of Public Health and Harvard Medical School, Cambridge, Mass., 30-31 May 2000.

"Civil Society, Local Authorities and Ownership of ICT: Global Diversity and Regional Integration," *Bamako 2000,* Bamako, Mali, 22-25 February 2000.

"The Internet: Reflections and Visions," (keynote speech) *NATO Advanced Networking Workshop: Networking Developments in the Caucasus Region.* Tbilisi, Georgia, 15-19 October 1999.

"Quelques aspects de l'évolution de la régulation technique et politique de l'Internet," *Société Française en Reseau,* Les 3ème Rencontres d'ISOC-France, Autrans, 11 January 1999.

"Internet Governance," Africa Internet Group AIG'98, Regional Internet Conference on Internet Governance, Keynote speech, Cotonou, Benin, 15 December 1998.

"The Internet: Governance and Education." *Internet World Venezuela,* Keynote address, 12 November 1998.

"Introduction to the Internet: Its History and Future Directions," Internet and Public Health Training Course, Centre for Health Development, World Health Organization, Kobe, Japan, 31 August 1998.

"Quelques soucis au sujet de l'avenir de l'Internet," *Inforoutes et Technologies de l'Information,* Preparatory Meeting for the Francophone Summit, Hanoi, Vietnam, 26 October 1997.

Lecture series on "Emergence, Growth and Impact of Global Networking," *International Nathiagali Summer College on Physics and Contemporary Needs,* Islamabad, Pakistan, 4-8 August 1997.

"The Internet: A Global Perspective." United States Information Service, Islamabad, Pakistan, 7 August 1997.

"50 Years of Global Technology," presented to the President of Pakistan and members of the senior Civil Service, Islamabad, Pakistan, 4 August 1997.

"Internet Trends," *COMNET IT: The Commonwealth Network of Information Technology for Development,* Commonwealth Secretariat, Kuala Lumpur, Malaysia, 28 June 1997.

"The Internet: Taking it to the Next Step," 6th AMIC Annual Conference, *Skyways, Highways and Corridors: Asia's Communication Challenges,* Kuala Lumpur, Malaysia, 20 June 1997.

"The Internet and Development," *Getting Wired for Diplomacy and Development,* U.S. State Department, Washington, D.C., 13 May 1997.

"The Internet Society's Network Training Workshops," Africa Internet Forum Donor's Meeting, Rabat, Morocco, 16 April 1997.

"The State of the Net," Keynote speech, *CAINET '97: The National Networking Conference of Egypt,* Cairo, Egypt, 31 March 1997.

"The Internet: The Outlook for A Global Multimedia Information Environment," Annual REUNA Conference, Santiago, Chile, 27 September 1996.

"The Internet and the Business Economist," Annual Meeting of the Conference of Business Economists, New York, N.Y., 17 July 1996.

"A Model for Training to Support the African Information and Communication Infrastructure," *AFCOM'96: The Global Internet Connectivity for Africa,* Herndon, Virginia, 6 June 1996.

"Globalizing Instructional Resources," keynote speech, International Symposium on Information Technology in Higher Education, Al-Ain, United Arab Emirates, 24 March 1996.

"The Role of the Internet in Development," (keynote speech) APS/UNESCO Network Training Workshop, Kiev, Ukraine, September 1995.

"Future Computing Environments for Socioeconomic Microsimulation," *Annual Meeting of the American Association for the Advancement of Science,* Washington, D.C., 16 February 1991 (with Paul Cotton).

PUBLICATIONS

"The Digital Revolution and the Information Age," Harvard Class Essays, May 2017.

"The Economics of Internet Standards," Handbook on the Economics of the Internet (ed. by Johannes M. Bauer and Michael Latzer, Cheltenham UK and Northampton MA: Edward Elgar, July 2016). ISBN-13: 978-0857939845 (with Stanley M. Besen).

"Developing Country Workshops," Book 2 (1991-2000) - Asia Internet History Projects (ed. Kilnam Chon, accessed August 23, 2013).

Accelerating Development Using the Web: Empowering Poor and Marginalized Populations (World Wide Web Foundation, May 2012).

"Issues Regarding Internet Governance" (in Russian), Analytical and Informational Journal of the RANS (Russian Association of Networks and Services), Vol. 9, no. 19 (September 2008), pp. 34-39.

"Internet Governance: The Importance of Access," *The Power of Ideas: Internet Governance in a Global Multi-Stakeholder Environment.* Marketing für Deutschland GmbH (ed. Wolfgang Kleinwachter, 2007), pp. 68-74.

"Professor Sam - A Pioneer," *Partners in Progress: A Felicitation Volume in Honour of Vidya Jyothi Professor V. K. Samaranayake.* Published for the University of Colombo School of Computing (Godage International Publishers, Ltd., Colombo, 2007), pp. 157-161.

"*Extending High Bandwidth Academic and Research Networking to Africa: A Feasibility Study*, Final Report, NSF Project SCI-0451384 (Washington, D.C., November 30, 2006), 27 pp (with John Mack).

(Oliver B. Popov, ed.), "Information Security in an Academic Environment: Setting the Framework for Discussion," *Policies for Secure Research and Education Networking,* NATO Scientific Affairs Division, NATO Science Series (IOS Press, 2008).

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EXHIBIT GS-2

Verisign releases statement about .Web

BY ANDREW ALLEMANN — AUGUST 1, 2016

UNCATEGORIZED 7 COMMENTS

Verisign plans to "quickly grow .web".

Verisign (NYSE:VRSN) released a statement this morning about .web.

It said what we already know : Verisign backed Nu Dot Co's bid for .web. Once Nu Do Co executes the contract, it will seek to transfer the contract to Verisign through the ICANN process.

I'm curious how much Nu Dot Co will receive for playing this role. If it had gone to a private auction, it probably would have banked about $10 million by splitting proceeds amongst the losers. So you can assume Verisign paid it millions for the deal.

But there might be more to it. Verisign's 10-Q stated that it will have to pay about $130 million for the transfer of contractual rights. Was this merely "about," and the number was an estimate because it was a last-minute

insertion in the 10-Q? Or will it pay some sort of royalty or earnout to Nu Dot Co? We'll have to wait and see.

As for Verisign's plans for the domain, it stated :

> *"As the most experienced and reliable registry operator, Verisign is well-positioned to widely distribute .web. Our expertise, infrastructure, and partner relationships will enable us to quickly grow .web and establish it as an additional option for registrants worldwide in the growing TLD marketplace. Our track record of over 19 years of uninterrupted availability means that businesses and individuals using .web as their online identity can be confident of being reliably found online. And these users, along with our global distribution partners, will benefit from the many new domain name choices that .web will offer.*

Learn More...

1. **It looks like Verisign bought .Web domain for $135 million (SEC Filing)**
2. **Kevin Ham and Mike Mann let these prize-winning domain names expire**
3. **"China" is #1 trending word in .Com**

7 Comments

Tags: .web, nu dot co, nyse:vrsn, VeriSign

EXHIBIT GS-3

Verisign and Afilias in open war over $135m .web

Kevin Murphy, November 11, 2016, 14:26:18 (UTC), Domain Registries

Two of the industry's oldest and biggest gTLD registries escalated their fight over the .web gTLD auction this week, trading blows in print and in public.

Verisign, accused by Afilias of breaking the rules when it committed $130 million to secure .web for itself, has now turned the tables on its rival.

It accuses Afilias of itself breaking the auction rules and of trying to emotionally blackmail ICANN into reversing the auction on spurious political grounds.

The .web auction was won by obscure shell-company applicant Nu Dot Co with a record-setting $135 million bid back in July.

It quickly emerged, as had been suspected for a few weeks beforehand, that Verisign was footing the bill for the NDC bid.

The plan is that NDC will transfer its .web ICANN contract to Verisign after it is awarded, assuming ICANN consents to the transfer.

Afilias has since revealed that it came second in the auction. It now wants ICANN to overturn the result of the auction, awarding .web to Afilias as runner-up instead.

The company argues that NDC broke the new gTLD Applicant Guidebook rules by refusing to disclose that it had become controlled by Verisign.

It's now trying to frame the .web debate as ICANN's "first test of accountability" under the new, independent, post-IANA transition regime.

Afilias director Jonathan Robinson posted on CircleID:

> If ICANN permits the auction result to stand, it may not only invite further flouting of its rules, it will grant the new TLD with the highest potential to the only entity with a dominant market position. This would diminish competition and consumer choice and directly contradict ICANN's values and Bylaws.
>
> ...
>
> Given the controversy over ICANN's independence, all eyes will be on the ICANN board to see if it is focused on doing the right thing. It's time for the ICANN board to show resolve and to demonstrate that it is a strong, independent body acting according to the letter and spirit of its own AGB and bylaws and, perhaps most importantly of all, to actively demonstrate its commitment to act independently and in the global public interest.

Speaking at the first of ICANN's two public forum sessions at ICANN 57 in Hyderabad, India this week, Robinson echoed that

RECENT POSTS

AlpNames could get PAID for abandoning its customers

O.com might be a one-off for Verisign

Andruff escalates Disspain feud, asks ICANN to ban him from chair

Rumors swirl as AlpNames suffers "days" of downtime

ICANN plays tough over Amazon dot-brands

Data beats Merdinger to head universal acceptance group

Radix sees revenue up 30%

Verisign gets approval to sell O.com for $7.85

At eleventh hour, most .uk registrants still don't own their .uk names

Mohan takes the reins at Afilias

Trademark posse fails to block Whois privacy policy

Nevett headhunts top execs from three rivals

Internet to lose its .co.ck?

RECENT COMMENTS

Steward:
Wow Thanks for sharing, there's a small typo toward the bottom "Bur will ICANN Compliance take action in response to t... read more

andrew:
A logical choice would be to have Endurance/Logic Boxes take over the domains... read more

Ben pedri:
Alp names has left the universe domains can not be renewed and are dropping icann and verisign are doing nothing to fix ... read more

John:
It's wrong and is an obvious Pandora's box and slippery slope for worse later. It's bad enough new gTLDs allow money gr... read more

John:
And though I'm sure it doesn't even need to be added - yes, that means the rich and famous Overstock company is NOT enti... read more

John:
Thanks for those links, I will examine them later. The issue is whether premium renewals are even allowed at all, and... read more

Greg:
UDRP pertains to use of a domain name, not registration of a domain name. Not to mention, it's a bit of a Johnny-come-la... read more

B:
Zak Muscovitch addressed this in the ICA public comment (see point 4): mm.icann.org/pipermail/comments-o-com-single-ch... read more

John:
So nobody but Snoopy is going to say anything about

Cook Islands mulls name change
Donuts founder replaces Pitts as MMX's premium guru
Phishing still on the decline, despite Whois privacy
Registrars given six months to deploy Whois killer
Neustar completes .in migration
Scottish registry dumps the pound over Brexit fears
ICANN pushes IANA under Conrad
.film gTLD sees spike after dropping restrictions
UN ruling may put .io domains at risk
Updated: More .amazon delay as governments cancel talks
Expect more Whois accuracy emails under new ICANN policy
Namazi named new GDD boss
Pritz quits Whois privacy group as work enters impossible second phase
Yanks beat Aussies to accountancy gTLD
Surprise! Most private Whois look-ups come from Facebook
Google launches .dev with some big-name anchor tenants
The internet is about to get a lot gayer
Claims UDRP has cost over $360 million so far
Ironic eight-figure deal marks more Euro-registrar consolidation
Court rules generic dictionary domains CAN be trademarked
ICANN director Burr leaving Neustar
Right of the colon? IDN getting killed over dot confusion
Despite Afilias lawsuit, Neustar names date for Indian takeaway
Endurance domain revenue dips
After ICANN knockback, Amazon countries agree to .amazon talks
Operation September Thrust leads to another million-domain Radix gTLD
Brexit blamed as .eu hits six-year low
CentralNic expects flat profit as revenue almost doubles
XYZ reveals .monster gTLD launch dates
Huge batch of Afilias TLDs approved in China
.SE sells off $3.2 million registrar biz
ICANN picks Seattle for public meeting
ICANN approves two new TLDs, including THAT one
MMX sees better profits than expected
Pay up or sell up, ICANN tells failing new gTLD
Brexit boost for Irish domains

call, telling the ICANN board:

> You are a cred ble, independent-minded, and respected board who recognized the enhanced scrutiny that goes with the post-transition environment. Indeed, this may well be the first test of your resolve in this new environment. You have the opportunity to deal with the situation by firmly applying your own rules and your own ICANN bylaw-enshrined core value to introduce and promote competition in domain names. We strongly urge you to do so.

Then, after a few months of relative quiet on the subject, Verisign and NDC this week came out swinging.

First, in a joint blog post, the companies rubbished Afilias' attempt to bring the IANA transition into the debate. They wrote:

> Afilias does a great disservice to ICANN and the entire Internet community by attempting to make this issue a referendum on ICANN by entitling its post "ICANN's First Test of Accountability." Afilias frames its test for ICANN's new role as an "independent manager of the Internet's addressing system," by asserting that ICANN can only pass this test if it disqualifies NDC and bars Verisign from acquiring rights to the .web new gTLD. In this case, Afilias' position is based on nothing more than deflection, smoke and cynical self-interest.

Speaking at the public forum in Hyderabad on Wednesday, Verisign senior VP Pat Kane said:

> This is not a test for the board. This issue is not a test for the newly empowered community. It is a test of our ability to utilize the processes and the tools that we've developed over the past 20 years for dispute resolution.

Verisign instead claims that Afilias' real motivation could be to force .web to a private auction, where it can be assured an eight-figure payday for losing.

NDC/Verisign won .web at a so-called "last resort" auction, overseen by ICANN, in which the funds raised go into a pool to be used for some yet-to-be-determined public benefit cause.

That robbed rival applicants, including Afilias, of the equal share of the proceeds they would have received had the contention set been settled via the usual private auction process.

But Verisign/NDC, in their post, claim Afilias wants to force .web back to private auction.

> Afilias' allegations of Applicant Guidebook violations by NDC are nothing more than a pretext to conduct a "private" instead of a "public" auction, or to eliminate a competitor for the .web new gTLD and capture it for less than the market price.

Verisign says that NDC was under no obligation to notify ICANN of a change of ownership or control because no change of ownership or control has occurred.

It says the two companies have an "arms-length contract" which saw Verisign pay for the auction and NDC commit to ask ICANN

allowing premium renewals for .com?... read more

John:
Australia is a hotbed of corruption and death. This truth channel is the most hard-hitting best and concisely powerfu... read more

Brexit won't just affect Brits, .eu registry says

New domain price guessing game warns against "asshole domain squatters"

to transfer its .web Registry Agreement to Verisign.

It's not unlike the deal Donuts had with Rightside, covering over a hundred gTLD applications, Verisign says.

> The contract between NDC and Verisign did not assign to Verisign any rights in NDC's application, nor did Verisign take any ownership or management interest in NDC (let alone control of it). NDC has always been and always will be the owner of its application

Not content with defending itself from allegations of wrongdoing, Verisign/NDC goes on to claim that it is instead Afilias that broke ICANN rules and therefore should have disqualified from the auction.

They allege that Afilias offered NDC a guarantee of a cash payout if it chose to go to private auction instead, and that it attempted to coerce NDC to go to private auction on July 22, which was during a "blackout period" during which bidders were forbidden from discussing bidding strategies.

During the public forum sessions at ICANN 57, ICANN directors refused to comment on statements from either side of the debate.

That's likely because it's a matter currently before the courts.

Fellow .web loser Donuts has already sued ICANN in California, claiming the organization failed to adequately investigate rumors that Verisign had taken over NDC.

Donuts failed to secure a restraining order preventing the .web auction from happening, but the lawsuit continues. Most recently, ICANN filed a motion attempting to have the case thrown out.

In my opinion, arguments being spouted by Verisign and Afilias both stretch credulity.

Afilias has yet to present any smoking gun showing Verisign or NDC broke the rules. Likewise, Verisign's claim that Afilias wants to enrich itself by losing a private auction appear to be unsupported by any evidence.

Related posts (automatically generated):

Could ICANN reject Verisign's $135m .web bid?

Afilias wins .green auction

Is Verisign .web applicant's secret sugar daddy?

Tweet

Tagged: .web, afilias, auction, donuts, hyderabad, ICANN, icann 57, ndc, nu dot co, verisign

COMMENTS (10)

Andrew

November 11, 2016 at 3 06 pm

One thing I noticed in Verisign's lastest 10-Q was that the number went up to $133M. I have to assume NDC has some sort of carry in this deal.

Reply

Adam

November 11, 2016 at 6 11 pm

Actually the post was first on the Afilias blog.

https://afilias.info/blogs/web-icanns-first-test-accountability

Then it was reposted on CircleID. Why isn't Afilias also complaining about .BLOG? Oh right, they have nothing to gain by mentioning that.

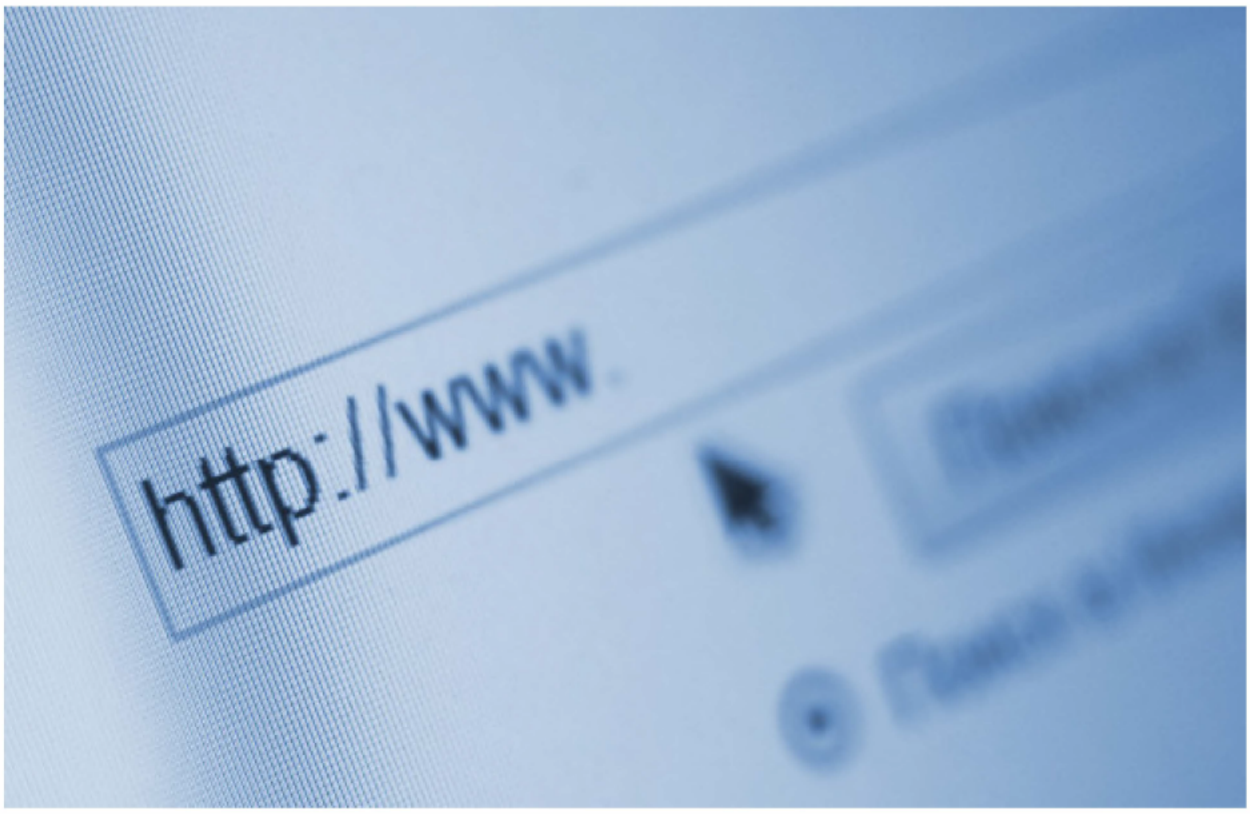
EXHIBIT GS-4

x

TBO
TRADEMARKS & BRANDS ONLINE

Afilias asks ICANN to investigate winning bid for .web

16-08-2016



Dmitry Strizhakov / Shutterstock.com

Domain name registry Aflias has written a letter to ICANN asking it to investigate Nu Dot Co's winning bid for the .web new generic top-level domain (gTLD).

In July, *TBO* reported that Nu Dot Co, a subsidiary of US-based Straat Investments, had successfully acquired the .web gTLD for $135 million.

Nu Dot Co is now able to operate the gTLD after it won the domain at an auction hosted by Power Auctions, ICANN's authorised auction service provider, on July 27.

On August 1, domain name and internet security company Verisign announced that it had "entered into an agreement" with Nu Dot Co in which it provided the funds for buying the .web gTLD.

Scott Hemphill, vice president and general counsel at Aflias, wrote a letter on August 8 to Akram Atallah, president of the global domains division at ICANN, asking for the organisation to re-consider Nu Dot Co's successful bid.

He asserted that Verisign filed its quarterly report with the US Securities and Exchange Commission on July 28 in which it said that from June 30 Verisign would pay Nu Dot Co $130 million for the "future assignment" of contractual rights, subject to third-party consent.

Hemphill said that this third-party agreement is against the rules in the ICANN guidebook, which states that an "applicant may not resell, assign or transfer any of applicant's rights or obligations in connection with the application".

He added: "An option to acquire a string won at auction, together with a promise to fund the auction, is exactly the type of transfer rights and obligations in connection with an application that ICANN was attempting to stop.

"The application requirements and associated filing deadlines were clear and strictly enforced from the beginning."

Hemphill continued: "To allow third parties to circumvent the entire guidebook process simply by buying rights in an application once filed renders the entire guidebook and ICANN process mere folly, and negatively impacts to a material degree the rights and expectations of applicants that have played by the rules."

He finished by saying that he "strongly urges" ICANN to stay any further action with Nu Dot Co until the ICANN ombudsman has investigated the matter.

This was first published on World IP Review.

EXHIBIT GS-5

Law Offices of
STIMMEL, STIMMEL & SMITH
A Professional Corporation

Basic Duties of a Director in a California Non-Public Corporation

A corporation is a small “republic” with the shareholders (owners) electing the directors who, in turn, appoint the officers who run the day to day operations of the company. Absent a contract to the contrary, the officers serve at the pleasure of the Board of Directors and most Boards are elected annually by the shareholders.

The role of the shareholders is clear: they own the company, enjoy its benefits, and elect the directors. The role of the officers is the day to day operations of the company. The directors are more strategic in nature, supervising generally the operations of the company and the actions of the officers. This article shall explore further the roles of the directors of a California non public corporation.

Basic Duties Imposed by Statute on Directors:

While officers run the day to day operations of the corporation, it is the directors who are concerned with the more strategic operations of the company and who have a direct duty to the shareholders as to the well being of the corporation. They supervise the activities of the officers and report back to the shareholders as reasonably required but no less often than annually. They have a **fiduciary duty** to the shareholders and the company.

A California non public owned corporate director’s general duty of care is set forth in Corporations Code §309. [1] Corporation Code Section 309 provides as follows:

(a) A director shall perform the duties of a director, including duties as a member of any

committee of the board upon which the director may serve, in good faith, in a manner such director believes to be in the best interests of the corporation and its shareholders and with such care, including reasonable inquiry, as an ordinarily prudent person in a like position would use under similar circumstances.

(b) In performing the duties of a director, a director shall be entitled to rely on information, opinions, reports or statements, including financial statements and other financial data, in each case prepared or presented by any of the following:

(1) One or more officers or employees of the corporation whom the director believes to be reliable and competent in the matters presented.

(2) Counsel, independent accountants or other persons as to matters which the director believes to be within such person's professional or expert competence.

(3) A committee of the board upon which the director does not serve, as to matters within its designated authority, which committee the director believes to merit confidence, so long as, in any such case, the director acts in good faith, after reasonable inquiry when the need therefor is indicated by the circumstances and without knowledge that would cause such reliance to be unwarranted.

(c) A person who performs the duties of a director in accordance with subdivisions (a) and (b) shall have no liability based upon any alleged failure to discharge the person's obligations as a director. In addition, the liability of a director for monetary damages may be eliminated or limited in a corporation's articles to the extent provided in paragraph (10) of subdivision (a) of Section 204.

The "Business Judgment Rule:"

Corporation Code Section 309 is a codification of the common law "business judgment rule". *Will v. Engebretson* (1989) 213 Cal. App. 3d 1033, 1040; *Gaillard v. Natomas Co*. (1989) 208 Cal. App. 3d 1250, 1264. The business judgment rule recognizes a long standing policy of judicial deference to the business judgment of corporate directors who are presumably better able than the courts to decide whether or not a proposed transaction is in the best interests of the corporation. *Will, supra*. at page 1033; *Gaillard, supra*. at page 1264

Under the business judgment rule, as codified, *a director is not liable for mistakes in business judgment, made in good faith, in a manner the director believes to be in the best interests of the corporation and which were made with such care, including reasonable inquiry, as an ordinarily prudent person in a like situation would use under similar circumstances*.[2] A director's liability

may be further limited or eliminated by the Articles of Incorporation by provisions.[3]

The language of the statue applies expansively to the "duties of a director". One authority summarized, without citation to case authority, that application of the business judgment rule as codified by §309 arises most frequently in actions seeking to hold corporate directors liable for corporate losses resulting from, among other things, the directors' failure to obtain adequate insurance on corporate assets, or to protect the corporation against foreseeable liabilities and claimed diversion or waste of corporate assets. [4]

The §309 duty of care includes a duty of "reasonable inquiry. Information that would cause a prudent business person to make further investigation of facts requires the director to make that investigation and take appropriate action or face violation of the fiduciary duty.

The Duty of Loyalty for Directors and Officers

In addition to the statutory duty of care, corporate directors and officers, who participate in corporate management and exercise some discretionary authority, owe the corporation a **fiduciary duty** of loyalty (*Bancroft-Whitney Co. v. Glen* (1966) 64 Cal. 2d 327, 345; *GAB Business Services, Inc. v. Lindsey and Newsome Claim Services, Inc*. (2000)83 Cal. App. 4th 409,420-424.

A public policy …demands of a corporate officer or director,

peremptorily and inexorably, the most scrupulous observance

of his duty, not only affirmatively to protect the interests of

the corporation committed to his charge, but also to refrain

from doing anything that would work injury to the corporation

or to deprive it of profit or advantage which his skill and

ability might properly bring to it, or enable it to make in the

reasonable and lawful exercise of his powers.

Bancroft-Whitney, supra. at 345

Both the *Bancroft-Whitney* case and the *GAB* case involved corporate executives who, while still employed, solicited the most desirable employees of their present employer to leave with them to take jobs with their employer's direct competitor. However, the reasoning and result in neither case turned on that particular fact pattern. The definition of the duty, as set forth above by the *Bancroft-Whitney* court would certainly seem to encompass the duty to prevent drastic drop in value and other economic damage or waste to a corporation in the event of a director's or key

officer's death or incapacity, prevention of which is clearly within the lawful exercise of the director's powers.

The **Corporate Opportunity Doctrine** would apply to certain of the actions and the article on that topic should be reviewed by the reader.

The fiduciary duty enunciated by the *Bancroft -Whitney Court is imposed upon corporate officers as well as directors[5]. At least one commentator suggests that an officer is held to a higher standard of care than a director because he/she may be required to be more familiar with corporate affairs and less able to rely on the reports or other information supplied by others.[6] A higher duty of care on the part of corporate officers was confirmed by the court in Gailliard v. NatomasCompany, supra.*, which held that an officer's liability is not limited by Corporations Code §309 or the business judgment rule. The *Gaillard* court considered the propriety of golden parachutes for various executives approved by the directors of the corporation, some of whom were also officers, who the court referred to as "inside directors." The *Gaillard* court reasoned as follows:

We further conclude, however, that, as a matter of law, our review of the conduct of the inside directors is not governed by section 309. The inside directors did not vote on the approval of the golden parachutes or consulting agreement. In securing the payment of these benefits to themselves, they were not "[performing] the duties of a director" as specified in section 309, but were acting as officer employees of the corporation. The judicial deference afforded under the business judgment rule therefore should not apply. As stated by Marsh in his discussion of section 309: "section 309 subdivision (a) does not relate to officers of the corporation, but only to directors. . . . [An] officer-director might be liable for particular conduct because of his capacity of an officer, whereas the other directors would not." (1 Marsh, op. *cit. supra*, § 10.3, at p. 576.) This result is in accord with the premise of the business judgment rule that courts should defer to the business judgment of *disinterested* directors who presumably are acting in the best interests of the corporation. *Gaillard, supra* at p.1265.

The facts upon which the *Gaillard* court distinguished the activities of an officer/director from the activities of an "outside director" for purposes of liability are the following. The officer/directors were active in the negotiation of the favorable employment agreements and the merger structure that required them. However, when the agreements were put to the full board of directors the five officer/directors who had been involved in their negotiation, abstained from voting. Only the "outside" directors voted.

When determining director liability under Corporations Code §309 there is a rebuttable presumption that a director acted in good faith. *Katz v. Chevron Corp*. (1994) 22 Cal.App. 4th 1352, 1366; Burt *v. Irvine* (1965) 237 Cal. App. 2d 828,845. Since the presumption stems from the business judgment rule it would not apply to the determination of liability of an officer. See *Burt v. Irvine*, s*upra* at p. 845.

Conclusion:

One wag put it succinctly: a director is allowed to be wrong but not allowed to cheat or be wrong without a leg to stand on. Courts will give him or her wide discretion and allow him or her to have made the wrong decision but only if there was some grounds for making such a decision and dishonesty or self dealing was not a factor.

It is equally vital to note that the duty of inquiry does not allow a director to “look the other way” or fail to make reasonable inquiry as to facts or developments that a prudent business person would investigate.

”I don’t want to know” is not a valid defense.

Bylaws can provide additional protection for a director and limit both the exposure and provide for indemnity to a director forced to defend him or herself. But the Courts have been firm that if wrongdoing or gross negligence is demonstrated that the director will not be able to rely on indemnity or the business judgment rule for protection.

Thus being a director requires due care and full understanding of the duties imposed. It is not merely a ceremonial position or a seat around a large table. It is an obligation, a duty, and the shareholders have the right to require compliance with all the obligations of a fiduciary.

[1] Other specific grounds for liability not readily apparent here are Corporations Code §310 [voidability contracts and other transactions for director self interest]; § 315 [liability for approving an illegal loan of corporate funds] and §316[liability for illegal guaranty on corporate credit].

[2] Corp. Code §309

[3] Corp Code § 204

[4] The Rutter Group, California Practice Guide Corporations, section 6:427, p. 6-50.

[5] *Bancroft-Whitney*, supra. p. 345.

[6] Mathew Bender, *California Pleading and Practice*, Vol. 14, Chpt. VII. Directors & Management, p.41 , Officer’s Standard of Care, relying upon Galantine & Sterling, *California Corporation Laws*, Chpt. 6, Management; Duties & Liabilities of Directors and Controlling Shareholders,§6.102

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Statement of Policy on the Management of Internet Names and Addresses

Topics:

- Domain Name System [1]

Date:
June 05, 1998
Docket Number:
980212036-8146-02

UNITED STATES DEPARTMENT OF COMMERCE

Management of Internet Names and Addresses

Docket Number: 980212036-8146-02

AGENCY: National Telecommunications and Information Administration

ACTION: Statement of Policy

SUMMARY: On July 1, 1997, as part of the Clinton Administration's *Framework for Global Electronic Commerce*,(1) the President directed the Secretary of Commerce to privatize the domain name system (DNS) in a manner that increases competition and facilitates international participation in its management.

Accordingly, on July 2, 1997, the Department of Commerce issued a Request for Comments (RFC) on DNS administration. The RFC solicited public input on issues relating to the overall framework of the DNS administration, the creation of new top-level domains, policies for domain name registrars, and trademark issues. During the comment period, more than 430 comments were received, amounting to some 1500 pages.(2)

On January 30, 1998, the National Telecommunications and Information Administration (NTIA), an agency of the Department of Commerce, issued for comment, *A Proposal to Improve the Technical Management of Internet Names and Addresses.* The proposed rulemaking, or "Green Paper," was published in the Federal Register on February 20, 1998,

providing opportunity for public comment. NTIA received more than 650 comments, as of March 23, 1998, when the comment period closed.[3]

The Green Paper proposed certain actions designed to privatize the management of Internet names and addresses in a manner that allows for the development of robust competition and facilitates global participation in Internet management. The Green Paper proposed for discussion a variety of issues relating to DNS management including private sector creation of a new not-for-profit corporation (the "new corporation") managed by a globally and functionally representative Board of Directors.

EFFECTIVE DATE: This general statement of policy is not subject to the delay in effective date required of substantive rules under 5 U.S.C. § 553(d). It does not contain mandatory provisions and does not itself have the force and effect of law.[4] Therefore, the effective date of this policy statement is [insert date of publication in the Federal Register].

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AUTHORITY: 15 U.S.C. § 1512; 15 U.S.C. § 1525; 47 U.S.C. § 902(b)(2)(H); 47 U.S.C. § 902(b)(2)(I); 47 U.S.C. § 902(b)(2)(M); 47 U.S.C. § 904(c)(1).

SUPPLEMENTARY INFORMATION:

Background:

Domain names are the familiar and easy-to-remember names for Internet computers (e.g., "www.ecommerce.gov"). They map to unique Internet Protocol (IP) numbers (e.g., 98.37.241.30) that serve as routing addresses on the Internet. The domain name system (DNS) translates Internet names into the IP numbers needed for transmission of information across the network.

U.S. Role in DNS Development:

More than 25 years ago, the U.S. Government began funding research necessary to develop packet-switching technology and communications networks, starting with the "ARPANET" network established by the Department of Defense's Advanced Research Projects Agency (DARPA) in the 1960s. ARPANET was later linked to other networks established by other government agencies, universities and research facilities. During the 1970s, DARPA also funded the development of a "network of networks;" this became known as the Internet, and the protocols that allowed the networks to intercommunicate became known as Internet protocols (IP).

As part of the ARPANET development work contracted to the University of California at Los Angeles (UCLA), Dr. Jon Postel, then a graduate student at the university, undertook the maintenance of a list of host names and addresses and also a list of documents prepared by ARPANET researchers, called Requests for Comments (RFCs). The lists and the RFCs were made available to the network community through the auspices of SRI International, under contract to DARPA and later the Defense Communication Agency (DCA) (now the Defense Information Systems Agency (DISA)) for performing the functions of the Network Information Center (the NIC).

After Dr. Postel moved from UCLA to the Information Sciences Institute (ISI) at the University of Southern California (USC), he continued to maintain the list of assigned Internet numbers and names under contracts with DARPA. SRI International continued to publish the lists. As the lists grew, DARPA permitted Dr. Postel to delegate additional administrative aspects of the list maintenance to SRI, under continuing technical oversight. Dr. Postel, under the DARPA contracts, also published a list of technical parameters that had been assigned for use by protocol developers. Eventually these functions collectively became known as the Internet Assigned Numbers Authority (IANA).

Until the early 1980s, the Internet was managed by DARPA, and used primarily for research purposes. Nonetheless, the task of maintaining the name list became onerous, and the Domain Name System (DNS) was developed to improve the process. Dr. Postel and SRI participated in DARPA's development and establishment of the technology and practices used by the DNS. By 1990, ARPANET was completely phased out.

The National Science Foundation (NSF) has statutory authority for supporting and strengthening basic scientific research, engineering, and educational activities in the United States, including the maintenance of computer networks to connect research and educational institutions. Beginning in 1987, IBM, MCI and Merit developed NSFNET, a national high-speed network based on Internet protocols, under an award from NSF. NSFNET, the largest of the governmental networks, provided a "backbone" to connect other networks serving more than 4,000 research and educational institutions throughout the country. The National Aeronautics and Space Administration (NASA) and the U.S. Department of Energy also contributed backbone facilities.

In 1991-92, NSF assumed responsibility for coordinating and funding the management of the non-military portion of the Internet infrastructure. NSF solicited competitive proposals to provide a variety of infrastructure services, including domain name registration services. On December 31, 1992, NSF entered into a cooperative agreement with Network Solutions, Inc. (NSI) for some of these services, including the domain name registration services. Since that time, NSI has managed key registration, coordination, and maintenance functions of the Internet domain name system. NSI registers domain names in the generic top level domains (gTLDs) on a first come, first served basis and also maintains a directory linking domain names with the IP numbers of domain name servers. NSI also currently maintains the authoritative database of Internet registrations.

In 1992, the U.S. Congress gave NSF statutory authority to allow commercial activity on the NSFNET.[(5)] This facilitated connections between NSFNET and newly forming commercial network service providers, paving the way for today's Internet. Thus, the U.S. Government has

played a pivotal role in creating the Internet as we know it today. The U.S. Government consistently encouraged bottom-up development of networking technologies, and throughout the course of its development, computer scientists from around the world have enriched the Internet and facilitated exploitation of its true potential. For example, scientists at CERN, in Switzerland, developed software, protocols and conventions that formed the basis of today's vibrant World Wide Web. This type of pioneering Internet research and development continues in cooperative organizations and consortia throughout the world.

DNS Management Today:

In recent years, commercial use of the Internet has expanded rapidly. As a legacy, however, major components of the domain name system are still performed by, or subject to, agreements with agencies of the U.S. Government.

Every Internet computer has a unique IP number. IANA, headed by Dr. Jon Postel, coordinates this system by allocating blocks of numerical addresses to regional IP registries (ARIN in North America, RIPE in Europe, and APNIC in the Asia/Pacific region), under contract with DARPA. In turn, larger Internet service providers apply to the regional IP registries for blocks of IP addresses. The recipients of those address blocks then reassign addresses to smaller Internet service providers and to end users.

- 1) Assignment of numerical addresses to Internet users.

The domain name space is constructed as a hierarchy. It is divided into top-level domains (TLDs), with each TLD then divided into second-level domains (SLDs), and so on. More than 200 national, or country-code, TLDs (ccTLDs) are administered by their corresponding governments or by private entities with the appropriate national government's acquiescence. A small set of gTLDs do not carry any national identifier, but denote the intended function of that portion of the domain space. For example, .com was established for commercial users, .org for not-for-profit organizations, and .net for network service providers. The registration and propagation of these key gTLDs are performed by NSI, under a five-year cooperative agreement with NSF. This agreement expires on September 30, 1998.

- 2) Management of the system of registering names for Internet users.

The root server system is a set of thirteen file servers, which together contain authoritative databases listing all TLDs. Currently, NSI operates the "A" root server, which maintains the authoritative root database and replicates changes to the other root servers on a daily basis. Different organizations, including NSI, operate the other 12 root servers.[(6)] The U.S. Government plays a role in the operation of about half of the Internet's root servers. Universal name consistency on the Internet cannot be guaranteed without a set of authoritative and consistent roots. Without such consistency messages could not be routed with any certainty to

the intended addresses.

- 3) Operation of the root server system.

The Internet protocol suite, as defined by the Internet Engineering Task Force (IETF), contains many technical parameters, including protocol numbers, port numbers, autonomous system numbers, management information base object identifiers and others. The common use of these protocols by the Internet community requires that the particular values used in these fields be assigned uniquely. Currently, IANA, under contract with DARPA, makes these assignments and maintains a registry of the assigned values.

- 4) Protocol Assignment.

The Need for Change:

From its origins as a U.S.-based research vehicle, the Internet is rapidly becoming an international medium for commerce, education and communication. The traditional means of organizing its technical functions need to evolve as well. The pressures for change are coming from many different quarters:

_ There is widespread dissatisfaction about the absence of competition in domain name registration.

_ Conflicts between trademark holders and domain name holders are becoming more common. Mechanisms for resolving these conflicts are expensive and cumbersome.

_ Many commercial interests, staking their future on the successful growth of the Internet, are calling for a more formal and robust management structure.

_ An increasing percentage of Internet users reside outside of the U.S., and those stakeholders want to participate in Internet coordination.

_ As Internet names increasingly have commercial value, the decision to add new top-level domains cannot be made on an *ad hoc* basis by entities or individuals that are not formally accountable to the Internet community.

_ As the Internet becomes commercial, it becomes less appropriate for U.S. research agencies to direct and fund these functions.

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The Internet technical community has been actively debating DNS management policy for several years. Experimental registry systems offering name registration services in an

alternative set of exclusive domains developed as early as January 1996. Although visible to only a fraction of Internet users, alternative systems such as the name.space, AlterNIC, and eDNS affiliated registries(7) contributed to the community's dialogue on the evolution of DNS administration.

In May of 1996, Dr. Postel proposed the creation of multiple, exclusive, competing top-level domain name registries. This proposal called for the introduction of up to 50 new competing domain name registries, each with the exclusive right to register names in up to three new top-level domains, for a total of 150 new TLDs. While some supported the proposal, the plan drew much criticism from the Internet technical community.(8) The paper was revised and reissued.(9) The Internet Society's (ISOC) board of trustees endorsed, in principle, the slightly revised but substantively similar version of the draft in June of 1996.

After considerable debate and redrafting failed to produce a consensus on DNS change, IANA and the Internet Society (ISOC) organized the International Ad Hoc Committee(10) (IAHC or the Ad Hoc Committee) in September 1996, to resolve DNS management issues. The World Intellectual Property Organization (WIPO) and the International Telecommunications Union (ITU) participated in the IAHC. The Federal Networking Council (FNC) participated in the early deliberations of the Ad Hoc Committee.

The IAHC issued a draft plan in December 1996 that introduced unique and thoughtful concepts for the evolution of DNS administration.(11) The final report proposed a memorandum of understanding (MoU) that would have established, initially, seven new gTLDs to be operated on a nonexclusive basis by a consortium of new private domain name registrars called the Council of Registrars (CORE).(12) Policy oversight would have been undertaken in a separate council called the Policy Oversight Committee (POC) with seats allocated to specified stakeholder groups. Further, the plan formally introduced mechanisms for resolving trademark/domain name disputes. Under the MoU, registrants for second-level domains would have been required to submit to mediation and arbitration, facilitated by WIPO, in the event of conflict with trademark holders.

Although the IAHC proposal gained support in many quarters of the Internet community, the IAHC process was criticized for its aggressive technology development and implementation schedule, for being dominated by the Internet engineering community, and for lacking participation by and input from business interests and others in the Internet community.(13) Others criticized the plan for failing to solve the competitive problems that were such a source of dissatisfaction among Internet users and for imposing unnecessary burdens on trademark holders. Although the POC responded by revising the original plan, demonstrating a commendable degree of flexibility, the proposal was not able to overcome initial criticism of both the plan and the process by which the plan was developed.(14) Important segments of the Internet community remained outside the IAHC process, criticizing it as insufficiently representative.(15)

As a result of the pressure to change DNS management, and in order to facilitate its withdrawal from DNS management, the U.S. Government, through the Department of Commerce and NTIA, sought public comment on the direction of U.S. policy with respect to DNS, issuing the Green Paper on January 30, 1998.(16) The approach outlined in the Green

Paper adopted elements of other proposals, such as the early Postel drafts and the IAHC gTLD- MoU.

Comments and Response: The following are summaries of and responses to the major comments that were received in response to NTIA's issuance of *A Proposal to Improve the Technical Management of Internet Names and Addresses*. As used herein, quantitative terms such as "some," "many," and "the majority of," reflect, roughly speaking, the proportion of comments addressing a particular issue but are not intended to summarize all comments received or the complete substance of all such comments.

1. Principles for a New System. The Green Paper set out four principles to guide the evolution of the domain name system: stability, competition, private bottom-up coordination, and representation.

Comments: In general, commenters supported these principles, in some cases highlighting the importance of one or more of the principles. For example, a number of commenters emphasized the importance of establishing a body that fully reflects the broad diversity of the Internet community. Others stressed the need to preserve the bottom-up tradition of Internet governance. A limited number of commenters proposed additional principles for the new system, including principles related to the protection of human rights, free speech, open communication, and the preservation of the Internet as a public trust. Finally, some commenters who agreed that Internet stability is an important principle, nonetheless objected to the U.S. Government's assertion of any participatory role in ensuring such stability.

Response: The U.S. Government policy applies only to management of Internet names and addresses and does not set out a system of Internet "governance." Existing human rights and free speech protections will not be disturbed and, therefore, need not be specifically included in the core principles for DNS management. In addition, this policy is not intended to displace other legal regimes (international law, competition law, tax law and principles of international taxation, intellectual property law, etc.) that may already apply. The continued applicability of these systems as well as the principle of representation should ensure that DNS management proceeds in the interest of the Internet community as a whole. Finally, the U.S. Government believes that it would be irresponsible to withdraw from its existing management role without taking steps to ensure the stability of the Internet during its transition to private sector management. On balance, the comments did not present any consensus for amending the principles outlined in the Green Paper.

2. The Coordinated Functions. The Green Paper identified four DNS functions to be performed on a coordinated, centralized basis in order to ensure that the Internet runs smoothly:

2. To oversee the operation of the Internet root server system;

3. To oversee policy for determining the circumstances under which new top level domains would be added to the root system; and

4. To coordinate the development of other technical protocol parameters as needed to maintain universal connectivity on the Internet.

- 1. To set policy for and direct the allocation of IP number blocks;

Comments: Most commenters agreed that these functions should be coordinated centrally, although a few argued that a system of authoritative roots is not technically necessary to ensure DNS stability. A number of commenters, however, noted that the fourth function, as delineated in the Green Paper, overstated the functions currently performed by IANA, attributing to it central management over an expanded set of functions, some of which are now carried out by the IETF.

Response: In order to preserve universal connectivity and the smooth operation of the Internet, the U.S. Government continues to believe, along with most commenters, that these four functions should be coordinated. In the absence of an authoritative root system, the potential for name collisions among competing sources for the same domain name could undermine the smooth functioning and stability of the Internet.

The Green Paper was not, however, intended to expand the responsibilities associated with Internet protocols beyond those currently performed by IANA. Specifically, management of DNS by the new corporation does not encompass the development of Internet technical parameters for other purposes by other organizations such as IETF. The fourth function should be restated accordingly:

- · to coordinate the assignment of other Internet technical parameters as needed to maintain universal connectivity on the Internet.

3. Separation of Name and Number Authority.

Comments: A number of commenters suggested that management of the domain name system should be separated from management of the IP number system. These commenters expressed the view that the numbering system is relatively technical and straightforward. They feared that tight linkage of domain name and IP number policy development would embroil the IP numbering system in the kind of controversy that has surrounded domain name issuance in recent months. These commenters also expressed concern that the development of alternative name and number systems could be inhibited by this controversy or delayed by those with vested interests in the existing system.

Response: The concerns expressed by the commenters are legitimate, but domain names and IP numbers must ultimately be coordinated to preserve universal connectivity on the Internet. Also, there are significant costs associated with establishing and operating two separate management entities.

However, there are organizational structures that could minimize the risks identified by commenters. For example, separate name and number councils could be formed within a single organization. Policy could be determined within the appropriate council that would submit its recommendations to the new corporation's Board of Directors for ratification.

4. Creation of the New Corporation and Management of the DNS. The Green Paper called for the creation of a new private, not-for-profit corporation(17) responsible for coordinating specific DNS functions for the benefit of the Internet as a whole. Under the Green Paper proposal, the U.S. Government(18) would gradually transfer these functions to the new corporation beginning as soon as possible, with the goal of having the new corporation carry out operational responsibility by October 1998. Under the Green Paper proposal, the U.S. Government would continue to participate in policy oversight until such time as the new corporation was established and stable, phasing out as soon as possible, but in no event later than September 30, 2000. The Green Paper suggested that the new corporation be incorporated in the United States in order to promote stability and facilitate the continued reliance on technical expertise residing in the United States, including IANA staff at USC/ISI.

Comments: Almost all commenters supported the creation of a new, private not-for-profit corporation to manage DNS. Many suggested that IANA should evolve into the new corporation. A small number of commenters asserted that the U.S. Government should continue to manage Internet names and addresses. Another small number of commenters suggested that DNS should be managed by international governmental institutions such as the United Nations or the International Telecommunications Union. Many commenters urged the U.S. Government to commit to a more aggressive timeline for the new corporation's assumption of management responsibility. Some commenters also suggested that the proposal to headquarter the new corporation in the United States represented an inappropriate attempt to impose U.S. law on the Internet as a whole.

Response: The U.S. Government is committed to a transition that will allow the private sector to take leadership for DNS management. Most commenters shared this goal. While international organizations may provide specific expertise or act as advisors to the new corporation, the U.S. continues to believe, as do most commenters, that neither national governments acting as sovereigns nor intergovernmental organizations acting as representatives of governments should participate in management of Internet names and addresses. Of course, national governments now have, and will continue to have, authority to manage or establish policy for their own ccTLDs.

The U.S. Government would prefer that this transition be complete before the year 2000. To the extent that the new corporation is established and operationally stable, September 30, 2000 is intended to be, and remains, an "outside" date.

IANA has functioned as a government contractor, albeit with considerable latitude, for some time now. Moreover, IANA is not formally organized or constituted. It describes a function more than an entity, and as such does not currently provide a legal foundation for the new corporation. This is not to say, however, that IANA could not be reconstituted by a broad-based, representative group of Internet stakeholders or that individuals associated with IANA should not themselves play important foundation roles in the formation of the new corporation. We believe, and many commenters also suggested, that the private sector

organizers will want Dr. Postel and other IANA staff to be involved in the creation of the new corporation.

Because of the significant U.S.-based DNS expertise and in order to preserve stability, it makes sense to headquarter the new corporation in the United States. Further, the mere fact that the new corporation would be incorporated in the United States would not remove it from the jurisdiction of other nations. Finally, we note that the new corporation must be headquartered somewhere, and similar objections would inevitably arise if it were incorporated in another location.

5. Structure of the New Corporation. The Green Paper proposed a 15-member Board, consisting of three representatives of regional number registries, two members designated by the Internet Architecture Board (IAB), two members representing domain name registries and domain name registrars, seven members representing Internet users, and the Chief Executive Officer of the new corporation.

Comments: Commenters expressed a variety of positions on the composition of the Board of Directors for the new corporation. In general, however, most commenters supported the establishment of a Board of Directors that would be representative of the functional and geographic diversity of the Internet. For the most part, commenters agreed that the groups listed in the Green Paper included individuals and entities likely to be materially affected by changes in DNS. Most of those who criticized the proposed allocation of Board seats called for increased representation of their particular interest group on the Board of Directors. Specifically, a number of commenters suggested that the allocation set forth in the Green Paper did not adequately reflect the special interests of (1) trademark holders, (2) Internet service providers, or (3) the not-for-profit community. Others commented that the Green Paper did not adequately ensure that the Board would be globally representative.

Response: The Green Paper attempted to describe a manageably sized Board of Directors that reflected the diversity of the Internet. It is probably impossible to allocate Board seats in a way that satisfies all parties concerned. On balance, we believe the concerns raised about the representation of specific groups are best addressed by a thoughtful allocation of the "user" seats as determined by the organizers of the new corporation and its Board of Directors, as discussed below.

The Green Paper identified several international membership associations and organizations to designate Board members such as APNIC, ARIN, RIPE, and the Internet Architecture Board. We continue to believe that as use of the Internet expands outside the United States, it is increasingly likely that a properly open and transparent DNS management entity will have board members from around the world. Although we do not set any mandatory minimums for global representation, this policy statement is designed to identify global representativeness as an important priority.

6. Registrars and Registries. The Green Paper proposed moving the system for registering second level domains and the management of generic top-level domains into a competitive environment by creating two market-driven businesses, registration of second level domain names and the management of gTLD registries.

a. Competitive Registrars. Comments: Commenters strongly supported establishment of a

competitive registrar system whereby registrars would obtain domain names for customers in any gTLD. Few disagreed with this position. The Green Paper proposed a set of requirements to be imposed by the new corporation on all would-be registrars. Commenters for the most part did not take exception to the proposed criteria, but a number of commenters suggested that it was inappropriate for the United States government to establish them.

Response: In response to the comments received, the U.S. Government believes that the new corporation, rather than the U.S. Government, should establish minimum criteria for registrars that are pro-competitive and provide some measure of stability for Internet users without being so onerous as to prevent entry by would-be domain name registrars from around the world. Accordingly, the proposed criteria are not part of this policy statement.

b. Competitive Registries. Comments: Many commenters voiced strong opposition to the idea of competitive and/or for-profit domain name registries, citing one of several concerns. Some suggested that top level domain names are not, by nature, ever truly generic. As such, they will tend to function as "natural monopolies" and should be regulated as a public trust and operated for the benefit of the Internet community as a whole. Others suggested that even if competition initially exists among various domain name registries, lack of portability in the naming systems would create lock-in and switching costs, making competition unsustainable in the long run. Finally, other commenters suggested that no new registry could compete meaningfully with NSI unless all domain name registries were not-for-profit and/or noncompeting.

Some commenters asserted that an experiment involving the creation of additional for-profit registries would be too risky, and irreversible once undertaken. A related concern raised by commenters addressed the rights that for-profit operators might assert with respect to the information contained in registries they operate. These commenters argued that registries would have inadequate incentives to abide by DNS policies and procedures unless the new corporation could terminate a particular entity's license to operate a registry. For-profit operators, under this line of reasoning, would be more likely to disrupt the Internet by resisting license terminations.

Commenters who supported competitive registries conceded that, in the absence of domain name portability, domain name registries could impose switching costs on users who change domain name registries. They cautioned, however, that it would be premature to conclude that switching costs provide a sufficient basis for precluding the proposed move to competitive domain name registries and cited a number of factors that could protect against registry opportunism. These commenters concluded that the potential benefits to customers from enhanced competition outweighed the risk of such opportunism. The responses to the Green Paper also included public comments on the proposed criteria for registries.

Response: Both sides of this argument have considerable merit. It is possible that additional discussion and information will shed light on this issue, and therefore, as discussed below, the U.S. Government has concluded that the issue should be left for further consideration and final action by the new corporation. The U.S. Government is of the view, however, that competitive systems generally result in greater innovation, consumer choice, and satisfaction in the long run. Moreover, the pressure of competition is likely to be the most effective means of discouraging registries from acting monopolistically. Further, in response to the comments

received, the U.S. government believes that new corporation should establish and implement appropriate criteria for gTLD registries. Accordingly, the proposed criteria are not part of this policy statement.

7. The Creation of New gTLDs. The Green Paper suggested that during the period of transition to the new corporation, the U.S. Government, in cooperation with IANA, would undertake a process to add up to five new gTLDs to the authoritative root. Noting that formation of the new corporation would involve some delay, the Green Paper contemplated new gTLDs in the short term to enhance competition and provide information to the technical community and to policy makers, while offering entities that wished to enter into the registry business an opportunity to begin offering service to customers. The Green Paper, however, noted that ideally the addition of new TLDs would be left to the new corporation.

Comments: The comments evidenced very strong support for limiting government involvement during the transition period on the matter of adding new gTLDs. Specifically, most commenters -- both U.S. and non-U.S.-- suggested that it would be more appropriate for the new, globally representative, corporation to decide these issues once it is up and running. Few believed that speed should outweigh process considerations in this matter. Others warned, however, that relegating this contentious decision to a new and untested entity early in its development could fracture the organization. Others argued that the market for a large or unlimited number of new gTLDs should be opened immediately. They asserted that there are no technical impediments to the addition of a host of gTLDs, and the market will decide which TLDs succeed and which do not. Further, they pointed out that there are no artificial or arbitrary limits in other media on the number of places in which trademark holders must defend against dilution.

Response: The challenge of deciding policy for the addition of new domains will be formidable. We agree with the many commenters who said that the new corporation would be the most appropriate body to make these decisions based on global input. Accordingly, as supported by the preponderance of comments, the U.S. Government will not implement new gTLDs at this time.

At least in the short run, a prudent concern for the stability of the system suggests that expansion of gTLDs proceed at a deliberate and controlled pace to allow for evaluation of the impact of the new gTLDs and well-reasoned evolution of the domain space. New top level domains could be created to enhance competition and to enable the new corporation to evaluate the functioning, in the new environment, of the root server system and the software systems that enable shared registration.

8. The Trademark Dilemma. When a trademark is used as a domain name without the trademark owner's consent, consumers may be misled about the source of the product or service offered on the Internet, and trademark owners may not be able to protect their rights without very expensive litigation. For cyberspace to function as an effective commercial market, businesses must have confidence that their trademarks can be protected. On the other hand, management of the Internet must respond to the needs of the Internet community as a whole, and not trademark owners exclusively. The Green Paper proposed a number of steps to balance the needs of domain name holders with the legitimate concerns of trademark owners in the interest of the Internet community as a whole. The proposals were designed to provide trademark holders with the same rights they have in the physical world, to ensure transparency, and to guarantee a dispute resolution mechanism with resort to a court system.

The Green Paper also noted that trademark holders have expressed concern that domain name registrants in faraway places may be able to infringe their rights with no convenient jurisdiction available in which the trademark owner could enforce a judgment protecting those rights. The Green Paper solicited comments on an arrangement whereby, at the time of registration, registrants would agree to submit a contested domain name to the jurisdiction of the courts where the registry is domiciled, where the registry database is maintained, or where the "A" root server is maintained.

Comments: Commenters largely agreed that domain name registries should maintain up-to-date, readily searchable domain name databases that contain the information necessary to locate a domain name holder. In general commenters did not take specific issue with the database specifications proposed in Appendix 2 of the Green Paper, although some commenters proposed additional requirements. A few commenters noted, however, that privacy issues should be considered in this context.

A number of commenters objected to NSI's current business practice of allowing registrants to use domain names before they have actually paid any registration fees. These commenters pointed out that this practice has encouraged cybersquatters and increased the number of conflicts between domain name holders and trademark holders. They suggested that domain name applicants should be required to pay before a desired domain name becomes available for use.

Most commenters also favored creation of an on-line dispute resolution mechanism to provide inexpensive and efficient alternatives to litigation for resolving disputes between trademark owners and domain name registrants. The Green Paper contemplated that each registry would establish specified minimum dispute resolution procedures, but remain free to establish additional trademark protection and dispute resolution mechanisms. Most commenters did not agree with this approach, favoring instead a uniform approach to resolving trademark/domain name disputes.

Some commenters noted that temporary suspension of a domain name in the event of an objection by a trademark holder within a specified period of time after registration would significantly extend trademark holders' rights beyond what is accorded in the real world. They argued that such a provision would create a de facto waiting period for name use, as holders would need to suspend the use of their name until after the objection window had passed to forestall an interruption in service. Further, they argue that such a system could be used anti-competitively to stall a competitor's entry into the marketplace.

The suggestion that domain name registrants be required to agree at the time of registration to submit disputed domain names to the jurisdiction of specified courts was supported by U.S. trademark holders but drew strong protest from trademark holders and domain name registrants outside the United States. A number of commenters characterized this as an inappropriate attempt to establish U.S. trademark law as the law of the Internet. Others suggested that existing jurisdictional arrangements are satisfactory. They argue that establishing a mechanism whereby the judgment of a court can be enforced absent personal jurisdiction over the infringer would upset the balance between the interests of trademark holders and those of other members of the Internet community.

Response: The U.S. Government will seek international support to call upon the World Intellectual Property Organization (WIPO) to initiate a balanced and transparent process, which includes the participation of trademark holders and members of the Internet community who are not trademark holders, to (1) develop recommendations for a uniform approach to resolving trademark/domain name disputes involving cyberpiracy (as opposed to conflicts between trademark holders with legitimate competing rights), (2) recommend a process for protecting famous trademarks in the generic top level domains, and (3) evaluate the effects, based on studies conducted by independent organizations, such as the National Research Council of the National Academy of Sciences, of adding new gTLDs and related dispute resolution procedures on trademark and intellectual property holders. These findings and recommendations could be submitted to the board of the new corporation for its consideration in conjunction with its development of registry and registrar policy and the creation and introduction of new gTLDs.

In trademark/domain name conflicts, there are issues of jurisdiction over the domain name in controversy and jurisdiction over the legal persons (the trademark holder and the domain name holder). This document does not attempt to resolve questions of personal jurisdiction in trademark/domain name conflicts. The legal issues are numerous, involving contract, conflict of laws, trademark, and other questions. In addition, determining how these various legal principles will be applied to the borderless Internet with an unlimited possibility of factual scenarios will require a great deal of thought and deliberation. Obtaining agreement by the parties that jurisdiction over the domain name will be exercised by an alternative dispute resolution body is likely to be at least somewhat less controversial than agreement that the parties will subject themselves to the personal jurisdiction of a particular national court. Thus, the references to jurisdiction in this policy statement are limited to jurisdiction over the domain name in dispute, and not to the domain name holder.

In order to strike a balance between those commenters who thought that registrars and registries should not themselves be engaged in disputes between trademark owners and domain name holders and those commenters who thought that trademark owners should have access to a reliable and up-to-date database, we believe that a database should be maintained that permits trademark owners to obtain the contact information necessary to protect their trademarks.

Further, it should be clear that whatever dispute resolution mechanism is put in place by the new corporation, that mechanism should be directed toward disputes about cybersquatting and cyberpiracy and not to settling the disputes between two parties with legitimate competing interests in a particular mark. Where legitimate competing rights are concerned, disputes are rightly settled in an appropriate court.

Under the revised plan, we recommend that domain name holders agree to submit infringing domain names to the jurisdiction of a court where the "A" root server is maintained, where the registry is domiciled, where the registry database is maintained, or where the registrar is domiciled. We believe that allowing trademark infringement suits to be brought wherever registrars and registries are located will help ensure that all trademark holders - both U.S. and non-U.S. - have the opportunity to bring suits in a convenient jurisdiction and enforce the judgments of those courts.

Under the revised plan, we also recommend that, whatever options are chosen by the new corporation, each registrar should insist that payment be made for the domain name before it becomes available to the applicant. The failure to make a domain name applicant pay for its use of a domain name has encouraged cyberpirates and is a practice that should end as soon as possible.

9. Competition Concerns.

Comments: Several commenters suggested that the U.S. Government should provide full antitrust immunity or indemnification for the new corporation. Others noted that potential antitrust liability would provide an important safeguard against institutional inflexibility and abuses of power.

Response: Applicable antitrust law will provide accountability to and protection for the international Internet community. Legal challenges and lawsuits can be expected within the normal course of business for any enterprise and the new corporation should anticipate this reality.

The Green Paper envisioned the new corporation as operating on principles similar to those of a standard-setting body. Under this model, due process requirements and other appropriate processes that ensure transparency, equity and fair play in the development of policies or practices would need to be included in the new corporation's originating documents. For example, the new corporation's activities would need to be open to all persons who are directly affected by the entity, with no undue financial barriers to participation or unreasonable restrictions on participation based on technical or other such requirements. Entities and individuals would need to be able to participate by expressing a position and its basis, having that position considered, and appealing if adversely affected. Further, the decision making process would need to reflect a balance of interests and should not be dominated by any single interest category. If the new corporation behaves this way, it should be less vulnerable to antitrust challenges.

10. The NSI Agreement.

Comments: Many commenters expressed concern about continued administration of key gTLDs by NSI. They argued that this would give NSI an unfair advantage in the marketplace and allow NSI to leverage economies of scale across their gTLD operations. Some commenters also believe the Green Paper approach would have entrenched and institutionalized NSI's dominant market position over the key domain name going forward. Further, many commenters expressed doubt that a level playing field between NSI and the new registry market entrants could emerge if NSI retained control over .com, .net, and .org.

Response: The cooperative agreement between NSI and the U.S. Government is currently in its ramp down period. The U.S. Government and NSI will shortly commence discussions about the terms and conditions governing the ramp-down of the cooperative agreement. Through these discussions, the U.S. Government expects NSI to agree to take specific actions, including commitments as to pricing and equal access, designed to permit the development of

competition in domain name registration and to approximate what would be expected in the presence of marketplace competition. The U.S. Government expects NSI to agree to act in a manner consistent with this policy statement, including recognizing the role of the new corporation to establish and implement DNS policy and to establish terms (including licensing terms) applicable to new and existing gTLD registries under which registries, registrars and gTLDs are permitted to operate. Further, the U.S. Government expects NSI to agree to make available on an ongoing basis appropriate databases, software, documentation thereof, technical expertise, and other intellectual property for DNS management and shared registration of domain names.

11. A Global Perspective

Comments: A number of commenters expressed concern that the Green Paper did not go far enough in globalizing the administration of the domain name system. Some believed that international organizations should have a role in administering the DNS. Others complained that incorporating the new corporation in the United States would entrench control over the Internet with the U.S. Government. Still others believed that the awarding by the U.S. Government of up to five new gTLDs would enforce the existing dominance of U.S. entities over the gTLD system.

Response: The U.S. Government believes that the Internet is a global medium and that its technical management should fully reflect the global diversity of Internet users. We recognize the need for and fully support mechanisms that would ensure international input into the management of the domain name system. In withdrawing the U.S. Government from DNS management and promoting the establishment of a new, non-governmental entity to manage Internet names and addresses, a key U.S. Government objective has been to ensure that the increasingly global Internet user community has a voice in decisions affecting the Internet's technical management.

We believe this process has reflected our commitment. Many of the comments on the Green Paper were filed by foreign entities, including governments. Our dialogue has been open to all Internet users - foreign and domestic, government and private - during this process, and we will continue to consult with the international community as we begin to implement the transition plan outlined in this paper.

12. The Intellectual Infrastructure Fund.

In 1995, NSF authorized NSI to assess domain name registrants a $50 fee per year for the first two years, 30 percent of which was to be deposited in the Intellectual Infrastructure Fund (IIF), a fund to be used for the preservation and enhancement of the intellectual infrastructure of the Internet.

Comments: Very few comments referenced the IIF. In general, the comments received on the issue supported either refunding the IIF portion of the domain name registration fee to domain registrants from whom it had been collected or applying the funds toward Internet infrastructure development projects generally, including funding the establishment of the new corporation.

Response: As proposed in the Green Paper, allocation of a portion of domain name registration fees to this fund terminated as of March 31, 1998. NSI has reduced its registration fees accordingly. The IIF remains the subject of litigation. The U.S. Government takes the position that its collection has recently been ratified by the U.S. Congress,(19)

and has moved to dismiss the claim that it was unlawfully collected. This matter has not been finally resolved, however.

13. The .us Domain.

At present, the IANA administers .us as a locality-based hierarchy in which second-level domain space is allocated to states and U.S. territories.(20) This name space is further subdivided into localities. General registration under localities is performed on an exclusive basis by private firms that have requested delegation from IANA. The .us name space has typically been used by branches of state and local governments, although some commercial names have been assigned. Where registration for a locality has not been delegated, the IANA itself serves as the registrar.

Comments: Many commenters suggested that the pressure for unique identifiers in the .com gTLD could be relieved if commercial use of the .us space was encouraged. Commercial users and trademark holders, however, find the current locality-based system too cumbersome and complicated for commercial use. They called for expanded use of the .us TLD to alleviate some of the pressure for new generic TLDs and reduce conflicts between American companies and others vying for the same domain name. Most commenters support an evolution of the .us domain designed to make this name space more attractive to commercial users.

Response: Clearly, there is much opportunity for enhancing the .us domain space, and .us could be expanded in many ways without displacing the current structure. Over the next few months, the U.S. Government will work with the private sector and state and local governments to determine how best to make the .us domain more attractive to commercial users. Accordingly, the Department of Commerce will seek public input on this important issue.

ADMINISTRATIVE LAW REQUIREMENTS:

On February 20, 1998, NTIA published for public comment a proposed rule regarding the domain name registration system. That proposed rule sought comment on substantive regulatory provisions, including but not limited to a variety of specific requirements for the membership of the new corporation, the creation during a transition period of a specified number of new generic top level domains and minimum dispute resolution and other procedures related to trademarks. As discussed elsewhere in this document, in response to public comment these aspects of the original proposal have been eliminated. In light of the public comment and the changes to the proposal made as a result, as well as the continued rapid technological development of the Internet, the Department of Commerce has determined that it should issue a general statement of policy, rather than define or impose a substantive regulatory regime for the domain name system. As such, this policy statement is not a

substantive rule, does not contain mandatory provisions and does not itself have the force and effect of law.

The Assistant General Counsel for Legislation and Regulation, Department of Commerce, certified to the Chief Counsel for Advocacy, Small Business Administration, that, for purposes of the Regulatory Flexibility Act, 5 U.S.C. §§ 601 et seq., the proposed rule on this matter, if adopted, would not have a significant economic impact on a substantial number of small entities. The factual basis for this certification was published along with the proposed rule. No comments were received regarding this certification. As such, and because this final rule is a general statement of policy, no final regulatory flexibility analysis has been prepared.

This general statement of policy does not contain any reporting or record keeping requirements subject to the Paperwork Reduction Act, 44 U.S.C. ch. 35 (PRA). However, at the time the U.S. Government might seek to enter into agreements as described in this policy statement, a determination will be made as to whether any reporting or record keeping requirements subject to the PRA are being implemented. If so, the NTIA will, at that time, seek approval under the PRA for such requirement(s) from the Office of Management and Budget.

This statement has been determined to be not significant for purposes of Office of Management and Budget review under Executive Order 12866, entitled Regulatory Planning and Review.

REVISED POLICY STATEMENT:

This document provides the U.S. Government's policy regarding the privatization of the domain name system in a manner that allows for the development of robust competition and that facilitates global participation in the management of Internet names and addresses.

The policy that follows does not propose a monolithic structure for Internet governance. We doubt that the Internet should be governed by one plan or one body or even by a series of plans and bodies. Rather, we seek a stable process to address the narrow issues of management and administration of Internet names and numbers on an ongoing basis.

As set out below, the U.S. Government is prepared to recognize, by entering into agreement with, and to seek international support for, a new, not-for-profit corporation formed by private sector Internet stakeholders to administer policy for the Internet name and address system. Under such agreement(s) or understanding(s), the new corporation would undertake various responsibilities for the administration of the domain name system now performed by or on behalf of the U.S. Government or by third parties under arrangements or agreements with the U.S. Government. The U.S. Government would also ensure that the new corporation has appropriate access to needed databases and software developed under those agreements.

The Coordinated Functions

Management of number addresses is best done on a coordinated basis. Internet numbers are a unique, and at least currently, a limited resource. As technology evolves, changes may be

needed in the number allocation system. These changes should also be coordinated.

Similarly, coordination of the root server network is necessary if the whole system is to work smoothly. While day-to-day operational tasks, such as the actual operation and maintenance of the Internet root servers, can be dispersed, overall policy guidance and control of the TLDs and the Internet root server system should be vested in a single organization that is representative of Internet users around the globe.

Further, changes made in the administration or the number of gTLDs contained in the authoritative root system will have considerable impact on Internet users throughout the world. In order to promote continuity and reasonable predictability in functions related to the root zone, the development of policies for the addition, allocation, and management of gTLDs and the establishment of domain name registries and domain name registrars to host gTLDs should be coordinated.

Finally, coordinated maintenance and dissemination of the protocol parameters for Internet addressing will best preserve the stability and interconnectivity of the Internet. We are not, however, proposing to expand the functional responsibilities of the new corporation beyond those exercised by IANA currently.

In order to facilitate the needed coordination, Internet stakeholders are invited to work together to form a new, private, not-for-profit corporation to manage DNS functions. The following discussion reflects current U.S. Government views of the characteristics of an appropriate management entity. What follows is designed to describe the characteristics of an appropriate entity generally.

Principles for a New System. In making a decision to enter into an agreement to establish a process to transfer current U.S. government management of DNS to such a new entity, the U.S. will be guided by, and consider the proposed entity's commitment to, the following principles:

The U.S. Government should end its role in the Internet number and name address system in a manner that ensures the stability of the Internet. The introduction of a new management system should not disrupt current operations or create competing root systems. During the transition and thereafter, the stability of the Internet should be the first priority of any DNS management system. Security and reliability of the DNS are important aspects of stability, and as a new DNS management system is introduced, a comprehensive security strategy should be developed.

2. Competition.

The Internet succeeds in great measure because it is a decentralized system that encourages innovation and maximizes individual freedom. Where possible, market mechanisms that support competition and consumer choice should drive the management of the Internet because they will lower costs, promote innovation, encourage diversity, and enhance user choice and satisfaction.

3. Private, Bottom-Up Coordination.

Certain management functions require coordination. In these cases, responsible, private-sector action is preferable to government control. A private coordinating process is likely to be more flexible than government and to move rapidly enough to meet the changing needs of the Internet and of Internet users. The private process should, as far as possible, reflect the bottom-up governance that has characterized development of the Internet to date.

4. Representation.

The new corporation should operate as a private entity for the benefit of the Internet community as a whole. The development of sound, fair, and widely accepted policies for the management of DNS will depend on input from the broad and growing community of Internet users. Management structures should reflect the functional and geographic diversity of the Internet and its users. Mechanisms should be established to ensure international participation in decision making.

- 1. Stability

Purpose. The new corporation ultimately should have the authority to manage and perform a specific set of functions related to coordination of the domain name system, including the authority necessary to:

2) oversee operation of the authoritative Internet root server system;

3) oversee policy for determining the circumstances under which new TLDs are added to the root system; and

4) coordinate the assignment of other Internet technical parameters as needed to maintain universal connectivity on the Internet.

- 1) set policy for and direct allocation of IP number blocks to regional Internet number registries;

Funding. Once established, the new corporation could be funded by domain name registries, regional IP registries, or other entities identified by the Board.

Staff. We anticipate that the new corporation would want to make arrangements with current IANA staff to provide continuity and expertise over the course of transition. The new corporation should secure necessary expertise to bring rigorous management to the organization.

Incorporation. We anticipate that the new corporation's organizers will include representatives of regional Internet number registries, Internet engineers and computer scientists, domain name registries, domain name registrars, commercial and noncommercial users, Internet service providers, international trademark holders and Internet experts highly respected throughout the international Internet community. These incorporators should include substantial representation from around the world.

As these functions are now performed in the United States, by U.S. residents, and to ensure stability, the new corporation should be headquartered in the United States, and incorporated in the U.S. as a not-for-profit corporation. It should, however, have a board of directors from around the world. Moreover, incorporation in the United States is not intended to supplant or displace the laws of other countries where applicable.

Structure. The Internet community is already global and diverse and likely to become more so over time. The organization and its board should derive legitimacy from the participation of key stakeholders. Since the organization will be concerned mainly with numbers, names and protocols, its board should represent membership organizations in each of these areas, as well as the direct interests of Internet users.

The Board of Directors for the new corporation should be balanced to equitably represent the interests of IP number registries, domain name registries, domain name registrars, the technical community, Internet service providers (ISPs), and Internet users (commercial, not-for-profit, and individuals) from around the world. Since these constituencies are international, we would expect the board of directors to be broadly representative of the global Internet community.

As outlined in appropriate organizational documents, (Charter, Bylaws, etc.) the new corporation should:

2) direct the Interim Board to establish a system for electing a Board of Directors for the new corporation that insures that the new corporation's Board of Directors reflects the geographical and functional diversity of the Internet, and is sufficiently flexible to permit evolution to reflect changes in the constituency of Internet stakeholders. Nominations to the Board of Directors should preserve, as much as possible, the tradition of bottom-up governance of the Internet, and Board Members should be elected from membership or other associations open to all or through other mechanisms that ensure broad representation and participation in the election process.

3) direct the Interim Board to develop policies for the addition of TLDs, and establish the qualifications for domain name registries and domain name registrars within the system.

4) restrict official government representation on the Board of Directors without precluding governments and intergovernmental organizations from participating as Internet users or in a non-voting advisory capacity.

- 1) appoint, on an interim basis, an initial Board of Directors (an Interim Board) consisting of individuals representing the functional and geographic diversity of the

Internet community. The Interim Board would likely need access to legal counsel with expertise in corporate law, competition law, intellectual property law, and emerging Internet law. The Interim Board could serve for a fixed period, until the Board of Directors is elected and installed, and we anticipate that members of the Interim Board would not themselves serve on the Board of Directors of the new corporation for a fixed period thereafter.

Governance. The organizing documents (Charter, Bylaws, etc.) should provide that the new corporation is governed on the basis of a sound and transparent decision-making process, which protects against capture by a self-interested faction, and which provides for robust, professional management of the new corporation. The new corporation could rely on separate, diverse, and robust name and number councils responsible for developing, reviewing, and recommending for the board's approval policy related to matters within each council's competence. Such councils, if developed, should also abide by rules and decision-making processes that are sound, transparent, protect against capture by a self-interested party and provide an open process for the presentation of petitions for consideration. The elected Board of Directors, however, should have final authority to approve or reject policies recommended by the councils.

Operations. The new corporation's processes should be fair, open and pro-competitive, protecting against capture by a narrow group of stakeholders. Typically this means that decision-making processes should be sound and transparent; the basis for corporate decisions should be recorded and made publicly available. Super-majority or even consensus requirements may be useful to protect against capture by a self-interested faction. The new corporation does not need any special grant of immunity from the antitrust laws so long as its policies and practices are reasonably based on, and no broader than necessary to promote the legitimate coordinating objectives of the new corporation. Finally, the commercial importance of the Internet necessitates that the operation of the DNS system, and the operation of the authoritative root server system should be secure, stable, and robust.

The new corporation's charter should provide a mechanism whereby its governing body will evolve to reflect changes in the constituency of Internet stakeholders. The new corporation could, for example, establish an open process for the presentation of petitions to expand board representation.

Trademark Issues. Trademark holders and domain name registrants and others should have access to searchable databases of registered domain names that provide information necessary to contact a domain name registrant when a conflict arises between a trademark holder and a domain name holder.(21) To this end, we anticipate that the policies established by the new corporation would provide that following information would be included in all registry databases and available to anyone with access to the Internet:

- up-to-date and historical chain of registration information for the domain name;

- a mail address for service of process;

- the date of domain name registration;

- the date that any objection to the registration of the domain name is filed; and

- any other information determined by the new corporation to be reasonably necessary to resolve disputes between domain name registrants and trademark holders expeditiously.

- - up-to-date registration and contact information;

Further, the U.S. Government recommends that the new corporation adopt policies whereby:

2) Domain name registrants would agree, at the time of registration or renewal, that in cases involving cyberpiracy or cybersquatting (as opposed to conflicts between legitimate competing rights holders), they would submit to and be bound by alternative dispute resolution systems identified by the new corporation for the purpose of resolving those conflicts. Registries and Registrars should be required to abide by decisions of the ADR system.

3) Domain name registrants would agree, at the time of registration or renewal, to abide by processes adopted by the new corporation that exclude, either pro-actively or retroactively, certain famous trademarks from being used as domain names (in one or more TLDs) except by the designated trademark holder.

4) Nothing in the domain name registration agreement or in the operation of the new corporation should limit the rights that can be asserted by a domain name registrant or trademark owner under national laws.

- 1) Domain registrants pay registration fees at the time of registration or renewal and agree to submit infringing domain names to the authority of a court of law in the jurisdiction in which the registry, registry database, registrar, or the "A" root servers are located.

THE TRANSITION

Based on the processes described above, the U.S. Government believes that certain actions should be taken to accomplish the objectives set forth above. Some of these steps must be taken by the government itself, while others will need to be taken by the private sector. For example, a new not-for-profit organization must be established by the private sector and its Interim Board chosen. Agreement must be reached between the U.S. Government and the new corporation relating to transfer of the functions currently performed by IANA. NSI and the U.S. Government must reach agreement on the terms and conditions of NSI's evolution into one competitor among many in the registrar and registry marketplaces. A process must be laid out for making the management of the root server system more robust and secure. A relationship between the U.S. Government and the new corporation must be developed to

transition DNS management to the private sector and to transfer management functions.

During the transition the U.S. Government expects to:

2) enter into agreement with the new corporation under which it assumes responsibility for management of the domain name space;

3) ask WIPO to convene an international process including individuals from the private sector and government to develop a set of recommendations for trademark/domain name dispute resolutions and other issues to be presented to the Interim Board for its consideration as soon as possible;

4) consult with the international community, including other interested governments as it makes decisions on the transfer; and

5) undertake, in cooperation with IANA, NSI, the IAB, and other relevant organizations from the public and private sector, a review of the root server system to recommend means to increase the security and professional management of the system. The recommendations of the study should be implemented as part of the transition process; and the new corporation should develop a comprehensive security strategy for DNS management and operations.

- 1) ramp down the cooperative agreement with NSI with the objective of introducing competition into the domain name space. Under the ramp down agreement NSI will agree to (a) take specific actions, including commitments as to pricing and equal access, designed to permit the development of competition in domain name registration and to approximate what would be expected in the presence of marketplace competition, (b) recognize the role of the new corporation to establish and implement DNS policy and to establish terms (including licensing terms) applicable to new and existing gTLDs and registries under which registries, registrars and gTLDs are permitted to operate, (c) make available on an ongoing basis appropriate databases, software, documentation thereof, technical expertise, and other intellectual property for DNS management and shared registration of domain names;

ENDNOTES

1. Available at <http://www.ecommerce.gov>.

2. July 2, 1997 RFC and public comments are located at: <http://www.ntia.doc.gov/ntiahome/domainname/index.html>.

3. [3]The RFC, the Green Paper, and comments received in response to both documents are available on the Internet

at the following address: <http://www.ntia.doc.gov>. Additional comments were submitted after March 23, 1998. These comments have been considered and treated as part of the official record and have been separately posted at the same site, although the comments were not received by the deadline established in the February 20, 1998 Federal Register Notice.

4. See Administrative Law Requirements at p. 19.

5. See Scientific and Advanced-Technology Act of 1992; Pub. L. 102-476 § 4(9), 106 Stat. 2297, 2300 (codified at 42 U.S.C. § 1862 (a)).

6. An unofficial diagram of the general geographic location and institutional affiliations of the 13 Internet root servers, prepared by Anthony Rutkowski, is available at <http://www.wia.org/pub/rootserv.html>.

7. For further information about these systems see: name.space: <http://namespace.pgmedia.net>; AlterNIC: <http://www.alternic.net>; eDNS: <http://www.edns.net>. Reference to these organizations does not constitute an endorsement of their commercial activities.

8. Lengthy discussions by the Internet technical community on DNS issues generally and on the Postel DNS proposal took place on the *newdom*, *com-priv*, *ietf* and *domain-policy* Internet mailing lists.

9. [9] See *draft-Postel-iana-itld-admin-01.txt*; available at <http://www.newdom.com/archive>.

10. For further information about the IAHC see: <http://www.iahc.org> and related links. Reference to this organization does not constitute an endorsement of the commercial activities of its related organizations.

11. December 1996 draft: *draft-iahc-gtldspec-00.txt*; available at <http://info.internet.isi.edu:80/in-drafts/files>.

12. The IAHC final report is available at <http://www.iahc.org/draft-iahc-recommend-00.html>.

13. See generally public comments received in response to July 2, 1997 RFC located at <http://www.ntia.doc.gov/ntiahome/domainname/email>.

14. For a discussion, see Congressional testimony of Assistant Secretary of Commerce Larry Irving, Before the House Committee on Science, Subcommittee on Basic Research, September 25, 1997 available at <http://www.ntia.doc.gov/ntiahome/domainname/email>.

15. See generally public comments received in response to July 2, 1997 RFC located at <http://www.ntia.doc.gov/ntiahome/domainname/email>.

16. [16]The document was published in the *Federal Register* on February 20, 1998, (63 Fed. Reg. 8826 (Feb. 20, 1998)).

17. As used herein, the term "new corporation" is intended to refer to an entity formally organized under well recognized and established business law standards.

18. As noted in the Summary, the President directed the Secretary of Commerce to privatize DNS in a manner that increases competition and facilitates international participation in its management. Accordingly, the Department of Commerce will lead the coordination of the U.S. government's role in this transition.

19. 1998 Supplemental Appropriations and Rescissions Act; Pub. L. 105-174; 112 Stat. 58.

20. [20] Management principles for the .us domain space are set forth in Internet RFC 1480, (http://www.isi.edu/in-notes/rfc1480.txt).

21. These databases would also benefit domain name holders by making it less expensive for new registrars and

registries to identify potential customers, enhancing competition and lowering prices.

National Telecommunications and Information Administration
1401 Constitution Ave., NW Washington, DC 20230

Links
[1] https://www.ntia.doc.gov/category/domain-name-system
[2] mailto Contact Information Redacted

EXHIBIT GS-8

GS-8

CNNMoney.com

VeriSign buys domain firm March 7, 2000: 8:16 a.m. ET

Proposed $21B deal will link Network Solutions with Internet security leader

NEW YORK (CNNfn) - VeriSign Inc. agreed to acquire Network Solutions Inc. for $21 billion in stock Tuesday, creating an online powerhouse that can shepherd companies onto the Internet and help them establish and maintain their e-commerce identity.

The surprise deal unites the world's leading provider of Internet domain name registrations, Network Solutions, with the nation's leading provider of e-commerce and e-mail security, creating a company that will begin with more than 12 million worldwide subscribers.

"It's a surprise deal but a phenomenal deal," said Paul Merenbloom, an analyst with Prudential Securities Inc. "This is ying and yang coming together for e-business solutions."

"You've got the leading provider of domain names and the leading provider of Internet security. If you can put those together in a fenceable business -- by that I mean the ability to create a seamless link of operations -- what's not to like?"

A hefty premium for a pricey stock

Still, despite some obvious synergies, other analysts and investors weren't quite so enthusiastic.

While conceding that VeriSign stands to gain invaluable access to Network Solutions' 8.1-million-member subscriber base, which it can then leverage to sell their other products, Merrill Lynch analyst Mark Fernandes said there are lingering questions as to whether VeriSign could have accomplished the goal for less money by establishing a partnership instead.

"That's the million dollar question," he said. "Can Network Solutions bring enough opportunity to justify this $21 billion valuation?"

VeriSign spokesman Richard Yanowitch said his company considered simply maintaining its current partnership with Network Solutions, but ultimately determined an outright acquisition was best.

"We now have the opportunity to take a customer from the moment they come onto the Internet all the way through the e-commerce phase," he said. "The notion of creating a single set of services working with a single set of customers become much more attractive than a partnership."

The agreement calls for Mountain View, Calif.-based VeriSign to issue 2.15 of its shares for each share of Network Solutions stock of record, prior to a planned 2-for-1 split scheduled for March 10.

Based on VeriSign's closing price of 247-7/16 Monday, the deal represented a nearly 48 percent premium for Network Solutions shareholders at the time of the announcement.

However, by mid-afternoon VeriSign (VRSN: Research, Estimates) had shed more than 16 percent of its value, falling 40-9/16 to 206-7/8, lowering the total deal price to roughly $17.9 billion.

"It's a big chunk of news," Yanowitch said. "The market will digest it and we feel confident the market will find its way."

Meanwhile, stock in Network Solutions (NSOL: Research, Estimates) climbed as much 76-3/4 before settling in at 416-1/2, up 55-7/8.

At that level, Network Solutions shares have now appreciated nearly 700 percent since

last August.

Looking for leverage opportunities

Still, company officials said the combination of Network Solutions subscriber base and massive Internet infrastructure would provide VeriSign's e-commerce efforts a significant boost, particularly as they look to move beyond the business of providing digital certificate services for companies to more B2B applications.

"With one of the largest subscriber bases on the Internet, VeriSign and Network Solutions will have the scale and range of services to take e-commerce to the next level," said Stratton Sclavos, chief executive officer of VeriSign. "Our combined company will serve as the trust utility that will power the Internet economy."

But analysts said the addition of Network Solutions would only strengthen the front end of their business line that is bringing companies onto the Internet. VeriSign's main competitors, Entrust Technologies Inc. and Baltimore Technologies Inc., should still maintain their advantage linking companies to other companies or their suppliers, they said.

"I can understand why the market is reacting the way it is," said Sean Jackson, an analyst with SunTrust Equitable Securities. "On the surface, the deal looks strategic."

"But VeriSign already sort of owns that front end of the business. This sort of helps them strengthen it and keep it. But I don't know if it helps them much on the back end."

VeriSign in acquisition mode

The deal continues VeriSign's recent acquisitive run. Just three months ago, the company paid more than $1.3 billion to acquire two Internet payment services firms. Analysts said the company was looking to buy its way into the domain registration business, but ultimately decided it would be better to purchase the industry's leading registrant instead.

VeriSign did not have to look very far to find Network Solutions. The two companies have a long history together, including several working relationships. In addition, Sclavos has held a seat on Network Solutions' board since it went public in 1997.

VeriSign intends to operate Network Solutions as an independent subsidiary run by its current CEO, Jim Rutt. The companies hope to complete the deal during the third quarter.

Christopher Clough, a Network Solutions spokesman, said the Herndon, Va.-based company will continue to operate primarily as a domain registration firm, but will work with VeriSign to leverage other aspects of their business as well.

For example, the company plans to use Network Solutions' massive subscriber lists to help supply buyer and supplier credentials for B2B exchanges and to complement VeriSign's various service-oriented businesses.

Network Solutions' long and winding road

Until last fall, Network Solutions had been the exclusive provider of domain-name registration services under a contract it had with the U.S. Commerce Department.

In an agreement reached in November with the Internet Corporation for Assigned Names and Numbers, or ICANN, a non-profit oversight group, Network Solutions opened up the Internet domain-name registration business to competition.

Currently, more than 90 companies are accredited to provide Internet domain names, but Network Solutions still controls the lion's share of that business from which it derives most of its revenues.

ICANN's board members were attending the organization's annual meeting in Egypt Tuesday and were not immediately available for comment.

Meanwhile, VeriSign's clientele list already includes such leading companies as Bank of

America (BAC: Research, Estimates), Ford Motor Co. (F: Research, Estimates) and Texas Instruments (TXN: Research, Estimates). The company also maintains working relationships with Microsoft Corp. (MSFT: Research, Estimates), IBM Corp. (IBM: Research, Estimates) and American Express (AXP: Research, Estimates).

Find this article at:
https://money.cnn.com/2000/03/07/deals/verisign

Check the box to include the list of links referenced in the article.

EXHIBIT GS-9

VeriSign transfers control of .org

BY PAUL FESTA | JANUARY 2, 2003 12:17 PM PST

VeriSign on Thursday relinquished its authority over the .org top-level domain to the Public Interest Registry (PIR), a group set up by the nonprofit Internet Society (ISOC) to administer .org. The .org domain is the Internet's fifth-largest top-level domain, with 2.4 million names registered, and is meant for use by noncommercial organizations.

PIR in October won responsibility for .org, which VeriSign gave up in exchange for the right to maintain the more lucrative .com domain. PIR announced a 25-day "phase-in period" during which VeriSign will still manage the back-end technical duties for .org. Afilias will assume those duties Jan. 25.

EXHIBIT GS-10

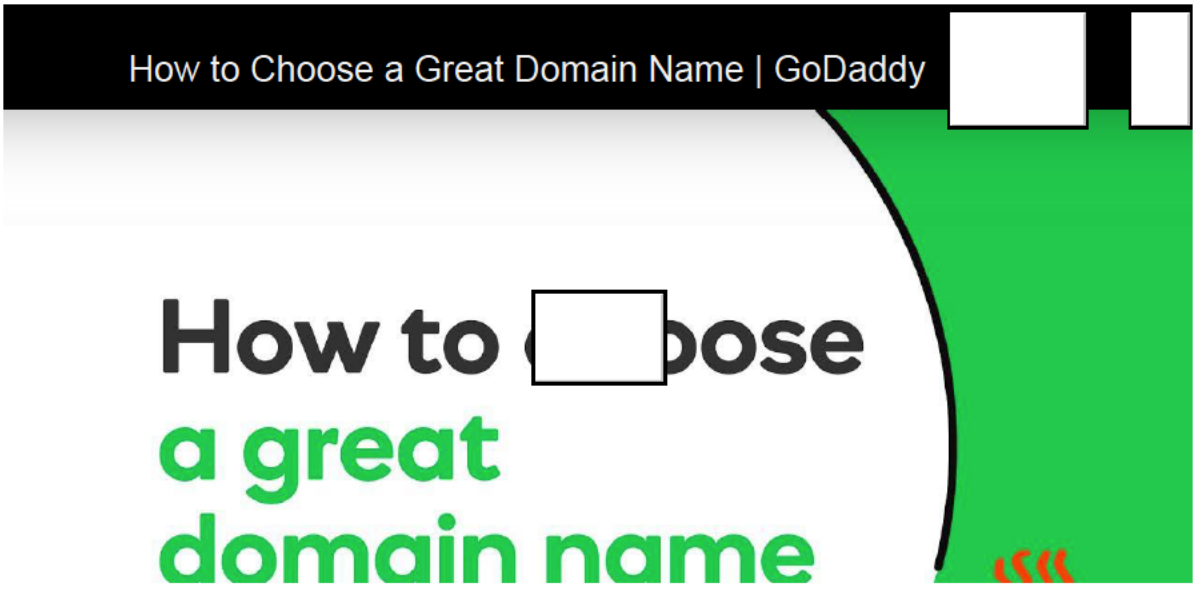
Home

10 tips for choosing the perfect domain name

By Andrea Rowland November 5, 2018

This article was originally published on Sept. 16, 2015, and was updated on Nov. 5, 2018.

Choosing a domain name is similar to choosing a company name — it requires a lot of thought and consideration. Your domain name is your identity on the web; you want to make sure you choose a domain name that not only fits your business, but is also easy to find and promote.



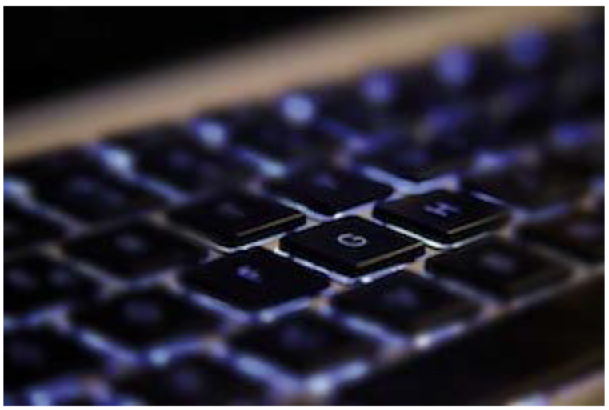
10 tips for choosing the perfect domain name

1. **Make it easy to type.**
2. **Keep it short.**
3. **Use keywords.**
4. **Target your area.**
5. **Avoid numbers and hyphens.**
6. **Be memorable.**
7. **Research it.**
8. **Use an appropriate domain name extension.**
9. **Protect and build your brand.**
10. **Act fast.**

Follow the steps below to help you pick the perfect domain name. And if you want to learn even more about choosing a domain name, check out "Claim your domain and make a statement online" for in-depth domain name tips and tricks.

1. Make it easy to type

Finding a domain name that's easy to type is critical to online success. If you use slang (u instead of you) or words with multiple spellings (express vs. xpress), it might be harder for customers to find your site.



Related: Avoid these stinky domain naming mistakes

2. Keep it short

If your domain name is long and complex, you risk customers mistyping or misspelling it. Short and simple is the way to go.

Related: Need an online name for your business? Check out these domain name examples.

3. Use keywords

Try using keywords that describe your business and the services you offer. For example, if you're a glass replacement business, you may want to register GlassRepair.com or GlassReplacement.com.

> Include the keywords that people enter when searching for your products or services.

It helps improve your rank on search engines (which increases traffic) and just makes more sense to your customers.

Related: Domain SEO — Can including keywords in a domain name improve search ranking?

4. Target your area

If your business is local, consider including your city or state in your domain name to make it easy for local customers to find and remember. Example: PhoenixGlassRepair.com.

Editor's note: From **.boston** to **.vegas**, you're likely to find a geographic domain extension that suits your business.

5. Avoid numbers and hyphens

Numbers and hyphens are often misunderstood — people who hear your website address don't know if you're using a numeral (5) or it's spelled out (five) or they misplace or forget the dash. If you need these in your domain, register the different variations to be safe.

Related: Why getting a domain name is a startup essential — and how to do it right

6. Be memorable

There are millions of registered domain names, so having a domain that's catchy and memorable is essential. Once you've come up with a name, share it with close friends to make sure it sounds appealing and makes sense to others.

Quick solution: Got a great idea for a domain? Register your name today and put a website out there before someone else beats you to it.

7. Research it

Make sure the name you've selected isn't trademarked, copyrighted or being used by another company. It could result in a huge legal mess that could cost you a fortune, as well as your domain!

> Don't forget to research the value of your possible domain.

As the largest reseller of aftermarket domain names, GoDaddy has access to extensive data that we use to analyze millions of historical domain sales. Try out GoDaddy Domain Appraisals to determine the value of your domain, so your can name your business with purpose.

8. Use an appropriate domain name extension

Extensions are suffixes, such as .com or .net, at the end of web addresses. These can have specific uses, so make sure to choose one that works for your business. The .com domain extension is far and away the most popular, but it can be tough to get a short and memorable .com domain name because it's been around for so long.

A bevy of new generic top-level domains — like .photography, .nyc and .guru — offer a great opportunity to register short and highly relevant names. And here are some other top extensions and how they're often used:

- .co : an abbreviation for company, commerce, and community.
- .info : informational sites.
- .net : technical, Internet infrastructure sites.
- .org : non-commercial organizations and nonprofits.
- .biz : business or commercial use, like e-commerce sites.
- .me : blogs, resumes or personal sites.

Pro tip: You don't need to build a website for every domain. Just forward any additional domains to your primary website.

Related: What are the 5 most common domain extensions?

9. Protect and build your brand

To protect your brand, you should purchase various domain extensions, as well as misspelled versions of your domain name. This prevents competitors from registering other versions and ensures your customers are directed to your website, even if they mistype it.

Related: Using multiple custom domains to control your online identity

10. Act fast

Domain names sell quickly. Thankfully, many domain names are also inexpensive, so register your favorite domain names as soon as possible. If you're having trouble finding an available name, domain registrars like GoDaddy will suggest alternate names during your domain search to help you find the perfect domain name.

EXHIBIT GS-11

Apr 10, 2017, 02:03pm

8 Smart Tips For Choosing A Winning Domain Name

Denis Pinsky
Forbes Staff
eCommerce, Web Analytics, Web Visibility, Website Optimization, SEO

Choose domain name that wins. HTTP://WEBFIA.COM/DOMAIN/

Forbes • Webfia • LinkedIn

Updated: Perfecting Your Domain Name

Many business owners mistakenly think of a domain name as just an address for their website. But as Rand Fishkin over at Moz recently explained, it's so much more than that.

Consequently, there are a number of factors you should seriously consider when brainstorming domain name ideas. Below, we give you a quick rundown of 8 tips for selecting a great domain name. You'll be able to nail one that's smart and effective by

sticking to these simple guidelines.

1. Be brandable

Your domain name is the face of your company—in the form of a URL. Therefore, you should make sure it actually sounds like a brand.

So, how do you do that? With simplicity, novelty, and memorability. Avoid inserting hyphens, numbers, or anything else that makes it sound unnatural and complicated. A great example is Pepsi.com. That domain name is leagues beyond inferior options like "Pepsi-cola.com" or "Pepsi-2-drink.com".

2. Make it pronounceable

This tip is closely related to our first bit of advice. Even though users aren't likely to be saying your domain name out loud, pronounceability is still important. This is because of something called processing fluency: the ease with which our brains can process information. Names that don't require a person to think too hard are usually the easiest to remember, and also more likely to inspire positive associations.

"If you have to spell it over the phone, you've lost." says Jason Calacanis, the serial entrepreneur and angel investor behind tech giants like Uber, the Launch Festival, and This Week in Startups.

When people routinely misspell your domain name because it's too hard to figure out, all of that potential traffic is lost. Most people will give up searching for your brand's site quickly; they don't have the time or desire to try multiple Google searches of possible spellings.

The lesson here is simple: make it easy for your customers to find you!

3. Keep it short, but not too short

Shortness can help keep a domain name simple and memorable, but going too short can have the opposite effect. Compare "PastaScience.com" to "PastaSci.com". Thanks to the abbreviation, the latter is harder to both pronounce and remember, despite it having fewer characters. The first version works fine.

The key here is to strike a balance. Go for something brief, but don't mangle your name by hacking off whole parts of words.

In the pursuit of brevity, many consider using an acronym for their domain name. But that's usually only wise if your brand or product is regularly referred to by the initials. For example, the World Wildlife Fund's website can be found at WWF.org. That's

perfect for them, since their charity is widely known and referred to as simply “WWF”.

4. Go after .com

When it comes to extensions, being unique isn’t always better. While new extensions like “.me” or “.pro” may feel hip and eye-catching, “.com” is still the easiest to remember and most often used. In fact, ¾ of all websites use a “.com” extension.

If you can’t get the “.com”, go with other well-known extensions like “.co” or “.net” or “.org”. Then plan on acquiring the .com in the future. Of course, you’ll need to check who owns the .com first. If a big brand already owns your preferred .com, you won’t be able to afford to buy it from them down the road. Unless you make mega bucks.

But what about those country-specific extensions, such as “.nl” for the Netherlands, or “.de” for Germany? These are perfectly fine if you’re not planning to do business outside the country you select. For instance, the .ca extension is great for a Canadian company operating solely in Canada.

5. Avoid trademark infringement & confusion

The ideal domain name is distinctive. It shouldn’t be easily confused with the name of another site or brand. After all, you don’t want any lawsuits on your hands. If your domain name infringes on a trademark, you could be sued and forced to give up the domain. Before you register your domain name, you can check to see if it violates any US trademarks here.

On a related note: if people can confuse your name with another brand, so can search engines. Picking a name that’s too similar to another business can lead to your name’s search engine results being littered with irrelevant links.

6. Make it instantly intuitive

The ideal domain name should give users a good idea of what your business is all about. For instance, Rand Fishkin uses “PastaPerfected.com” as an example of an intuitive domain name for a site all about pasta. Right off the bat, a potential customer can make a good guess as to what they’ll find at that site (perfect pasta!). Your domain name should have the same effect.

Additionally, instant intuitiveness gives bonus points for memorability. When people can grasp your site’s concept just from the domain name, you can bet that it’s going to stick in their minds.

7. Use keywords sensibly

It's true that having some keywords in your domain name can help. However, you shouldn't bend over backwards to include exact match phrases. Doing so can actually hurt your brand.

Google caught on to this spammy tactic, so an exact match keyword domain isn't much of a ranking factor anymore. Besides, many users have developed the impression that such sites are spammy and low-quality. Which men's athletic shoe domain do you think sounds more professional and trustworthy: SportsDirect.com, or BuyMensSportShoes.com?

Our advice: avoid using generic keywords and phrases exclusively. Not only are they hard to remember, but domain names based solely on generic keyword strings don't carry the same SEO benefit they used to.

8. Append or modify if necessary

Tried all the tips above, but ended up with a domain name that's unavailable? If you have your heart set on a domain name, you can append or modify it a little to make it unique for registration.

You can add a prefix or suffix, as was done in Rand's examples of "ThePastaTerra.com" or "PastaTerraShop.com". You also have a little wiggle room on tip #4: go ahead and use a different extension, so long as it doesn't conflict with the other tips and works for your brand and audience. This might look something like "Terra.Pasta".

We hope that these 8 tips help you zone in on the most effective domain name for your site. If you're currently juggling a few domain name ideas, feel free to share them in the comments. We'd love to hear what you're considering, and can help your business establish a thriving web presence. We offer services like website design and search marketing, all engineered to give you a leg up on the competition.

—

Denis Pinsky is a Director of Digital Marketing and Analytics at Forbes. For the past 15 years, he's been using industry-leading practices to assist companies implement masterful solutions in all aspects of internet marketing and e-commerce. With a team of industry veterans and an arsenal of the cutting-edge technologies, Denis founded Webfia Inc to provide scalable and sustainable solutions in the areas of eCommerce, Web Analytics, Web Visibility, Website Optimization, and SEO.

Connect With Denis on Facebook, LinkedIn, Twitter

EXHIBIT GS-12

GS-12

Google Webmaster Central Blog

Official news on crawling and indexing sites for the Google index

Google's handling of new top level domains

Tuesday, July 21, 2015

With the coming of many new generic top level domains (gTLDs), we'd like to give some insight into how these are handled in Google's search. We've heard and seen questions and misconceptions about the way we treat new top level domains (TLDs), like .guru, .how, or any of the .BRAND gTLDs, for example:

Q: How will new gTLDs affect search? Is Google changing the search algorithm to favor these TLDs? How important are they really in search?

A: Overall, our systems treat new gTLDs like other gTLDs (like .com & .org). Keywords in a TLD do not give any advantage or disadvantage in search.

Q: What about IDN TLDs such as .みんな? Can Googlebot crawl and index them, so that they can be used in search?

A: Yes. These TLDs can be used the same as other TLDs (it's easy to check with a query like [site:みんな]). Google treats the Punycode version of a hostname as being equivalent to the unencoded version, so you don't need to redirect or canonicalize them separately. For the rest of the URL, remember to use UTF-8 for the path & query-string in the URL, when using non-ASCII characters.

Q: Will a .BRAND TLD be given any more or less weight than a .com?

A: No. Those TLDs will be treated the same as a other gTLDs. They will require the same geotargeting settings and configuration, and they won't have more weight or influence in the way we crawl, index, or rank URLs.

Q: How are the new region or city TLDs (like .london or .bayern) handled?

A: Even if they look region-specific, we will treat them as gTLDs. This is consistent with our handling of regional TLDs like .eu and .asia. There may be exceptions at some point down the line, as we see how they're used in practice. See our help center for more information on multi-regional and multilingual sites, and set geotargeting in Search Console where relevant.

Q: What about real ccTLDs (country code top-level domains) : will Google favor ccTLDs (like .uk, .ae, etc.) as a local domain for people searching in those countries?

A: By default, most ccTLDs (with exceptions) result in Google using these to geotarget the website; it tells us that the website is probably more relevant in the appropriate country. Again, see our help center for more information on multi-regional and multilingual sites.

Q: Will Google support my SEO efforts to move my domain from .com to a new TLD? How do I move my website without losing any search ranking or history?

A: We have extensive site move documentation in our Help Center. We treat these moves the same as any other site move. That said, domain changes can take time to be processed for search (and outside of search, users expect email addresses to remain valid over a longer period of time), so it's generally best to choose a domain that will fit your long-term needs.

We hope this gives you more information on how the new top level domains are handled. If you have any more questions, feel free to drop them here, or ask in our help forums.

Posted by John Mueller, Webmaster Trends Analyst

Labels: geotargeting , TLDs , webmaster guidelines

EXHIBIT GS-13

GS-13

Council of European National Top-Level Domain Registries

CENTRstats Global TLD Report is CENTR's quarterly publication covering status and trends in global top-level domains with a focus on European ccTLDs (country code top-level domains).

CENTR is the association of European country code top-level domain (ccTLD) registries, such as .de for Germany or .si for Slovenia. CENTR currently counts 55 full and 9 associate members – together, they are responsible for over 80% of all registered country code domain names worldwide. The objectives of CENTR are to promote and participate in the development of high standards and best practices among ccTLD registries.

CENTRstats

Global TLD Report

Q3 2018 – Edition 25

Global Market

The **global TLD market** is estimated at 344 million domains. The median growth of total domains over the past 12 months was 5.7%, which represents a small decrease compared to 12 months prior.

ccTLDs make up 44% of the global domain market, most of which comes from the European market. In percentage terms, ccTLDs in Africa have grown the highest over the past 12 months, although from a relatively small base. ccTLDs in Asia and the Americas have slowed down, particularly among Latin American and Caribbean ccTLDs where median growth was 1.4% YOY at October 2018.

Overall, domains under the new gTLDs total some 22.5 million – up 11% from 1 year prior. While many new gTLDs are growing well, roughly one third of the top 300 have contracted over the year. Larger legacy gTLDs such as .net, .org and .info have also seen declines, while .com has been increasing its growth rates. New entrant .app exploded into the market in the middle of year and has around 320K domains so far.

View the interactive report

GLOBAL MARKET OVERVIEW | Oct 2018

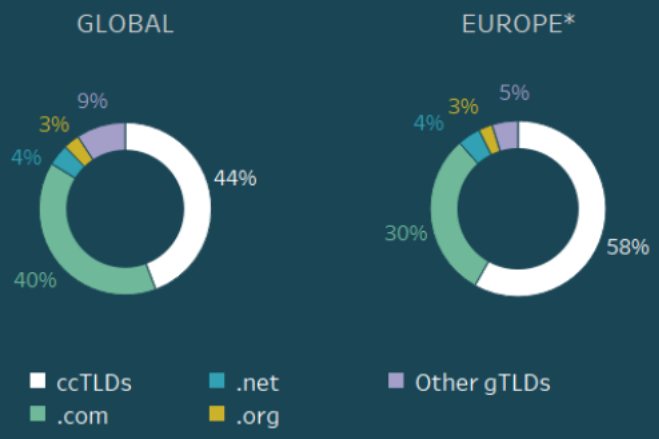
Estimate market: 344.2M domains (1501 TLDs)

		Domains (est. million)	Median* Growth (1Y)
ccTLDs	Africa (58)	3.4	6.2%
	Americas (53)	13.9	1.4%
	Asia (98)	63.3	2.9%
	Europe (57)	71.7	2.7%
gTLDs (1,232)		191.9	7.1%
		344.2	5.7%

* based on available data of TLDs with over 1000 domains.
Excludes TLDs that do not publish or share data and brand TLDs

MARKET SHARE

By total domains | Oct 2018



Top 15 LARGEST TLDS*

Ordered by total domains | Oct 2018

			Domains	Growth 1Y
1	.com	-	135.9M	5.1%
2	.de	Germany	16.2M	-0.3%
3	.net	-	13.9M	-6.1%
4	.uk	United Kingdom	11.9M	9.8%
5	.org	-	10.3M	-0.5%
6	.nl	Netherlands	5.8M	0.8%
7	.info	-	5.0M	-17.6%
8	.ru	Russian Federation	5.1M	-7.4%
9	.br	Brazil	4.0M	1.7%
10	.eu	European Union	3.7M	-1.4%
11	.fr	France	3.3M	4.7%
12	.au	Australia	3.2M	0.9%
13	.it	Italy	3.1M	2.6%
14	.ca	Canada	2.8M	5.2%
15	.top	-	3.2M	49.1%

* Excludes TLDs that do not publish or share data

CENTRstats Global TLD Report Oct 2018

European ccTLDs

For many European ccTLDs, 2018 has been focused around GDPR. This has no doubt left some with less marketing resources, but despite this, registrations have continued with relative stability. Although the long term growth average continues to decline, it is doing so at a much reduced rate. At the end of the third quarter however, the median growth hit a new low of 2.7% (1.5% for the top 10 largest ccTLDs). Driving this decline was a sharp slow down in rates of new adds between March and August 2018, particularly among some of the larger ccTLDs. This was aggrevated by deletes which did not reduce at the same level. Despite this, the average renewal rate remained strong at a median of 84% (slighly lower at 81% among the top 10 largest ccTLDs).

Across Europe, the average local market share to ccTLDs is estimated at 58% for registrations and 37% for local web traffic*. In both cases, the figures are higher when filtered to central and eastern European countries.

View the interactive report

* Web traffic data sourced from Alexa. Analysis made on the top 500 domains by total page views per million, then aggregated to the TLD.

Key figures | Medians

Calculated on 46 European ccTLDs - Oct 2018

Growth (1 year)	2.7%
Renewal Rate	84.1%
Add ratio	18.8%
Delete ratio	14.5%

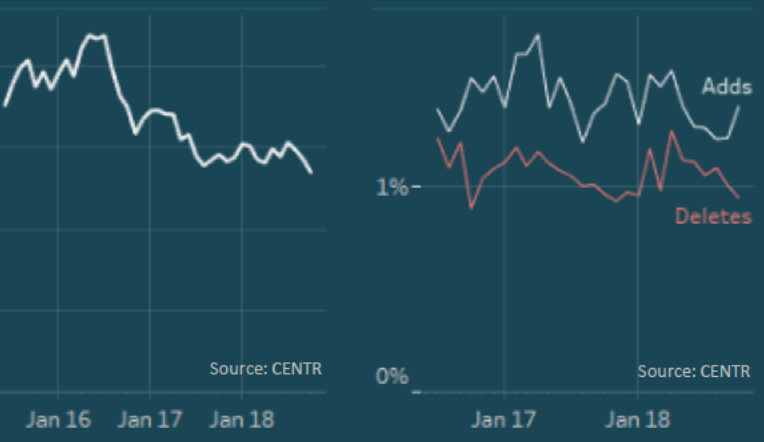
Add/delete ratios are annualised. See last page for methodology

Domain growth

Median 1Y net growth in total domains

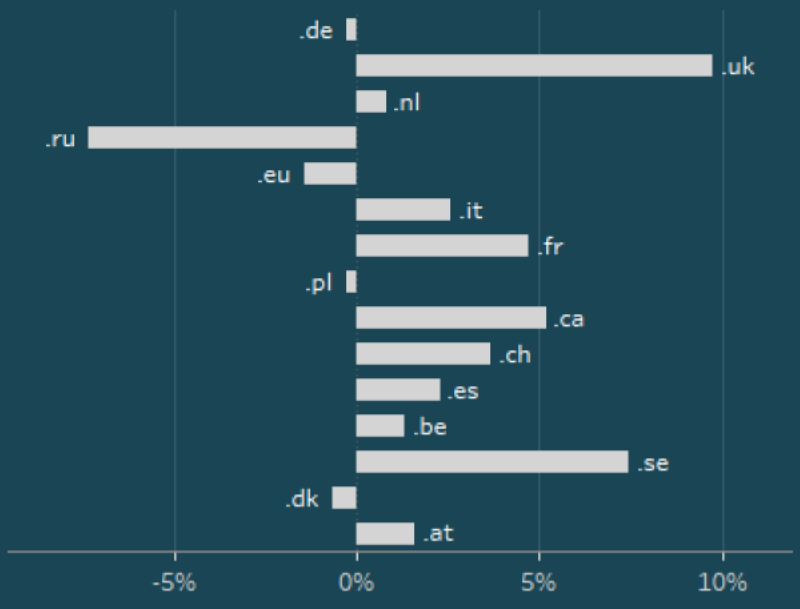
Adds/deletes

Median add/delete ratio



Domain growth (1Y)

Top 15* ordered by total domains | Oct 2018



Source: CENTR

*.ca (Canada) is exceptionally added to the above European focused chart, given its status as CENTR full member

CENTRstats Global TLD Report Oct 2018

Global gTLDs

gTLDs across all categories are estimated at 191 million globally and had a median growth of 9.7% over the past 12 months (top 300). This growth is expected to be forced downwards due to increases in both the average deletion rate (see right) as well as declines in average renewal rates.

Growth rates in .com have been steadily increasing for over a year. The increase appears to have been driven by a noticeable upwards trend in average renewals (reflected in a higher renewal rate) as well as a modest incline in the rate of new adds. .com's growth in the past 12 months was 5.1% - this compares to a benchmark of 4.3% over the top 10 largest gTLDs. These figures may be interesting to follow given the recent NTIA contract amendment repealing price controls on the .com wholesale price[1]. A wholesale price increase in .com may have the potential to impact the massive secondary market of domain speculation and warehousing of .com for some registrars. This, coupled with the increasing awareness of new gTLDs may result in a changing gTLD landscape in the future.

View the interactive report

1 https://www.ntia.doc.gov/press-release/2018/ntia-statement-amendment-35-cooperative-agreement-verisign

Key figures | Medians

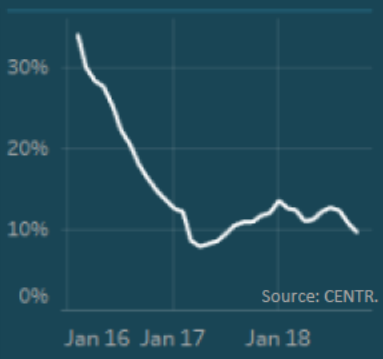
Calcaulated on top 300 gTLDs - Oct 2018

Growth (1 year)	9.7%
Renewal Rate	62.5%
Add ratio	38.2%
Delete ratio	23.8%

Brand TLDs excluded. Renew/add/delete ratios have 3 - 4 month lag and are annualised
See last page for methodology

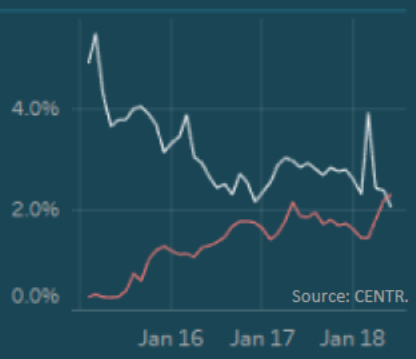
Domain growth

Median 1Y net growth in total domains



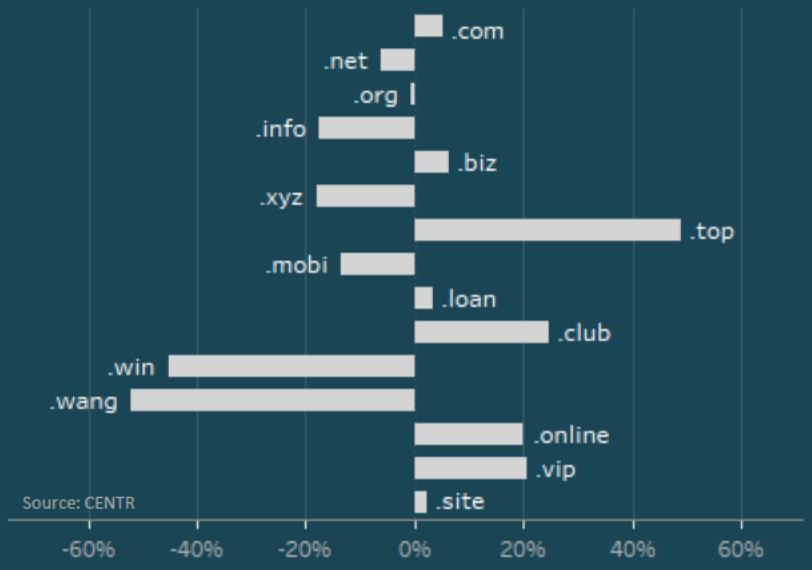
Adds/deletes

Median add/delete ratio



Domain growth (1Y)

Top 15 largest gTLDs | Oct 2018



SOURCES AND METHODOLOGIES

ccTLD registrations: CENTR member registries (European ccTLDs) and co-operation with APTLD (Asia Pacific region ccTLDs) and LACTLD (South America and Caribbean ccTLDs). Other ccTLDs supplemented by data from Zooknic. When data on a ccTLD is not reliable, meaning it is not updated from quarter to quarter, it is not included in growth calculations within this report.
gTLD registrations: ICANN (CZDS) and direct zone downloads with TLD operators.
Parking statistics (on new gTLDs only): https://ntldstats.com/parking/tld. Percentages expressed (parked domains as a proportion of total domains) are based on the total domain counts ntldstats.com provides.
European country market share: geographic distribution of domain location (registrant) sourced from CENTR member registries (ccTLDs) and Zooknic (gTLDs). Market share averages at country level include domains registered from foreign European ccTLDs.

RATIOS USED IN THIS REPORT

The following are calculations for ratios used in this report. These ratios are calculated by CENTR on a monthly basis.
Add ratio: total adds over previous 12 months / total domains (current).
Delete ratio: total deletes over the previous 12 months / total domains (current)
Renewal rate: renews / (renews + deletes).
Park ratio: based on definition of parked domains at https://ntldstats.com/parking/tld as a proportion of total domains
Note that renewal, add and delete ratios for gTLDs have a 4-5-month lag in data. In most cases, total domains counts are recorded at the beginning of each month.

Exclusions in data – Some calculations in this report exclude TLDs with limited or unreliable data.

TERMS

ccTLD – a Country Code Top-Level Domain (ccTLD) is a two-character top-level domain used and reserved for a country or independent territory. Examples include .uk for the United Kingdom or .de for Germany.
gTLD – a Generic Top-Level Domain (gTLD) is a 3-or-more-character string. Examples include .com, .org .club, .london
IDN – An Internationalised Domain Name is a domain that contains at least one label that is displayed in software applications, in whole or in part, in a language-specific script or alphabet, such as Arabic, Chinese, Cyrillic, Tamil, Hebrew or the Latin alphabet-based characters with diacritics or ligatures, such as French (source: Wikipedia). A ccTLD IDN is an IDN at the top level – e.g., the ccTLD IDN for the Russian Federation is .РФ, which is the Cyrillic script version of .ru.
Registrant – The individual or organisation that registers a specific domain name. A registrant holds the right to use that domain name for a specified period of time.
Registry – An internet domain name registry receives domain name information into a centralised database and transmits the information in internet zone files so that domain names can be found by users around the world via the web and email.
Market Share – TLD market share in European countries is calculated by using the locally registered domains under each TLD group (ccTLD, new gTLD, legacy gTLD) in over 30 European countries measured as a percentage of their sum (source: CENTR and ZookNic). Market share averages are calculated quarterly.

CENTR would like to thank the Regional Organisations (LACTLD, APTLD and AfTLD) for their continued support in the development of statistical reporting for the global ccTLD community. ccTLD data sourced by CENTR comes via direct automated communication with CENTR ccTLD members, CENTR surveys and other ongoing data collection.

ABOUT CENTR

CENTR is the association of European country code top-level domain (ccTLD) registries, such as .de for Germany or .si for Slovenia. CENTR currently counts 54 full and 9 associate members – together, they are responsible for over 80% of all registered domain names worldwide. The objectives of CENTR are to promote and participate in the development of high standards and best practices among ccTLD registries.

For any questions on this report, please contact Contact Information Redacted

EXHIBIT GS-14

GS-14

THE DOMAIN NAME INDUSTRY BRIEF

VOLUME 14 – ISSUE 1

THE VERISIGN DOMAIN REPORT

AS A GLOBAL LEADER IN DOMAIN NAMES AND INTERNET SECURITY, VERISIGN REVIEWS THE STATE OF THE DOMAIN NAME INDUSTRY THROUGH A VARIETY OF STATISTICAL AND ANALYTICAL RESEARCH. VERISIGN PROVIDES THIS BRIEFING TO HIGHLIGHT IMPORTANT TRENDS IN DOMAIN NAME REGISTRATIONS, INCLUDING KEY PERFORMANCE INDICATORS AND GROWTH OPPORTUNITIES, TO INDUSTRY ANALYSTS, MEDIA AND BUSINESSES.

VERISIGN®

Published February 2017

VERISIGN

EXECUTIVE SUMMARY

The fourth quarter of 2016 closed with approximately 329.3 million domain name registrations across all top-level domains (TLDs), an increase of approximately 2.3 million domain name registrations, or 0.7 percent over the third quarter of 2016.[1,2] Domain name registrations have grown by 21.0 million, or 6.8 percent, year over year.[1,2]

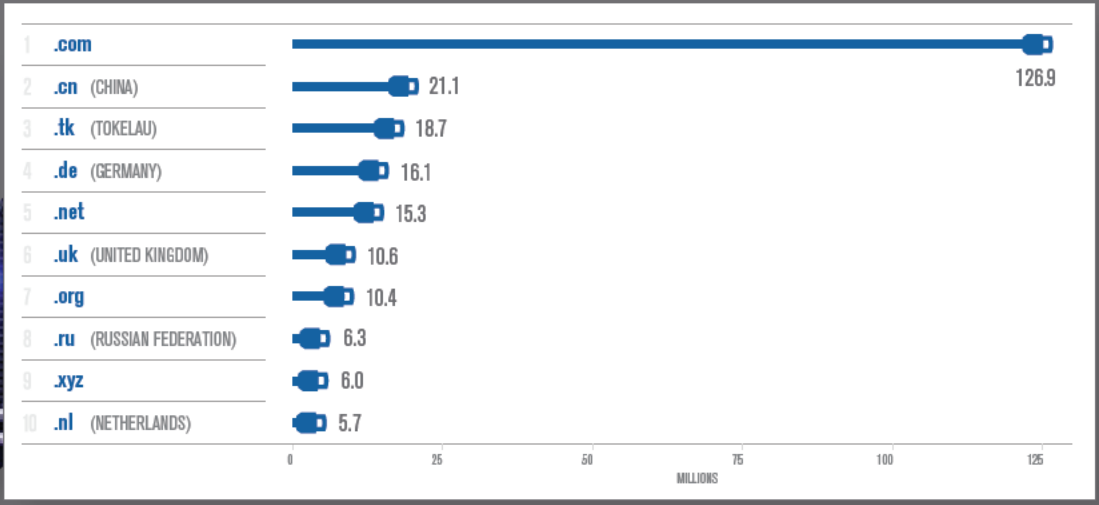
Total country-code TLD (ccTLD) domain name registrations were approximately 142.7 million, a 1.8 percent increase over the third quarter of 2016, and a 3.1 percent increase year over year.[1,2]

The .com and .net TLDs had a combined total of approximately 142.2 million domain name registrations in the domain name base[3] in the fourth quarter of 2016. This represents a 1.7 percent increase year over year. As of Dec. 31, 2016, the .com domain name base totaled 126.9 million domain name registrations, while the .net domain name base totaled 15.3 million domain name registrations.

New .com and .net domain name registrations totaled 8.8 million during the fourth quarter of 2016. In the fourth quarter of 2015, new .com and .net domain name registrations totaled 12.2 million.

TOP 10 LARGEST TLDS BY NUMBER OF REPORTED DOMAIN NAMES

Source: Zooknic, Q4 2016; Verisign, Q4 2016; Centralized Zone Data Service, Q4 2016



As of Dec. 31, 2016, the largest TLDs were .com, .cn, .tk, .de, .net, .uk, .org, .ru, .xyz and .nl.[1]

The average sale price for the 8 .com domain names reported by DN Journal as sold in the aftermarket in Q4 2016.[4]

$938K USD

Growth of .com and .net domain names redirecting to popular global social media and e-commerce sites compared to Q4 2015.[5]

INSTAGRAM **81%**

AMAZON.COM **41%**

LINKEDIN **23%**

YOUTUBE **23%**

FACEBOOK **20%**

ETSY **18%**

1. .tk is a ccTLD that is provided for free to individuals and businesses worldwide (http://www.businesswire.com/news/home/20131216006048/en/Freenom-Closes-3M-Series-Funding#.UxeUGNJDv9s). The zone size for .tk was last estimated by Zooknic in Q4 2014 and this zone size was subsequently used in the Q4 2014 through Q2 2016 DNIBs. In Q3 2016, Zooknic reported a significant decline in the .tk zone and restated the estimated zone size of .tk for each quarter from Q4 2014 through Q3 2016 using a proprietary methodology. As a result, for comparative purposes of this DNIB to the Q3 2016 DNIB and the Q4 2015 DNIB, Verisign has applied an updated estimate of the total zone size across all TLDs for Q3 2016 of 327.0 million and Q4 2015 of 307.7 million and an updated estimate of the total ccTLD zone size for Q3 2016 of 140.1 million and Q4 2015 of 138.1 million.
2. The generic top-level domain (gTLD) and ccTLD data cited in this brief includes ccTLD Internationalized Domain Names, is an estimate as of the time this brief was developed, and is subject to change as more complete data is received.
3. The domain name base is the active zone plus the number of domain names that are registered but not configured for use in the respective Top-Level Domain zone file plus the number of domain names that are in a client or server hold status.
4. Source: DN Journal (accessed Jan. 20, 2017) http://www.dnjournal.com/ytd-sales-charts.htm.
5. Source: VeriSign, Inc. data.

Largest ccTLDs by Number of Reported Domain Names

Source: Zooknic, Q4 2016
For further information on the Domain Name Industry Brief methodology, please refer to the last page of this brief.

Total ccTLD domain name registrations were approximately 142.7 million in the fourth quarter of 2016, with an increase of 2.6 million domain name registrations, or a 1.8 percent increase compared to the third quarter of 2016.[1,2] ccTLDs increased by approximately 4.3 million domain name registrations, or 3.1 percent, year over year.[1,2] Without including .tk, ccTLD domain name registrations increased approximately 2.1 million in the fourth quarter of 2016, a 1.7 percent increase compared to the third quarter of 2016 and ccTLDs increased by approximately 8.0 million domain name registrations, or 6.9 percent, year over year.

The top 10 ccTLDs, as of Dec. 31, 2016, were .cn (China), .tk (Tokelau), .de (Germany), .uk (United Kingdom), .ru (Russian Federation), .nl (Netherlands), .br (Brazil), .eu (European Union), .au (Australia) and .it (Italy).[1,2]

As of Dec. 31, 2016, there were 293 global ccTLD extensions delegated in the root, including Internationalized Domain Names (IDNs), with the top 10 ccTLDs composing 64.7 percent of all ccTLD domain name registrations.[1,2]

TOP 10 TRENDING KEYWORDS IN .COM AND .NET IN Q4 2016

This chart represents the top 10 trending keywords registered in English in .com and .net domain name registrations for the fourth quarter of 2016 and reflects the keywords in .com and .net domain name registrations with the highest percentage of registration growth relative to the preceding quarter.

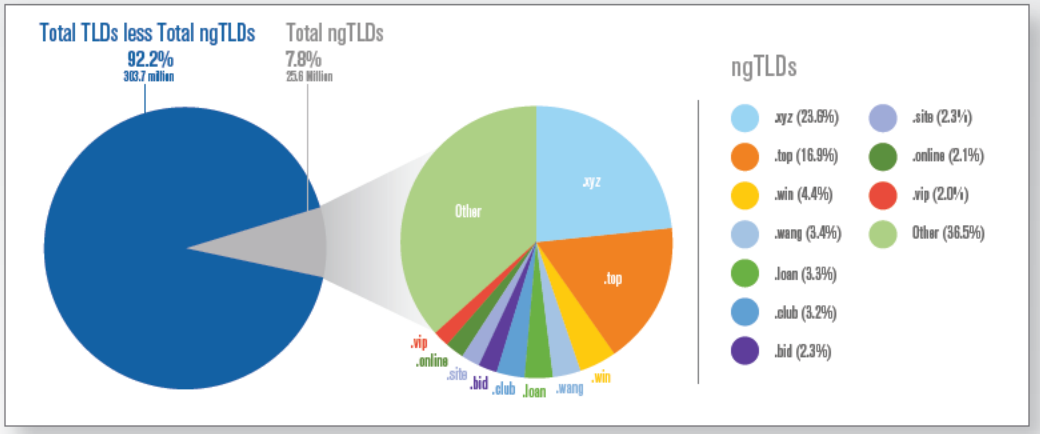
Verisign publishes a **monthly blog post** highlighting domain name registration keyword trends.

Rank	.com	.net
1	trump	shop
2	cannabis	tech
3	marijuana	art
4	weed	web
5	gain	ting
6	near	mark
7	pot	cloud
8	Christmas	travel
9	corporation	insurance
10	Donald	fit

New gTLDs as Percentage of Total TLDs

Source: Centralized Zone Data Service, Q4 2016 and Zooknic, Q4 2016

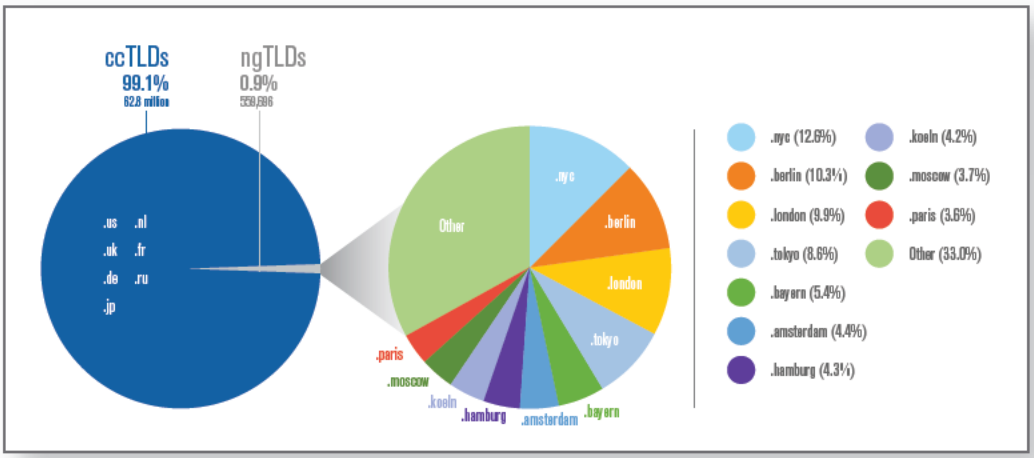
As of Dec. 31, 2016, new gTLDs (ngTLD) totaled 25.6 million domain name registrations, which represents 7.8 percent of total domain name registrations. The top 10 ngTLDs represented 63.5 percent of all ngTLD domain name registrations. The following charts show ngTLD domain name registrations as a percentage of overall TLD domain name registrations, and also the top 10 ngTLDs as a percentage of all ngTLD domain name registrations for the fourth quarter of 2016.



Geographical New gTLDs as Percentage of Total Corresponding Geographical gTLDs

Source: Centralized Zone Data Service, Q4 2016 and Zooknic, Q4 2016

As of Dec. 31, 2016, there were 37 ngTLDs delegated that have a geographical focus and more than 1,000 domain name registrations since entering general availability (GA). The chart on the left below summarizes the domain name registrations as of Dec. 31, 2016 for the listed geographical ngTLDs and the corresponding ccTLDs within the same geographic region. In addition, the chart on the right highlights the top 10 geographical ngTLDs as a percentage of the total geographical ngTLDs.



DNS QUERY LOAD

During the fourth quarter of 2016, Verisign's average daily Domain Name System (DNS) query load was approximately 143 billion queries per day across all TLDs operated by Verisign, with a peak of approximately 398 billion queries. Quarter over quarter, the daily average query load increased 11.4 percent and the peak increased by 122.5 percent. Year over year, the daily average query load increased by 16.0 percent, and the peak increased by 105.1 percent.

LEARN MORE

To subscribe or access the archives for the Domain Name Industry Brief, please go to Verisign.com/DNIBArchives. Email your comments or questions to Contact Information Redacted

ABOUT VERISIGN

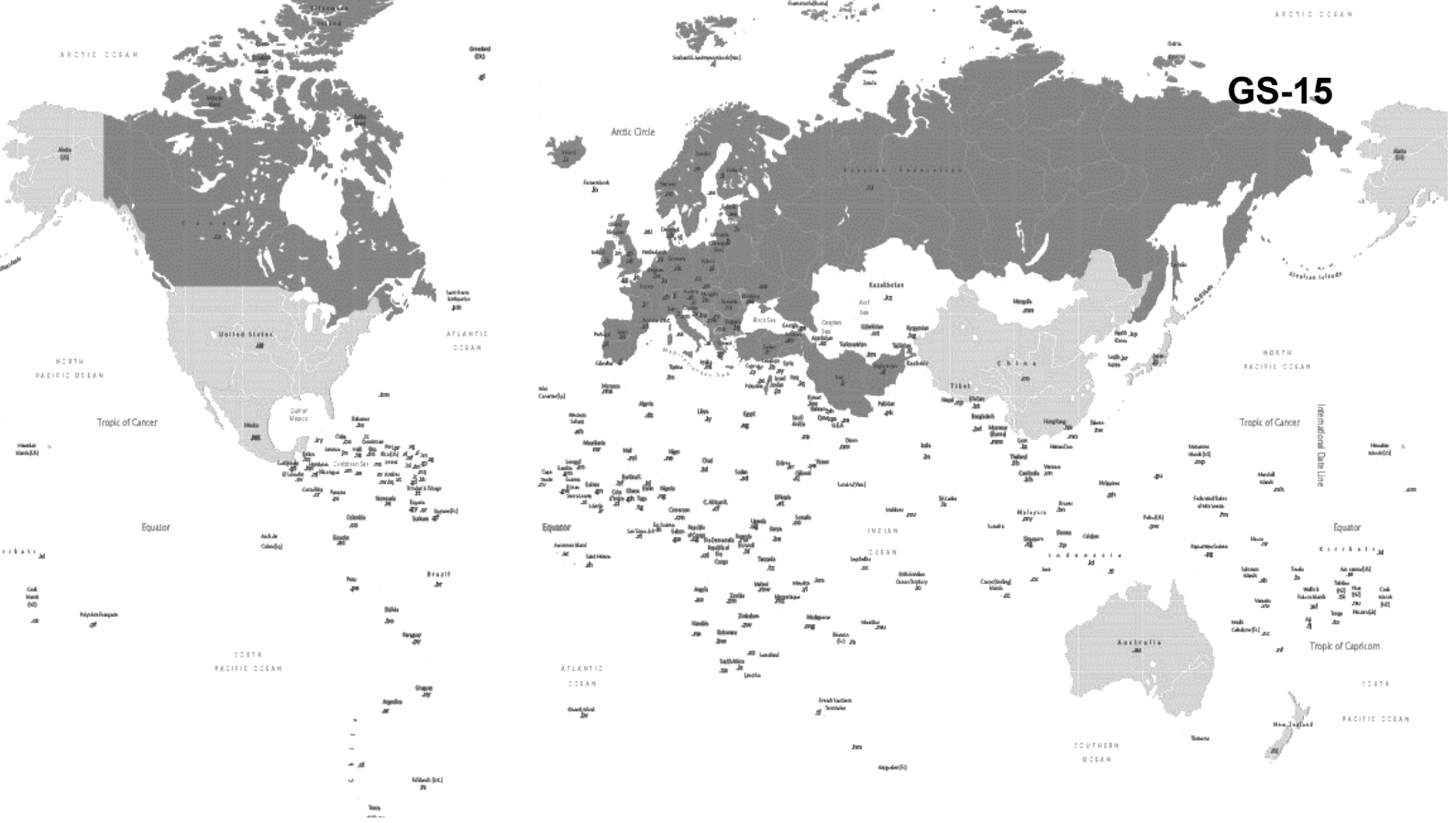
Verisign, a global leader in domain names and internet security, enables internet navigation for many of the world's most recognized domain names and provides protection for websites and enterprises around the world. Verisign ensures the security, stability and resiliency of key internet infrastructure and services, including the .com and .net domains and two of the internet's root servers, as well as performs the root-zone maintainer function for the core of the internet's Domain Name System (DNS). Verisign's Security Services include intelligence-driven Distributed Denial of Service Protection, iDefense Security Intelligence and Managed DNS. To learn more about what it means to be Powered by Verisign, please visit Verisign.com.

METHODOLOGY

The data presented in this brief for ccTLDs, including quarter-over-quarter and year-over-year metrics, reflects the information available to Verisign at the time of this brief and may incorporate changes and adjustments to previously reported periods based on additional information received since the date of such prior reports, so as to more accurately reflect the growth rate of domain name registrations of the ccTLDs. In addition, the data available for this brief may not include data for all of the 293 ccTLD extensions that are delegated to the root, and includes only the data available at the time of the preparation of this brief.

For gTLD and ccTLD data cited with Zooknic as a source, the Zooknic analysis uses a comparison of domain name root zone file changes supplemented with Whois data on a statistical sample of domain names, which lists the registrar responsible for a particular domain name, and the location of the registrant. The data has a margin of error based on the sample size and market size. The ccTLD data is based on analysis of root zone files. For more information, see ZookNIC.com.

EXHIBIT GS-15



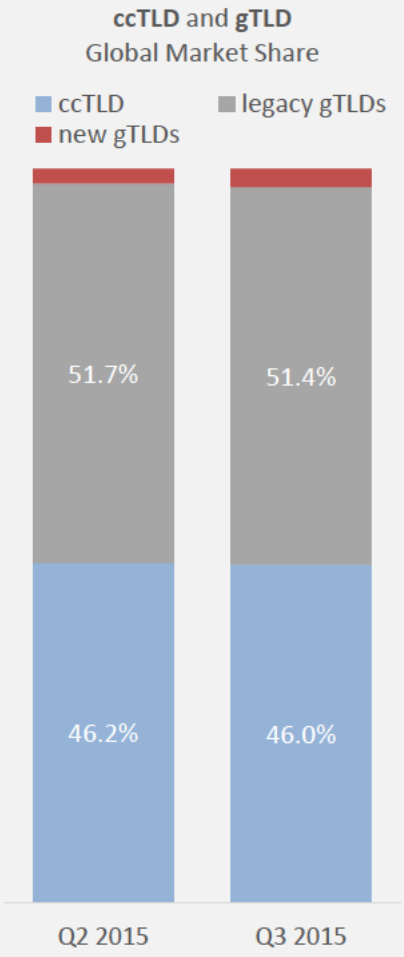
DomainWire

Edition 13 – Q3 2015

Global TLD Stat Report

DomainWire Stat Report is CENTR's quarterly publication covering status and trends in global top-level domains with a focus on European ccTLDs (country code top-level domains). A ccTLD is a two-letter domain name extension such as .de (Germany), .es (Spain) or .cz (Czech Republic).

CENTR is the association of European country code top-level domain (ccTLD) registries, such as .de for Germany or .si for Slovenia. CENTR currently counts 52 full and 9 associate members – together, they are responsible for over 80% of all registered country code domain names worldwide. The objectives of CENTR are to promote and participate in the development of high standards and best practices among ccTLD registries.



Worldwide Status and Growth in Top Level Domains

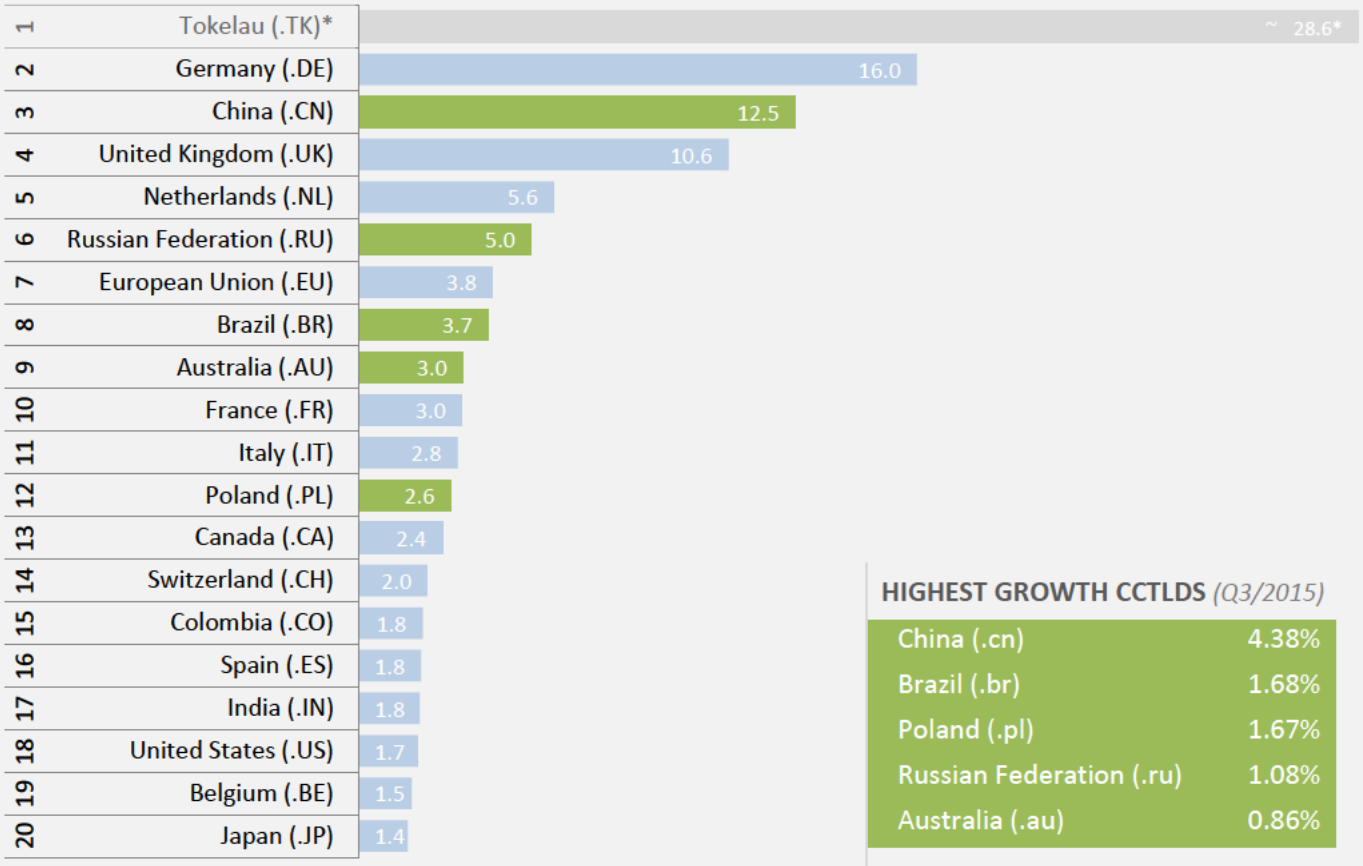
There are now over one thousand Top Level Domains available with combined registrations at **298.4 million** – fast approaching the 300 million mark. Combined growth over the third quarter 2015 was 1.6% which in terms of absolute values was fairly evenly split between the ccTLDs, new gTLDs and legacy gTLDs.

Generally market share is split between ccTLDs and legacy gTLDs however the share of the new gTLDs has grown from as estimate 2.2% in Q2 to almost 3% at the end of Q3 2015. Despite the increase, anecdotal reports suggest usage and awareness of new gTLDs remains relatively low for the moment.

	REGISTRATIONS	GROWTH Q3/2015	
	(million)	COMBINED	MEDIAN
ccTLD	135.9	1.0%	1.2%
ccTLD IDN	1.3	1.3%	-0.5%
Legacy gTLD	153.5	0.9%	-0.9%
New gTLD	7.7	28.7%	10.0%
Total	**298.4**	**1.6%**	

Legacy gTLDs = biz, com, info, mobi, net, org, aero, asia, cat, jobs, museum, name, post, pro, tel, travel.
New gTLDs figures/growth can vary depending on the way zone files are calculated
Market share chart: ccTLDs include ccTLD IDNs. Legacy gTLDs include sTLDs (some have 4 month data lag)

Top 20 largest **country code** domains



HIGHEST GROWTH CCTLDS *(Q3/2015)*

China (.cn)	4.38%
Brazil (.br)	1.68%
Poland (.pl)	1.67%
Russian Federation (.ru)	1.08%
Australia (.au)	0.86%

Scale: Millions
Source: ZookNIC, CENTR (SEP 2015)

* .tk (Tokelau) run by Freenom and offers free domains at global level. It's considered a fundamentally different business model than most other ccTLDs.

European ccTLDs

Q3/2015 Status & Trends

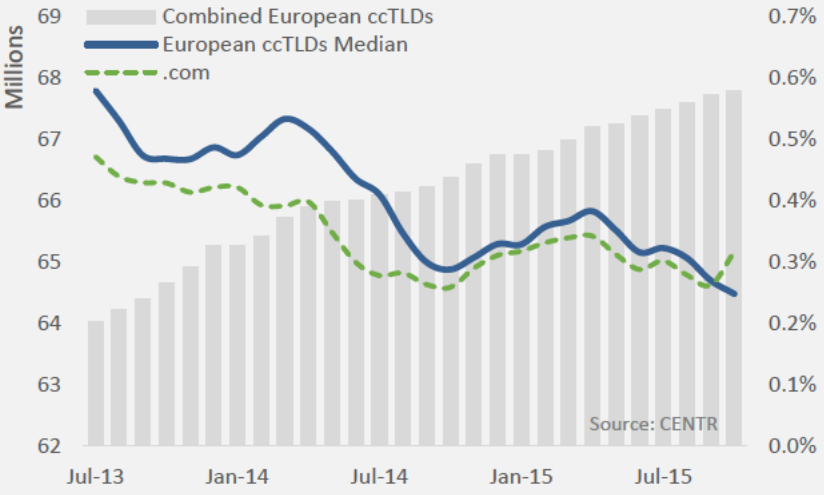
European ccTLDs closed the third quarter 2015 with just under 68 million combined domains under management – a net growth of around 344K registrations (0.5%).

The chart (right) shows a longer term trend of combined ccTLDs in Europe as well as the median growth rates. There is a long term decline in the growth rates among ccTLDs most of which is due to declines in the rates of new domains being added. Retained (renewed) domains however are relatively stable over the past few years. The average renewal rate is around 85%.

European ccTLDs are turning their attention increased data analysis/sharing, branding, awareness and other factors to ensure they continue their business remains strong and competitive in the changing TLD landscape.

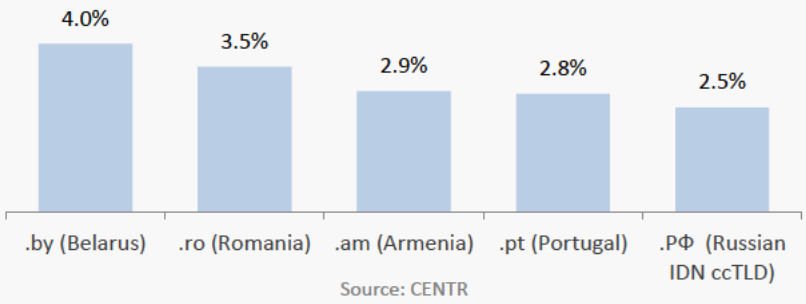
European ccTLDs *Snapshot*

Est. ccTLD domains (Europe):	67.7 million
Combined Growth – Q2, 2015:	344K (0.5%)
Median Retention *(renewals)* Rate* (2014):	84.3%
Largest Zone:	.de (Germany) 15.9 million
Highest DNSSEC signed:	.no (Norway) 55% signed



Growth Lines: 6 month moving averages are used to smooth the line
Data Source: CENTR, ICANN (gTLDs)

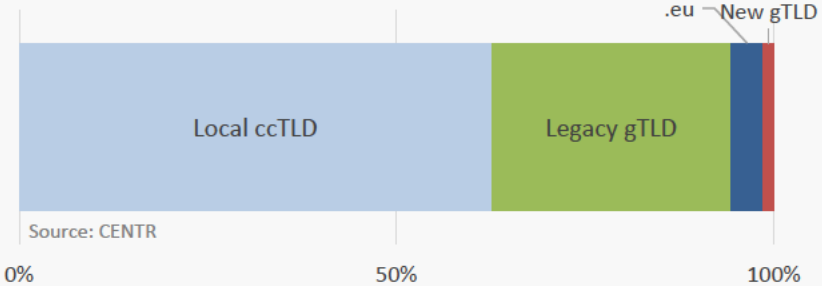
Top 5: Registration Growth *(Q3/2015)*



The chart (left) shows the top 5 highest European ccTLD percentage growth over the most recent quarter. The ccTLD .by for Belarus achieved the highest growth of 4.0%. It's worth noting that .pt (Portugal) has been within this top 5 list for over a year.

Over the past 12 months, the highest growth ccTLD from the European region was .ro (Romania) with just under 10% net growth.

Median Country TLD Market Share



The chart (left) shows estimate breakdown of TLDs by domain holder among European countries. Most countries are weighted in favour of their local ccTLD (around 61%). New gTLDs are entering the market and although their impact is still small, it is increasing.

Note: CENTR is in the process of refining market share data for its members. Future publications will include this refinement.

Legacy gTLDs

Q3/2015 Status & Trends

Combined domains in legacy gTLDs is currently around 153.5 million and has grown around 1% over Q3, 2015. This figures is largely weighted to .com which represents roughly 80% of all legacy gTLDs.

The chart (right) shows the 3 year evolution of the 3 largest legacy gTLDs. The chart highlights that despite the size of the .com zone, it is still growing on average at a higher rate than its peers.

It is important to remember that like all top level domains, volume is just one aspect of how one could assess the impact and trends. Another important factor is how the domains in each TLD are being used (eg. websites, email etc). This will become increasingly important for registry operators as new gTLDs increase the competition.

	Domains (million)	Growth *(Q3/2015)*
.com	120.0	1.3%
.net	15.1	0.4%
.org	10.6	0.5%
.info	5.2	-1.0%
.biz	2.2	-3.7%

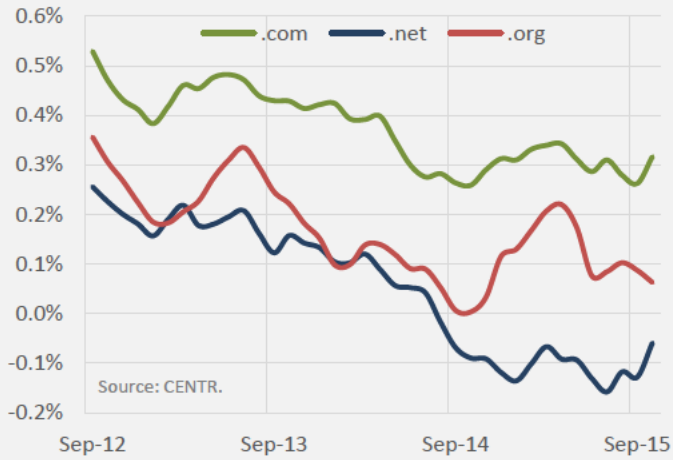


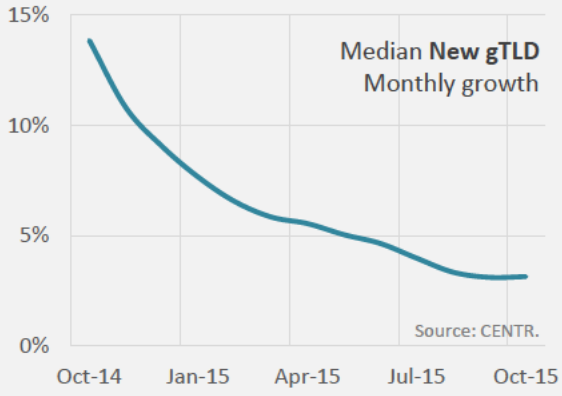
Chart includes top 3 largest legacy gTLDs
6 month moving averages used to smooth the lines. Data Source: ICANN

New gTLDs

Q3/2015 Status & Trends

New gTLDs combined domains have grown around 30% over Q3, 2015 and are slowly beginning to show signs of market penetration (see previous page).

Although many new gTLDs will not focus on volume growth, a significant number will (including most in the top 10 list to the right). The median monthly growth over all new gTLDs (below) shows a steady stabilisation of growth particularly over Q3, 2015.



	Domains	Growth *(Q3/2015)*	Category
xyz	965,056	20%	Lifestyle
top	538,005	227%	Lifestyle
网址	366,815	-4%	Technology
science	324,890	4%	Education
wang	270,988	43%	Technology
club	269,504	7%	Lifestyle
party	207,135	5%	Lifestyle
link	154,965	21%	Technology
click	153,799	99%	Technology
win	122,659	NA	Technology
all other	4,278,278		
Combined new gTLDs	**7,652,094**		

Source: CZDAP (ICANN). Data recorded 1 OCT 2015
Chart: 3 month moving averages used to smooth the lines

SOURCES

All data in this report is sourced from the following: CENTR, ZookNic (http://www.zooknic.com/) LACTLD, www.hosterstats.com. CENTR would like to thank the support of other Regional Organisations (LACTLD, APTLD and AFTLD) for their continued support in the development of statistical reporting for the global ccTLD community. When sourcing CENTR, data is taken from direct communication and responses received from CENTR members (ccTLD registry operators) via CENTR surveys and ongoing data collection.

When the term European ccTLDs' definition is used within this report, it refers to a set of European ccTLDs which are Full Members of CENTR. In most cases the aggregated values of this group are estimated to represent at least 95% of domain registrations from ccTLDs based in Europe.

GLOSSARY OF TERMS

ccTLD – a Country Code Top Level Domain (ccTLD) is a top level domain used and reserved for a country or dependent territory. Examples include .uk for the United Kingdom or .de for Germany. Each country appoints a manager of its ccTLD and sets the rules for allocating domains.
gTLD – a Generic Top Level Domain (gTLD) is a top level domain that is open to registrants worldwide in contrast to a Country Code Top Level Domain that are often restricted to registrants located in a particular country. The more popular gTLDs are .com, .org and .net
ccTLD IDN – an IDN is a domain name that includes characters used in the local representation of languages that are not written with the twenty-six letters of the basic Latin alphabet (a-z). An IDN can contain Latin letters with diacritical marks, as required by many European languages, or may consist of characters from non-Latin scripts such as Arabic or Chinese. A ccTLD IDN is an IDN at the top level – eg., the ccTLD IDN for the Russian Federation is .РФ which is the Cyrillic script version of .RF (Russian Federation).
sTLD – a Sponsored Top Level Domain (sTLD) is another form of a gTLD overseen by ICANN. An example of a sTLD is .cat for the Catalonia region.
Registrant – The individual or organisation that registers a specific domain name. They hold the right to use that domain name for a specified period of time (often one year however multi-year registrations are increasingly popular).
Registry – An internet domain name registry receives domain name information into a centralised database and transmits the information in internet zone files on the internet so that domain names can be found by users around the world via the worldwide web and email.

ABOUT CENTR

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For any questions on this report, please contact Contact Information Redacted

EXHIBIT GS-16

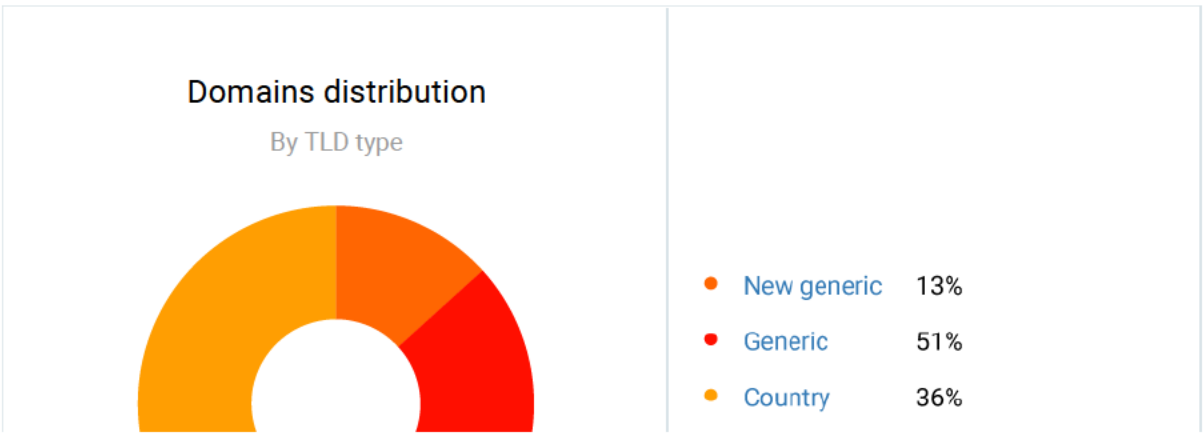
Domain Name Stat (https://domainnamestat.com)

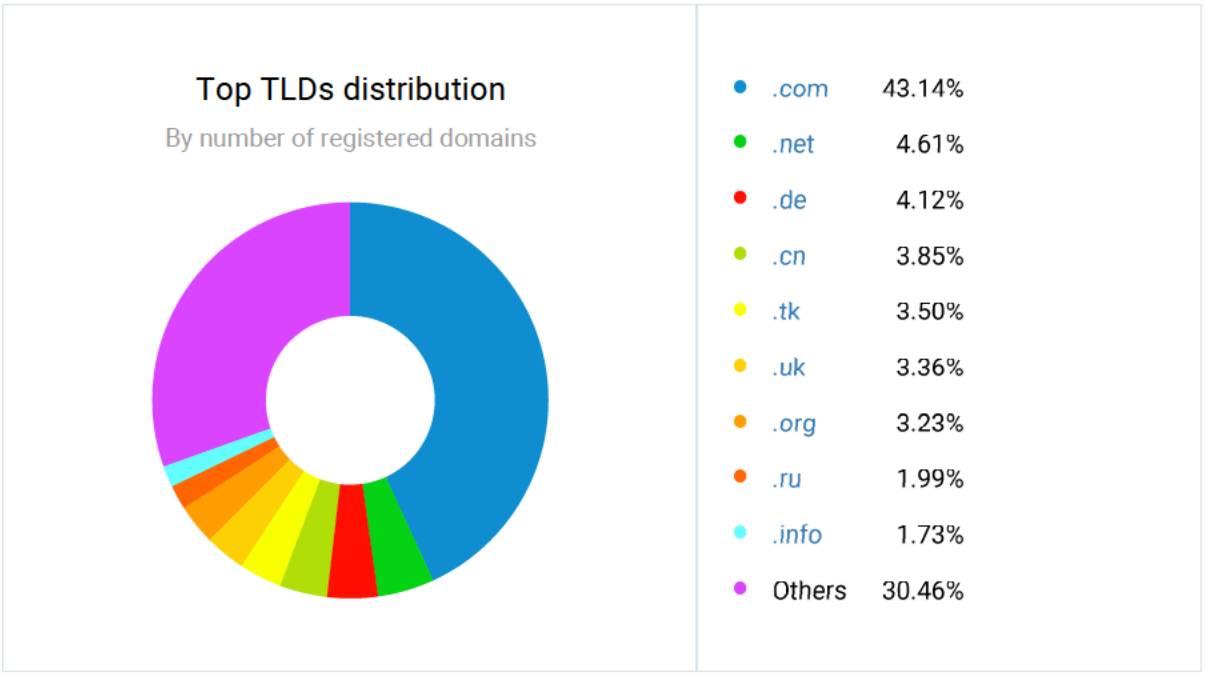
Domain name registration's statistics

Domain names are the cornerstones of the World Wide Web and if it were not for them, the internet would never be as we know it today. This website is a tool that collects and analyzes all changes, key trends and detailed stats with regard to particular domain names.

The overall number of domains registered, by TLD type

Type of TLD	Number of TLDs	Domains registered	Signed zones	Upcoming deletes
New gTLDs (https://domainnamestat.com/statistics/tldtype/new)	1,222	45,249,535	92,061	3,464,801
Generic TLDs (https://domainnamestat.com/statistics/tldtype/generic)	7	173,752,997	461,175	5,070,817
Country TLDs (https://domainnamestat.com/statistics/tldtype/country)	329	121,721,832	2,159,790	1,518,107
All TLDs (https://domainnamestat.com/statistics/tldtype/all)	1,558	340,724,364	2,713,026	10,053,725





Domain name registrations, by the country

The map shows the distribution of domain names registered in different countries. A domain name registrant is an organization or an individual that registers a certain domain name. You become one on submitting your application for a domain name.

Country	Registered domains	Share, %
Unknown (https://domainnamestat.com/statistics/country/ZZ)	113,216,784	33.23%
United States of America (https://domainnamestat.com/statistics/country/US)	92,572,814	27.17%
China (https://domainnamestat.com/statistics/country/CN)	25,900,053	7.60%
Canada (https://domainnamestat.com/statistics/country/CA)	15,692,430	4.61%
Netherlands (https://domainnamestat.com/statistics/country/NL)	9,939,706	2.92%
Panama (https://domainnamestat.com/statistics/country/PA)	8,290,524	2.43%
France (https://domainnamestat.com/statistics/country/FR)	7,234,586	2.12%
Japan (https://domainnamestat.com/statistics/country/JP)	6,170,375	1.81%
Germany (https://domainnamestat.com/statistics/country/DE)	5,768,226	1.69%

Country		Share, %
United Kingdom (https://domainnamestat.com/statistics/country/GB)	5,340,702	1.57%

Show 10 countries

1 2 3 4 5 ... 26

Domain name registrars, by the number of registered domains

The table breaks down the distribution of all domain names registrations between registrars, which are companies accredited by the Internet Corporation for Assigned Names and Numbers (ICANN) to put domain names on sale.

Registrar name	Registered domains	Share, %
GoDaddy.com, LLC (https://domainnamestat.com/statistics/registrar/GoDaddy_com_LLC-IANA_ID-146)	64,941,680	19.06%
Tucows Domains Inc. (https://domainnamestat.com/statistics/registrar/Tucows_Domains_Inc_-IANA_ID-69)	11,091,853	3.26%
NameCheap, Inc. (https://domainnamestat.com/statistics/registrar/NameCheap_Inc_-IANA_ID-1068)	11,073,306	3.25%
HiChina Zhicheng Technology Limited (https://domainnamestat.com/statistics/registrar/HiChina_Zhicheng_Technology_Limited-IANA_ID-420)	8,068,337	2.37%
Network Solutions, LLC (https://domainnamestat.com/statistics/registrar/Network_Solutions_LLC-IANA_ID-2)	7,608,846	2.23%
eNom, LLC (https://domainnamestat.com/statistics/registrar/eNom_LLC-IANA_ID-48)	7,388,530	2.17%
1&1 Internet SE (https://domainnamestat.com/statistics/registrar/1_1_Internet_SE-IANA_ID-83)	6,751,719	1.98%

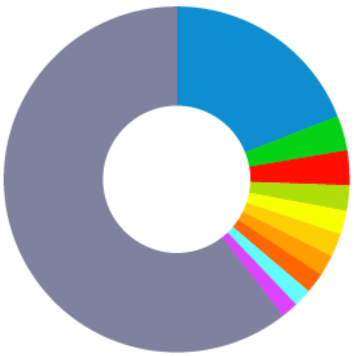
Registrar name		Share, %
Alibaba Cloud Computing Ltd. (https://domainnamestat.com/statistics/registrar/Alibaba_Cloud_Computing_Ltd_d_b_a_HiChina_www_net_cn_-IANA_ID-1599)	6,387,149	1.87%
PDR Ltd. (https://domainnamestat.com/statistics/registrar/PDR_Ltd_d_b_a_PublicDomainRegistry_com-IANA_ID-303)	5,732,457	1.68%
GMO Internet, Inc. d/b/a Onamae.com (https://domainnamestat.com/statistics/registrar/GMO_Internet_Inc_d_b_a_Onamae_com-IANA_ID-49)	5,453,628	1.60%

Show 10 registrars

1 2 3 4 5

Top registrars distribution

By number of registered domains



- GoDaddy.com, LLC 19.06%
- Tucows Domains Inc. 3.26%
- NameCheap, Inc. 3.25%
- HiChina Zhicheng Technology Limited 2.37%
- Network Solutions, LLC 2.23%
- eNom, LLC 2.17%
- 1&1 Internet SE 1.98%

Alibaba Cloud Computing Ltd.	1.87%
PDR Ltd.	1.68%
GMO Internet, Inc. d/b/a Onamae.com	1.60%
Others	60.53%

Name

Domain Name Stat (https://domainnamestat.com)

Email

Message

Leave message

(https://domainnamestat.com/blog/feed)

(https://www.domaining.com/)

EXHIBIT GS-17

A theory of interdependent demand for a communications service

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The utility that a subscriber derives from a communications service increases as others join the system. This is a classic case of external economies in consumption and has fundamental importance for the economic analysis of the communications industry. This paper analyzes the economic theory of this kind of interdependent demand. We begin by defining "equilibrium user set" as a set of users consistent with all individuals' (users and nonusers) maximizing their utilities. There are typically multiple equilibria at any given price, and which equilibrium is attained depends partly on the static model, partly on the initial disequilibrium conditions, and partly on the disequilibrium adjustment process. Some general properties of equilibrium user sets are derived. Then we turn our attention to some specific models based on simple characterizations of communities of interest. The implications for pricing are discussed, with special reference to the problem of starting up a new communications service (e.g., a video communications service).

1. Introduction

The utility that a subscriber derives from a communications service increases as others join the system. This is a classic case of external economies in consumption and has fundamental importance for the economic analysis of the communications industry. It suggests that although marginal cost pricing may be superior to allocated-cost formulae, it is still not completely appropriate.

This can be illustrated with respect to an historical policy of the industry: promoting universal service. This policy might be justified on the basis of marginal cost pricing, so long as new subscribers pay the incremental cost of expanding the system to accommodate them—even if they do not pay their "allocated"

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In the course of this study, I talked to many people, and their knowledge and ideas contributed to much of the analysis in this paper. M. Wish has been a collaborator in some previous related work, and he has greatly influenced my thinking. My analysis of the general problem was greatly stimulated by a discussion I had with E. Gilbert, who developed some preliminary results about the maximum equilibrium set. I have also had many profitable discussions with W. Ballamy, J. Berrier, A. Ciesielka, D. Deutsch, A. Gersho, E. Goldstein, A. H. McKeage, D. Mitra, and R. Sanders. F. Sinden, W. Taylor, N. Valcoff, M. Wilk, and E. Zajac provided helpful comments on previous written and oral presentations of this material.

share of average costs. A still lower price, perhaps much lower, might be justified if the externalities are taken into account. The total benefits that *all* subscribers derive from the expansion of the service may be sufficient to justify the incremental costs—even if the new subscribers are unwilling to pay the entire incremental costs.

Recently Artle and Averous[1] made what appears to be the first published analysis of these externalities in communications.[2] They formulate a simple model in which the incremental utility of the service to an individual depends only on the number of telephone subscribers—not on who they are. This is the uniform calling model discussed in Section 3 of this paper. They also assume that the cost of providing telephone service depends only on the number of subscribers. This enables them to derive and interpret the necessary conditions for a social welfare optimum. Their expression has some important similarities (but also some differences) with the usual necessary conditions for a social optimum with respect to a pure public good.

The authors then use these notions to develop a dynamic demand model. They show that interdependent demand can sustain continual growth in a stationary population with stationary income. The mechanism is as follows. New subscribers join. This increases the incremental utility of the service and induces marginal nonusers to join. That in turn induces further growth, etc., etc. The authors offer this as a possible explanation for the continual growth of telephone service observed in all empirical studies of the industry.

Squire studies the problem using a somewhat different model.[3] He considers usage of the system as well as number of telephones, and assumes that the cost of providing the service is a function of these two variables. Squire specifies individual demand curves (based on a fixed number of subscribers) for incoming and outgoing calls. This enables him to develop an expression for optimal usage of the system, based on a modified consumer-surplus concept. He then derives the optimal price per call (charged only to the person making the call) consistent with this optimal usage. He finally develops an expression for the optimal size of the system and the price per telephone consistent with this optimum.

This paper makes a much more detailed analysis of the demand side of the market than attempted by Artle and Averous or by Squire. We begin by defining an "equilibrium user set" as a set of users consistent with all individuals' (users and nonusers) maximizing their utilities. A basic result is that there are typically

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[1] See [1].

[2] An earlier attempt to model interdependent demand is Marris [2]. Marris develops a general theory of demand for new products but does not consider communications in particular. The interdependent aspects of demand have a much different interpretation in his analysis than in this paper or in Artle and Averous [1] or Squire [3] (discussed later in the text). Also, irreversibility plays a much larger role in Marris' analysis. Nevertheless, Marris develops some of the same concepts used in this paper; e.g., critical mass.

[3] In [3].

multiple equilibria at any given price. For example, a very small equilibrium user set may be consistent with utility maximization, since the smallness of the user set in itself makes the service relatively unattractive to potential users. However, a much larger user set may also be possible for the same population at the same price. In this case the largeness of the user set would make the service attractive and allow a high level of demand to be sustained. In any planning (public or private) for the communications service, special attention must be paid to which equilibrium user set is likely to be attained.

The next section of this paper develops a general theory of demand. It derives the following results:

(1) The static model determines the attained equilibrium user set (at a given price) within a certain set of bounds.
(2) A possibly narrower set of bounds (for a given price) is derived, given the initial user set.
(3) Within the bounds defined in (2), the equilibrium attained (at a given price) depends entirely on the disequilibrium adjustment process.

The following two sections of the paper develop specialized models based on various simple characterizations of communities of interest. The simplest of all is the uniform calling pattern, which assumes that no one has any special community of interest (other than the entire population). This model is the only one in which the equilibrium theory can be developed in terms of the *number* of users, without paying attention to who they are. We can therefore define a demand curve, which turns out to have an inverted *U* shape. See Figure 1 on page 28.

Zero demand is a stable equilibrium for all positive prices. The upward-sloping part of the inverted *U* consists of unstable equilibria and constitutes the "critical mass" of the service (at any given price). If the critical mass is exceeded, demand expands to the downward sloping part of the inverted *U*. Points on the latter are stable equilibria and represent the maximum level of demand sustainable at a given price.

Unfortunately (for ease of analysis), the uniform calling pattern may not be very realistic. People typically belong to groups, each of which has a strong community of interest within itself. And they typically have a few principal contacts who alone account for a substantial part of their communication. These complications are briefly discussed in the section entitled "Nonuniform Calling Patterns."

The final section of the paper discusses some implications of the preceding demand analysis for supply and pricing of the service. An important distinction is made between viability of the service (existence of a nonnull equilibrium user set that can be served with nonnegative profits) and the start-up problem (how to attain such a user set, starting from a small or null initial user set).

Viable nonnull equilibrium user sets (if they exist) are always superior to the null set from a static point of view. We can compare such sets to determine the static social optimum or the overall

market equilibrium corresponding to a static supply model. However, this kind of analysis is incomplete and may be misleading without consideration of the start-up problem. Achieving the static optimal user set may require ruinous (albeit temporary) promotional costs.

Appropriate solutions to the start-up problem depend in large part on the demand model. In the uniform calling model, the start-up problem is simply a question of getting beyond the critical mass. Community of interest groups may make the practical start-up problem much easier, but they also introduce some special problems. If an individual's demand is contingent on a few principal contacts' being users, there may exist many small self-sufficient user sets. These allow the possibility of a long-term introductory program, in which the seller gradually expands the size and number of such sets.

This paper presents only a limited discussion of costs and supply. The reason is that costs of a communications service are very complex and merit a separate study in their own right. This is a very fruitful topic for future research.

2. General theory of demand

■ Let the population consist of n individuals. As in Artle and Averous' work, we define a set of binary variables:

$$q_i = \begin{cases} 0 \text{ if individual } i \text{ does not subscribe to the communication service} \\ 1 \text{ if the individual } i \text{ does subscribe to the communication service} \end{cases} \quad (1)$$

for $i = 1, \ldots, n$.

We assume there are also m other goods in the economy. To model interdependent demand, we specify a pair of utility functions for each individual:

$$U_i^0 = U_i^0 (r_{i1}, \ldots, r_{im}) \quad (2)$$

$$U_i^1 = U_i^1 (q_1, \ldots, q_{i-1}, q_{i+1}, \ldots, q_n, r_{i1}, \ldots, r_{im}) \quad (3)$$

where

U_i^0 = Utility of individual i if he does not subscribe to the communications service,

U_i^1 = Utility of individual i if he does subscribe to the communications service, and

r_{ij} = Consumption of (noncommunications) good j by individual i.

Equations (2) and (3) implicitly assume independent utilities with respect to all goods in the economy *other* than the communications service in question. In addition, we make the usual monotonicity assumptions:

$$\frac{\partial U_i^k}{\partial r_{ij}} \geqslant 0 \text{ for all } j \text{ and } > 0 \text{ for some } j; \quad \text{and} \quad (4)$$

$$U_i^0 \leqslant U_i^1 \quad (5)$$

for all $i, k, q_1, \ldots, q_{i-1}, q_{i+1}, \ldots, q_n, r_{i1}, \ldots, r_{im}$.

We also make a specialized assumption applicable to a communications service:

$$\frac{\partial U_i^1}{\partial q_w} \geqslant 0 \tag{6}$$

for all $i \neq w$, $q_1, \ldots, q_{i-1}, q_{i+1}, \ldots, q_n, r_{i1} \ldots, r_{im}$. That is, a subscriber's utility never decreases as additional individuals subscribe (and none drop out).

This seems like a reasonable working assumption. We can, of course, imagine some exceptions; e.g., the value of the service to others would probably be lessened if a large number of life insurance salesmen subscribed to the service to solicit other subscribers. However, we assume that such occurrences are the exception rather than the rule—that, in general, the availability of a communications link is not detrimental to either party.

We assume utility maximization, which we analyze in two steps. (1) We evaluate the maxima of U_i^0 and U_i^1 (with respect to $r_{i1}, \ldots, r_{im}$) subject to individual i's budget constraint. Let us denote these maxima as $\hat{U}_i^0$ and $\hat{U}_i^1$. (2) We then compare $\hat{U}_i^0$ and $\hat{U}_i^1$ to see if the individual demands the communication service. This defines a demand variable for each individual:

$$q_i^D = \left\{ \begin{array}{l} 0 \text{ if } \hat{U}_i^0 > \hat{U}_i^1 \\ 1 \text{ if } \hat{U}_i^0 \leqslant \hat{U}_i^1 \end{array} \right\} \tag{7}$$

for $i = 1, \ldots, n$.

The basic methodology of this paper is to ignore interrelationships between the communications market and other markets and concentrate on relationships *within* the communications market. Thus, we make the *ceteris paribus* assumption that prices of all goods other than the communications service are fixed and that each individual has a fixed budget constraint. This allows us to express the demand variables as functions of price and the set of subscribers:

$$q_i^D = q_i^D\ (p, q_1, \ldots, q_{i-1}, q_{i+1}, \ldots, q_n) \tag{8}$$

for $i = 1, \ldots, n$, where $p =$ the price of the communications service.

It follows from previous assumptions that all the q_i^D are monotonically decreasing (equality allowed) with respect to p. That is, an increase in p can never change q_i^D from 0 to 1; a decrease in p can never change q_i^D from 1 to 0. However, a change in p may have no effect on q_i^D. It also follows from previous assumptions that all the q_i^D are monotonically increasing (equality allowed) with respect to all q_w $(w \neq i)$.

□ **Equilibrium user sets.** Naturally, there is a correspondence between demanding the service and being a subscriber. We define an *equilibrium user set* as a set of users such that

$$q_i = q_i^D\ (p, q_1, \ldots, q_{i-1}, q_{i+1}, \ldots, q_n) \tag{9}$$

for all i.[4] Thus, in equilibrium all users demand the service; all nonusers do not demand it.

Equation (9) defines equilibrium with respect only to the demand side of the market. It describes user sets that are consistent with utility maximization at a given price. These constitute necessary but not sufficient conditions for an overall market equilibrium. The latter additionally requires that the user set and price be consistent with some specified model of supply behavior.

For fixed $p = \bar{p}$, equations (9) are a system of n equations in n binary variables. Such a system does *not* generally have a unique solution. In fact, unique solutions did not arise in any of the simple models investigated in this paper (except in the trivial case where price is so high that there can never be any demand at all).

Consequently, the equation

$$q = q^D, \tag{10}$$

where

$$q = \sum_{i=1}^{n} q_i \quad \text{and}$$

$$q^D = \sum_{i=1}^{n} q_i^D$$

may be indeterminate (for fixed $\bar{p}$). That is, it may either hold or fail to hold depending on which set of users constitutes the sum q.

For this reason, the general theory of interdependent demand cannot be developed in terms of the sum q. It is necessary to work with the individual q_i. The basic analytical concept is not the demand curve—i.e., equilibrium pairs (q, p)—but rather equilibrium user sets.

□ **Disequilibrium analysis.** Given that several equilibrium user sets exist for a given price (*ceteris paribus*), it is important to know which ones (if any) are most likely to occur. This requires analyzing what happens if the market is initially in disequilibrium. Our procedure is as follows. We specify a very general disequilibrium adjustment process. We then investigate the extent to which the user sets resulting from this process depend on the static model, the extent to which they depend on the initial disequilibrium conditions, and the extent to which they are indeterminate, depending on a more detailed specification of the adjustment process.

In this section, we restrict our attention to the demand side of the market and assume a given price for the communications service. We further assume that adjustments of consumption in other markets can be made rapidly and costlessly. This seems like a reasonable simplifying assumption, allowing us to analyze dis-

[4] We can also define equilibrium user sets with respect to any given set of discriminatory prices; i.e., a set of users such that

$$q_i = q_i^D(p_i, q_1, \ldots, q_{i-1}, q_{i+1}, \ldots, q_n) \tag{9a}$$

for all i, where p_i is the price charged to individual i.

equilibria in the communications market without considering possible disequilibria in the rest of the economy.

Now suppose there is an arbitrary initial user set. It may be based on utility maximization for current or previous states of the world, past selling efforts of the supplier of the service, or anything else. We assume that adjustments to this user set occur according to the following adjustment process. (1) An individual in equilibrium ($q_i^D = q_i$) never changes his status from user to nonuser or vice versa. This is reasonable, since such a change would always reduce his utility (except in the knife-edge case where $\hat{U}_i^0 = \hat{U}_i^1$, in which case the change in status has no effect on utility). (2) The length of time an individual can remain continually in disequilibrium ($q_i^D \neq q_i$) is bounded. He eventually must change his status. This is also reasonable, since the change always increases his utility (except in the knife-edge case where $\hat{U}_i^0 = \hat{U}_i^1$, in which case the change in status has no effect on utility).

The adjustment process is essentially a model of utility maximization with inertia. It is very general in that it makes no assumption about the speed of adjustment. This speed may vary from individual to individual. It may depend on the user set or actions of the seller. Or it may change over time.

A limitation of this process is that it does not allow individuals to collude and subscribe together. This is relatively unimportant if an individual's demand is contingent on a large user set, since such collusion would be difficult with very large groups. However (as will be seen later) we do have to consider relaxing the assumption in models where an individual's demand is contingent on a few of his principal contacts' being users.

It is important to note that the adjustment process does *not* necessarily converge to an equilibrium user set. Consider the following example. A demands the service if and only if B is a user; B demands the service if and only if C is a user; C demands the service if and only if A is a user. Suppose the initial user set is A. One possible version of the adjustment process is as follows. C joins because A is a user. Then A disconnects because B is not a user. Then B joins because C is a user. Then C disconnects because A is not a user. Then A joins because B is a user. Then B disconnects because C is not a user. We are now back to the original user set, and the process can be repeated indefinitely.

Nevertheless, the user sets resulting from the adjustment process can be bounded, as shown in the following theorems.

Theorem 1: If the initial user set is the entire population, the adjustment process can only *remove* individuals from the user set; no individual can ever be added who has previously dropped out.

Proof: If the entire population is an equilibrium user set, no one is added or removed, and the theorem is satisfied. If the entire population is *not* an equilibrium set, let $r_1, r_2 \ldots$ represent the sequence of individuals who change status. (If individuals change status simultaneously, we list them in arbitrary order.) Now r_1 must be a removal (not an addition), since the entire population consists of users, and there is no one left to be added. Given that $r_1, \ldots, r_k$ are removals, r_{k+1} must also be a removal for the fol-

lowing reason. The only possible additions would be the individuals $r_1, \ldots, r_k$. But all of these dropped out (and therefore did not demand the service) when the user set contained the current user set. Thus, they cannot demand the service according to the monotonicity assumption.

It follows that all of the r_i must be removals. Q.E.D.

Theorem 2: If the initial user set is the entire population, the adjustment process converges to an equilibrium user set in finite time.

Proof: The process must converge in finite time for the following reason. All changes of status are removals. Since only n (the size of the population) individuals can be removed, there are at most n changes in status. These must all occur in finite time.

After all the changes in status occur, no user can fail to demand the service, for otherwise the process would continue. Moreover, no nonuser can demand the service because of the monotonicity condition. Thus, the final user set is an equilibrium user set. Q.E.D.

Theorem 3: If the initial user set is the entire population, the adjustment process converges to the union of all equilibrium user sets regardless of the order of removals.

Proof: Let X be an arbitrary equilibrium user set; let R be the equilibrium result after individuals $r_1, \ldots, r_k$ have been removed according to the adjustment process. X cannot contain r_1, since r_1 was removed when the user set was the entire population (and hence contained X). Since X does not contain r_1, it cannot contain r_2 either. (The entire population minus r_1 contains X-r_1.) Nor can X contain $r_3, \ldots, r_k$. Thus, $X \subseteq R$.

But X is an arbitrary equilibrium user set. Thus, R contains all equilibrium user sets. Since R is itself an equilibrium user set, it is the union of all equilibrium user sets. Q.E.D.

This set will hereafter be referred to as the "maximum equilibrium user set."

By entirely symmetrical reasoning we can establish the following. If the initial user set is null,

(1) the adjustment process can only add individuals, and no one is ever removed who previously joined;
(2) the adjustment process converges to an equilibrium user set in finite time;
(3) the adjustment process converges to the intersection of all equilibrium user sets, regardless of the order in which individuals are added.

This set will hereafter be referred to as the "minimum equilibrium user set."

It is important to note that the minimum and maximum equilibrium user sets need not be the same. For example, consider the following simple model. Each individual demands the service if three of his five principal contacts are users. The minimum equilibrium user set is null. There are no users; so no one has

three of his five principal contacts as users; so no one demands the service. The maximum equilibrium set is the entire population. Everyone has all five of his principal contacts as users; so everyone demands the service. In addition, there may be any number of equilibrium user sets between these two extremes, depending on the distribution of principal contacts.

In this example, the static model tells us practically nothing about what equilibrium will actually be attained. We only know that it will be zero or 100 percent or somewhere in between. This is an extreme case, but in general the static model determines the actual equilibrium only within certain bounds—the minimum and maximum equilibrium sets. Moreover, in all of the models investigated in this paper, there exists the possibility that these bounds may be far apart. In a practical situation, this difference may mean the difference between marketing success and failure.

The above theorems show that if the initial user set is sufficiently large, convergence to the maximum equilibrium user set is assured (according to the assumed adjustment process). If the initial user set is sufficiently small, convergence to the minimum equilibrium set is assured. For intermediate initial disequilibrium user sets, the actual equilibrium attained may also depend on a more detailed specification of the adjustment process than given above.[5] It may be critical whether or not the disequilibrium nonusers subscribe before the disequilibrium users drop out.

□ **Particular initial user set.** The minimum and maximum equilibrium user sets provide bounds on user sets that are possible for *any* given initial user for *any* version of the adjustment process described above.[6] This subsection provides bounds on user sets that can be attained from a *particular* initial user set for *any* version of the adjustment process.

Let S be an arbitrary initial user set. We now define the following two adjustment sequences.

Optimistic sequence

(1) First all nonusers who demand the service subscribe in arbitrary order, but no users drop out. This converges to the same user set $\overline{\overline{S}}$, irrespective of the order in which individuals subscribe. (Proof is analogous to that of Theorem 3.)

(2) Then all users who do not demand the service drop out in arbitrary order. This converges to the same user set S, irrespective of the order in which individuals drop out. Moreover, $\overline{S}$ is an equilibrium user set. (Proof analogous to Theorems 2 and 3.)

Pessimistic sequence

(1) First all users who do not demand the service drop out in arbitrary order, but no nonusers subscribe. This converges to the same user set $\underline{S}$, irrespective of the order in

[5] P. 22.
[6] P. 22.

which individuals drop out. (Proof analogous to Theorem 3.)

(2) Then all nonusers who demand the service subscribe (in arbitrary order). This converges to the same user set $\underline{S}$, irrespective of the order in which individuals subscribe. Moreover, $\underline{S}$ is an equilibrium user set. (Proof analogous to Theorems 2 and 3.)

Now let $R_1, R_2, \ldots$ be a sequence of user sets resulting from applying an arbitrary version of the adjustment process to S. As previously discussed, this sequence need not converge to an equilibrium user set. However, we can place the following bounds on the sequence:

(1) $\underline{\underline{S}} \subseteq R_i \subseteq \overline{\overline{S}}$ for all i. This follows directly from the monotonicity assumption.

(2) After some finite period of time, $\underline{S} \subseteq R_i \subseteq \overline{S}$ for all i.

Proof: Let $x_1, \ldots, x_k$ be a sequence of individuals who drop out in part (2) of the optimistic sequence. Since x_1 does not demand the service given user set $\overline{\overline{S}}$, he cannot demand it given any user set R_i. Thus, if x_1 is a user, he is continually in disequilibrium. He must drop out in finite time and can never thereafter rejoin. Once x_1 drops out, we can apply the same reasoning sequentially to $x_2, \ldots, x_m$. Thus, after some finite period of time, all $R_i \subseteq \overline{S}$. The proof that $\underline{S} \subseteq R_i$ is exactly symmetrical. Q.E.D.

Thus, the optimistic and pessimistic sequences define bounds on user sets attainable from a particular initial user set. These bounds may (or may not) be considerably narrower than the bounds provided by the minimum and maximum equilibrium sets. In any event, within these bounds the equilibrium user set attained depends entirely on a detailed specification of the adjustment process.

☐ **Additive utilities.** In order to proceed further we must make more assumptions. To simplify the problem we propose a model of additive utilities. That is, we define a vector $\underset{\sim}{f}$ and a matrix $\underset{\sim}{V}$ such that

$$U_i^0 = f_i\,(r_{i1}, \ldots, r_{im}) \tag{11}$$

$$U_i^1 = f_i\,(r_{i1}, \ldots, r_{im}) + \sum_{j \neq i} v_{ij}\, q_i, \tag{12}$$

where v_{ij} $(i \neq j)$ is the incremental utility to individual i of a communications link with individual j, $(v_{ij} \geqslant 0.)$

The additive model assumes that these incremental utilities do not depend on consumption of other goods or on other communications links available to the individual. These do seem to be reasonable simplifying assumptions, but there are some problems with them. The growth of telephone service has had fundamental effects on social and business customs, and these would not be captured in an additive model. It has also resulted in substantial changes in communities of interest, which are assumed to be fixed in equation (12). However, the additive model would be commensurately better for analyzing smaller differences in market

penetration or for analyzing a service that does not provide so revolutionary an improvement in communications as did the invention of the telephone.

Equation (12) also assumes that the service has no value except to communicate with others who have the service. The service is worthless if no one else subscribes. This assures that the null set is an equilibrium user set at any positive price.

This assumption sounds reasonable enough, but there are some possible exceptions. An individual may have noncommunications applications for the hardware. If the service is new, he may find it prestigious or derive self-satisfaction from being an innovator. However, these kinds of considerations go beyond the scope of this paper.

The additivity assumption is quite useful and allows us to derive a convenient expression for q_i^D as shown below.

The maxima $\hat{U}_i^0$ are defined by the *ceteris paribus* conditions and do not depend on anything in the communications industry. Maximizing equation (12) with respect to $r_{i1}, \ldots, r_{im}$, subject to individual i's budget constraint, we obtain

$$\hat{U}_i^1 = \hat{U}_i^0 - h_i(p) + \sum_{j \neq i} v_{ij} q_j \tag{13}$$

for some function h_i where $h_i(0) = 0$, $h_i(p) > 0$ for all i.

It follows that

$$q_i^D = \begin{cases} 0 \text{ if } \sum_{j \neq i} v_{ij} q_j < h_i(p) \\ 1 \text{ if } \sum_{j \neq i} v_{ij} q_j \geqslant h_i(p) \end{cases} \tag{14}$$

where $v_{ij} \geqslant 0$ for all i, j.

We also assume constant marginal utility of money for a given individual. This means that $h_i(p)$ is a linear function:

$$h_i(p) = b_i p. \tag{15}$$

We can therefore write equation (14) as follows:

$$q_i^D = \begin{cases} 0 \text{ if } \sum_{j \neq i} w_{ij} q_j < p \\ 1 \text{ if } \sum_{j \neq i} w_{ij} q_j \geqslant p \end{cases} \tag{16}$$

where $w_{ij} = \dfrac{v_{ij}}{b_i}$ for all $i \neq j$.

□ **Further simplification.** Both the monotonicity and the additivity assumptions greatly simplify the problem (at some cost in realism). However, we still must deal with the matrix $\underset{\sim}{V}$ which is the size of the population squared. Thus for a city with a population of one million, $\underset{\sim}{V}$ would have one trillion entries. Clearly, further simplification is required. The following two sections consider some possibilities for breaking the problem down to manageable size.

3. Uniform calling pattern

■ The preceding section began by considering the problem in its full generality and considered some reasonable kinds of simplifying assumptions. We now take the opposite approach, beginning with a very simple model and then relaxing assumptions to make the model more complicated and realistic.

In this section we assume that all the (off-diagonal) elements in any single row of $\underset{\sim}{V}$ are equal. This implies that no one has any special community of interest other than the entire population. The *number* of subscribers affects an individual's demand, but he does not care who these subscribers are.

This may in fact be a reasonable approximation (for some purposes). We might reason that the individual communicates with a large number of people during the course of a year, many of whom he does not know in advance. The number of users may be as good a proxy as any for the incremental utility he derives from the service.

However, it is also true that most people belong to groups, each of which has a community of interest within itself. They also typically have a few principal contacts with whom they communicate more than with others. Thus, their demand for a communications service would depend on how many members of their community of interest group and which of their principal contacts subscribe to the service.

In any event, the uniform calling model seems like a good place to begin developing the theory. (This model is also adopted by Artle and Averous and Squire.)[7] It allows some strong results to be derived and provides some useful insights about interdependent demand. Results from the uniform calling model also provide convenient reference points for analyzing more complex models, which are briefly discussed in the next section of this paper.

The uniform calling model allows us to write equation (15) as follows for a large population:

$$q_i^D \begin{cases} 0 \text{ if } fw_i < p \\ 1 \text{ if } fw_i \geqslant p \end{cases}, \tag{17}$$

where $f =$ the user fraction (q/n), and

$$w_i = \sum_{j \neq i} w_{ij}.$$

This in turn allows individuals to be ordered in terms of their demand for the service. That is, if $w_i \geqslant w_j$ (i's demand exceeds j's), individual i is in every equilibrium user set that contains j.

□ **Demand curve.** Since individuals can be ordered as above, every equilibrium user set consists of *all* individuals (i) for whom $w_i \geqslant$ some K. Similarly, for any q, there is at most one equilibrium user set with q members; i.e., the q people with the highest values of w_i. (If more than one person has the minimum w_i in the user set, all persons with that w_i must be in the user set for it to be an equilibrium.)

[7] In [1] and [3], respectively.

Thus, every equilibrium user set can be uniquely characterized by q, the number of members in it. We can develop the equilibrium theory for this model in terms of the sum q, without specifying the individual elements q_i. In particular, we can define a demand curve; i.e., the locus of all the pairs (q, p) for which there exists an equilibrium user set (which would have to be the q people with highest w_i).

This gives us a convenient way of looking at the relationship between price and the equilibrium user sets. However, it is important to note that equation (10) is still indeterminate, and we must be careful in applying the demand curve in disequilibrium situations.

□ **An example.** Before discussing the general properties of such a demand curve, let us consider a specific example. Suppose the population is large, and w_i is distributed uniformly between 0 and 100 over the population. For the marginal individual

$$w_i = 100(1 - f). \tag{18}$$

For an equilibrium at $0 < f < 1$, fw_i for the marginal individual must equal p. [See equation (17).] Thus, the demand curve is the locus of points where

$$100\, f(1 - f) = p. \tag{19}$$

As previously mentioned[8] the null set ($f = 0$) is an equilibrium user set for all $p > 0$. For an equilibrium at $f = 1$, p must be less than or equal to fw_i for all individuals. But the minimum of w_i and hence fw_i is 0. Thus, the only equilibrium is $p = 0$.

FIGURE 1

DEMAND CURVE FOR UNIFORM CALLING PATTERN

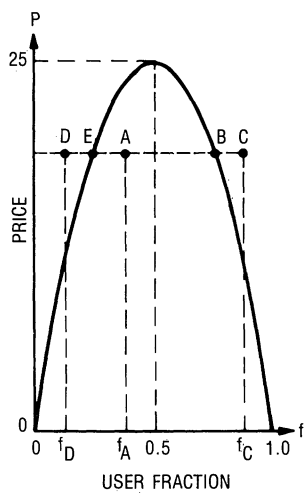


Figure 1 shows the demand curve. It consists of the entire positive p-axis plus an invested parabola going through (0,0) and (1,0) and having a maximum at (0.50,25).

The maximum equilibrium set is the right-hand side of the parabola for $0 < p \leqslant 25$; it is null for $p > 25$.

For small p, there is an enormous difference between the minimum and maximum equilibrium user sets. Thus, the actual equilibrium attained (for small p) depends critically on the initial disequilibrium conditions and the disequilibrium adjustment process.

□ **Disequilibrium analysis.** The following analysis of disequilibrium is based on the adjustment process proposed above.[9] As before, we assume a fixed price and restrict our attention to the demand side of the market. We first consider the special case in which the initial disequilibrium users are those with the highest w_i. We then consider the general case by examining arbitrary perturbations from an initial equilibrium.

□ **Initial users have highest w_i.** This subsection assumes that the initial user set consists of all individuals for whom $w_i \geqslant$ some K. This is necessarily true if the users form an equilibrium user set for any $\bar{p}$. Thus, the results apply to any disequilibrium brought about by a price change from an initial equilibrium.

[8] P. 26.
[9] P. 22.

Suppose we are originally in disequilibrium at A (in Figure 1), underneath the parabola. Given the user fraction f_A, the equilibrium price is higher than the actual price. All users are satisfied, but some nonusers would prefer to become users. If p remains constant, the user fraction will ultimately increase to B.

Suppose we are originally in disequilibrium at C. Given f_C, actual price exceeds equilibrium price, and f declines to B.

Suppose we are originally in disequilibrium at D. Given f_D, actual price exceeds the equilibrium price. So, f declines. As f declines, the discrepancy between actual and equilibrium price increases until the market achieves equilibrium at $f = 0$.

In all these cases, the order in which individuals join or drop out is immaterial. The optimistic and pessimistic sequences are equivalent, and all versions of the adjustment process converge to the same equilibrium user set.

In general, the positive p-axis and the downward sloping part of the parabola in Figure 1 consist of stable equilibria. The upward sloping part of the parabola consists of unstable equilibria.

The upward sloping part of the parabola can be regarded as a "critical mass" for the service. That is, for any positive price below the maximum of the parabola, the market must be forced to some initial disequilibrium beyond the critical mass before the service can grow by itself. The higher the price, the higher is the critical mass.

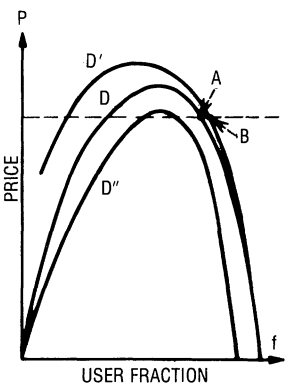
□ **Arbitrary perturbations from equilibrium.** The preceding analysis does *not* necessarily apply for arbitrary initial conditions. An initial user set of y people may converge to very different equilibria depending on who those y people are and on a more detailed specification of the adjustment process (than given above[10]).

For example, suppose the initial user set of y people contains none of the y people with highest w_i. Suppose it contains the people with the next y highest values of w_i. Even though the initial market penetration is y, the market can achieve a critical mass of $2y$ if the y nonusers with highest w_i all subscribe before any of the initial users drop out (optimistic sequence). However, if all the initial users who do not demand the service drop out before any nonusers subscribe (pessimistic sequence), the market may fail to achieve a critical mass much lower than y.

The results of the preceding subsection do apply for small but arbitrary perturbations (in the user set) from an original stable equilibrium. For example, suppose the market is originally in the stable equilibrium at A in Figure 2, and a set (R) of nonusers subscribes. We can analyze this by constructing a demand curve conditional on all members of R being users (D' in Figure 2). The perturbation of R becoming users may cause additional users to subscribe. However, no matter what the adjustment process is (subject to the rules laid down above[11]), demand can never expand beyond B. And at B (or any point between B and A), only people in the *original* equilibrium set demand the service. Thus,

FIGURE 2

ARBITRARY PERTURBATIONS FROM EQUILIBRIUM



[10] P. 22.
[11] P. 22.

the market eventually goes back to A (so long as the price remains fixed).

In the general case the perturbation may involve users dropping out as well as nonusers joining. We analyze this by constructing D' as before and D'', demand conditional on those who drop out being nonusers. The market might converge to $f = 0$, if the perturbation is large and brings demand below critical mass. However, if the perturbation is sufficiently small, D'' will be sufficiently close to D that demand cannot go below critical mass. Thus, the market must return to the initial equilibrium.

This reasoning also applies to the stable equilibria at $f = 0$. If the perturbation is sufficiently small, D' will be sufficiently close to D that critical mass cannot be achieved, and the market must return to the initial equilibrium.

□ **General properties of the model.** Some properties of the above example apply generally to all uniform calling models. The entire positive p-axis always consists of stable equilibria. The demand curve always has an upward-sloping part, which constitutes the critical mass for the service for initial users sets with maximal w_i. It always has a downward sloping part (perhaps vertical), which consists of stable equilibria. However, both parts need not be unique, and the demand curve may be jagged. This allows the possibility of many stable equilibria for a given price.

4. Nonuniform calling patterns

■ This section considers some models that are more complex than the uniform calling model. Some specific results are presented, but they are naturally not so strong as those of the previous section. Our primary objective is to point out the analytical complexities in such models and suggest some ways of dealing with them.

□ **Community of interest groups.** Suppose the population consists of k groups ($k \leqslant n$). We assume that an individual has the same community of interest with everyone in the same group. However, this community of interest may be different for different groups. Mathematically, we assume that if individuals j and m are in the same group, $v_{ij} = v_{im}$ for all i.

□ **Disjoint groups.** The simplest case is disjoint groups. That is, $v_{ij} = 0$ unless i and j are in the same group. In such a model, we can consider each group as a separate population, and all the analysis of the previous section carries over. A critical mass can be defined for each group in terms of market penetration within that group. For given $\bar{p}$ the maximum possible number of stable equilibria is 2^k (unless the demand curve for some groups is jagged). The equilibria are characterized by which of the k groups achieve their critical mass.

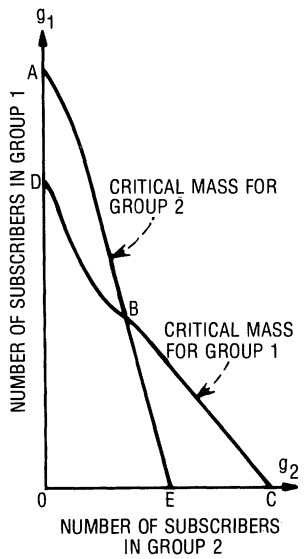
□ **Joint groups.** We now consider the case of joint groups, where v_{ij} does not necessarily equal zero for i and j in different groups.

In this model, the incremental utility of the service to an individual is a function of the g_i (number of subscribers in the ith group). Thus, we can define the critical mass for each group as a function of all the g_i (and p). This is illustrated in Figure 3 for the case of two groups.

If the initial user set in Figure 3 consists of individuals with the highest w_i in each group (a weaker condition than requiring initial users to have the highest w_i in the population), we have the following result. If all groups achieve their critical mass (initial market penetration outside *ABCO* in Figure 3), the service will expand to the maximum equilibrium set. If no group achieves its critical mass (initial market penetration within *DBEO* in Figure 3), the service will collapse to the minimum equilibrium set. If some groups achieve their critical mass but others do not (initial market penetration within *ABD* or *BCE* in Figure 3), the service may expand to the maximum equilibrium set, collapse to the minimum equilibrium set, or achieve equilibrium somewhere in between. Which of these occurs depends on the parameters of the static model, the initial market penetration in each group, and the disequilibrium adjustment process. An upper bound on the number of stable equilibria is 2^k (unless the demand surface is jagged). Each equilibrium is characterized by which of the k groups achieve their critical mass and which do not.

FIGURE 3

CRITICAL MASSES FOR MODEL WITH COMMUNITIES OF INTEREST



☐ **Further refinements.** Introducing further refinements into the model is straightforward. As before, we somehow divide the population into k groups such that within each group individuals can be ordered in terms of their demand for the service. For greater realism, we could have a large value for k, but that has the drawback of requiring us to deal with a k-dimensional quantity vector and to contend with the possibility of many different equilibria (for each price).

☐ **Few principal contacts.** An individual's demand may depend primarily on which of his few principal contacts are users. A basic analytical tool for studying such demand is the "self-sufficient" user set; i.e., a set of individuals, each of whom demands the service conditional on all others in the set being users. An equilibrium user set must, of course, be self sufficient, but the converse is not necessarily true. Someone outside the self-sufficient set may demand the service if everyone in the set has it.

All self-sufficient sets necessarily belong to the maximum equilibrium user set. Moreover, if the entire self-sufficient set is contained in the initial disequilibrium user set, then the entire self-sufficient set is necessarily part of the final equilibrium user set.

In any practical problem, we could never hope to have a complete empirical list of principal contacts. The way to proceed in such cases is to specify a probability distribution which indicates (approximately) how likely various configurations of principal contacts are. This leads to some interesting combinatorial analysis but goes beyond the scope of this paper.

5. Some implications for supply and pricing

■ Costs of providing a communications service depend on the constituency of the user set as well as its size. These costs are in themselves fully as complex as interdependent demand. Such complexities go beyond the scope of this paper, which is a study of interdependent *demand*. Nevertheless, it is useful to look at some implications of the preceding sections for supply and pricing of the service. We assume that the service is provided by a (regulated) monopoly and specify a very general cost function:

$$C = C(q_1, \ldots, q_n), \tag{20}$$

where C is strictly monotonic (equality *not* allowed) in all its arguments.

We investigate various kinds of pricing strategies, some involving short-run losses. However, we assume that in (long-run) equilibrium, the monopoly must earn nonnegative profits. Some of the pricing strategies considered involve discriminatory pricing, but we do not assume that perfect discrimination is necessarily possible. Indeed, perfect discrimination would surely not be possible in any realistic situation. Consequently, the nonnegative profit restriction may be inconsistent with Pareto optimality. It is nevertheless consistent with existing real-world institutions.

We can now make a crucial distinction for planning supply of a communications service; i.e., the difference between "viability of the service" and "the start-up problem." Viability is determined solely by the static model. It means that there exists a nonnull equilibrium user set that can be served with nonnegative profits. (We also refer to such a user set as "viable.") The start-up problem is a dynamic consideration. It refers to the costs and practical difficulties of attaining a viable user set, starting from a small or null initial user set.

From a static point of view, any viable user set is superior to the null user set (in the sense that the supplier of the service and all users are at least as well off as before and possibly better off. Nonusers' utilities are unchanged).[12] If there are several viable user sets, they can be compared to determine the social optimum (subject to the nonnegative profit restriction). We can also determine the overall market equilibria consistent with various static supply models.

However, this kind of static analysis is incomplete and may in fact be misleading. We must also consider the dynamic aspects; i.e., the start-up problem. If the initial user set is small or null, the static social optimum may require ruinous (albeit temporary) promotional costs. Thus, all things considered, a smaller user set, or perhaps even the null set, may be superior.

The remainder of this section discusses various possible solutions to the start-up problem. We consider the case of a new service (e.g., a video communications service) and assume that the initial user set is null. This is necessarily an equilibrium user set at all positive prices. Thus, the service, even though viable,

[12] Of course, this issue becomes much more complicated if we consider interrelationships with other markets and possible income redistribution.

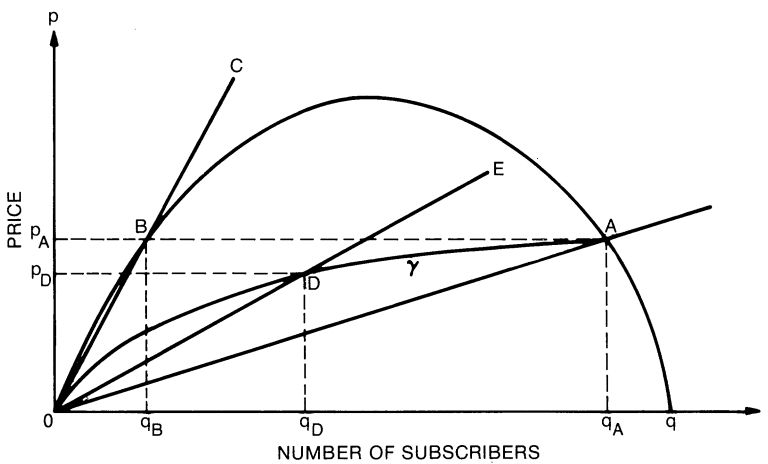
cannot get started by itself. It requires some positive action by the seller, probably involving temporary losses. The next three subsections consider some possible start-up strategies in the context of the various demand models we have studied in the previous sections.

Although we assume in this analysis that the product is viable, it is worth noting that in real life the seller would have no such guarantee. There is always a risk involved in introducing a new product or service. The seller generally faces certain losses when the product or service is first introduced and the *prospect* of future profits. In a regulatory environment, the supplier must consider how the regulators will respond if the service succeeds and how they will respond if it fails.

☐ **Uniform calling pattern.** Let us assume that the demand curve is a (nonjagged) inverted U, and suppose the desired nonnull equilibrium set is A in Figure 4. The long-run optimal price is P_A, but some method must be contrived to get beyond the critical mass.

FIGURE 4

SOLVING THE START-UP PROBLEM



☐ **Direct approach.** The most direct approach is to give the service free to a selected group of people for a limited time. For this method to succeed, the initial user set must, of course, be sufficiently large to achieve critical mass. Half measures are worse than useless. If critical mass is not achieved, the whole effort will be a complete failure, and demand will eventually contract to zero.

The success of this approach may also depend on how the initial user set is selected. The discussion above[13] shows that the optimal initial user does not necessarily consist of those with maximal w_i. (In the example, an alternative choice of y people allowed a critical mass of $2y$ to be achieved.) However, if any other set is chosen, there should be some assurance that the initial users will not discontinue the service before those with higher w_i subscribe.

[13] P. 29.

If they do discontinue, the start-up effort will have failed to achieve anything.

□ **Low introductory price.** Another way to start up the service is to have a low introductory price. This price could then be raised as the number of subscribers increased. There are any number of ways this could be accomplished. We can represent the introductory program as an expansion path in (q,p) space; e.g., γ in Figure 4. The expansion path shows how p increases as q increases.

The expansion path must pass through the origin to get the service started in this simple model. If, in addition, the expansion path is always concave downward, the introductory program has a very desirable property. Regardless of the order in which individuals enter the market, no individual ever subscribes and then later discontinues service after price and quantity rise along the expansion path. The proof is as follows. Suppose an individual enters at D. That means he is willing to pay p_D to have the service available for q_D of his communication. It follows from the uniform calling assumption that he would be an equilibrium user at *any* point along the straight line OE through D. But the concavity assumption assures that the expansion path γ is always below OE for $p > p_D$, $q > q_D$. Thus, if the individual joins at D, he cannot drop out at any point on γ to the right of D. Q.E.D.

The above condition can be very important if the cost of connecting an individual to the network is large.

Perhaps the most interesting program with a low introductory price is usage-proportional pricing. The remainder of this subsection investigates that plan under various assumptions.

We first consider the possibility that all subscribers have equal usage, proportional to the number of subscribers. It follows that price is also proportional to number of subscribers [instead of proportional to a quadratic function of number of subscribers as in the equilibrium model, equation (19)], and the expansion path of the service is a straight line.

One possibility would be to let $p = p_A \frac{q}{q_A}$. In that case demand would expand along OA. Price would increase automatically as q increased. When q reached the optimum, q_A, price would just equal its optimum, p_A.

An alternative is to let $p = p_A \frac{q}{q_B}$. Demand would expand along OB until the critical mass was reached. Then, for further expansion price should be fixed at $p_A(-\epsilon)$, and demand would expand along BA.

Unfortunately, the equal-usage assumption may not be very realistic. If not, usage-proportional pricing would exclude individuals with a lot of low value usage, and would admit (for a low price) individuals with a small amount of high value usage.

This might not be a bad idea, even in the long run. In general, usage-proportional pricing would be appropriate if the network were being used at capacity, and costs were closely related to total usage, not necessarily to the number of subscribers. A fixed price per subscriber would be appropriate if the network were not being

used at capacity, and much equipment had to be committed for each subscriber.

The latter is perhaps more typical of a new communications service. Thus, usage-proportional pricing would probably result in some inefficiencies and misallocation of resources. Whether these inefficiencies are substantial or trivial is an empirical question. In any event, they should be compared to the inefficiencies of other start-up programs; e.g., the direct approach discussed in the previous subsection.

For a mature service the price should probably have a higher fixed component and a lower usage component. However, the externalities in consumption still have to be taken into account.[14]

A program with a low introductory price relies more on market processes than does the direct approach discussed in the previous subsection and does not depend so critically on the managers' judgment. In particular, the managers are not required to determine which individuals have the highest w_i. The individuals select themselves by choosing to subscribe to the service at the offered price.

☐ **Community of interest groups.** Community of interest groups may greatly reduce the practical difficulty of starting up the service. Maximum equilibrium demand may be achieved even if the initial user set is small—so long as that set exceeds the critical masses for some community of interest groups.

At the same time, community of interest groups place a greater burden on whatever procedure is used to select the initial users. If the initial user set is selected by managers, they must know what the community of interest groups are and decide how many individuals to select from each. In some circumstances, it would be optimal to select everyone from the same group; in other cases a more even spread would be optimal. In any event, the managers must make this choice, and the success of the program may be greatly influenced by how well they choose.

Community of interest groups also place a greater burden on the market process for programs involving a low introductory price. The expansion path involves price and $g_1, \ldots g_k$ (instead of q as in Figure 4). Efficiency requires that k different linear combinations of the g_i be concave downward. (The equivalent condition to γ's being concave downward in Figure 4.) But we have only one control variable, p. Clearly, it may be impossible to satisfy all k concavity conditions.

Thus, *any* program based on a (single) low introductory price may be inefficient in the sense that some individuals may join at the low introductory price but later drop out as the price rises. If this problem is serious, the seller may find it advantageous (and perhaps necessary) to use discriminatory pricing to assure that only "permanent" users join.

☐ **Few substantial contacts.** If an individual's demand depends on his principal contacts' being users, the start-up problem may be

[14] See Squire [3].

fundamentally different from that discussed above. It may be unnecessary for there to be hundreds or thousands of users before an individual demands the service. A user population of two or three may be self-sufficient—if they are the right two or three people.

These small self-sufficient sets do not necessarily promote further growth, but they do allow a different kind of approach to starting up the service. The seller can begin by establishing small self-sufficient user sets. He can then gradually expand the size and number of these sets until the desired equilibrium user set is attained or until the service starts to grow by itself. The practicality of this method depends primarily on the size of the (minimum) self-sufficient user sets.

The smallest possible self-sufficient user sets consists of two mutual contacts for whom both v_{ij} and $v_{ji} \geqslant p$. If there are many such pairs i, j in the population, the service will start up, expanding beyond the minimum equilibrium set, with little or no help. Selling the service to i and j requires only getting the two together. And they may organize themselves and agree to subscribe to the service (contrary to the disequilibrium adjustment process assumed above[15]). After i and j both subscribe to the service, they may attract other individuals, and the service can grow further.

In fact, such growth from self-sufficient sets of two probably accounts in large part for the success in starting up telephone service. Indeed, telephone made a substantial penetration of the market while it was entirely a private-line service.

However, even if the service is viable, its incremental utility may be insufficient for very many people to demand the service to communicate with a single principal contact. If this is the case, the start-up problem is more difficult, and we must deal with larger self-sufficient user sets.

A self-sufficient set of three mutual contacts might also be able to organize itself and have all three members agree to subscribe together. However, this becomes progressively more difficult and unlikely as the size of the self-sufficient sets increases. It would be especially difficult if all the members of the set were not mutual contacts and no one knew all the other members of the set.

The seller might be able to gather data and determine self-sufficient user sets. He could then try to sell the service to everyone in such a set simultaneously. Naturally this is more difficult, the larger is the self-sufficient set. In fact, the difficulties of organizing even six to eight people and getting them all to agree to a joint purchasing decision may be far from trivial.

Nevertheless, the seller might do well to gather data on communications patterns and try to determine self-sufficient user sets. But it may be necessary to combine this with some other kind of start-up program. This could take the form of the direct approach or the low introductory price previously discussed. However, it is also possible to have a continual program in which each new subscriber is offered a low rate until the seller can connect a self-sufficient set of users that contains him. This kind of program

[15] P. 22.

would be effective if new users had high values of w_i but little community of interest with the current user set.

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EXHIBIT GS-18

BANDWAGON, SNOB, AND VEBLEN EFFECTS IN THE THEORY OF CONSUMERS' DEMAND

SUMMARY

I. The nature of the problem, 183. — II. Functional and nonfunctional demand, 188. — III. The bandwagon effect, 190. — IV. The snob effect, 199. — V. The Veblen effect, 202. — VI. Mixed effects, 205. — VII. Conclusion, 206.

I. The Nature of the Problem[1]

The desire of some consumers to be "in style," the attempts by others to attain exclusiveness, and the phenomena of "conspicuous consumption," have as yet not been incorporated into the current theory of consumers' demand. My purpose, in this paper, is to take a step or two in that direction.

1. *"Non-additivity" in Consumers' Demand Theory*

This enquiry was suggested by some provocative observations made by Professor Oskar Morgenstern in his article, "Demand Theory Reconsidered."[2] After examining various aspects of the relationship between individual demand curves and collective market demand curves Professor Morgenstern points out that in some cases the market demand curve is not the lateral summation of the individual demand curves. The following brief quotation may indicate the nature of what he calls "non-additivity" and give some indication of the problem involved. "Non-additivity in this simple sense is given, for example, in the case of fashions, where one person buys because another is buying the same thing, or vice versa. The collective demand curve of snobs is most likely not additive. But the phenomenon of non-additivity is in fact much deeper; since virtually all collective supply curves are non-additive it follows that the demand of the firms for their labor, raw materials, etc. is also non-additive. This expands the field of non-additivity enormously."[3]

Since the purpose of Professor Morgenstern's article is immanent criticism he does not present solutions to the problems he raises. He does clearly imply, however, that since coalitions are bound to be important in this area only the "Theory of Games" (developed by Von Neumann and Morgenstern) is likely to give an adequate solution to this problem.[4] The present writer is not competent to judge

1. The writer wishes to take this opportunity to thank Professor Ansley Coale and Messrs. Carey P. Modlin and Norman B. Ryder for their painstaking criticism of an earlier draft of this paper.

2. This *Journal*, February 1948, pp. 165–201.

3. *Ibid.*, p. 175 n.

4. *Ibid.*, p. 201.

whether this is or is not the case, but he does believe that there are many markets where coalitions among consumers are not widespread or of significance, and hence abstracting from the possibility of such coalitions may not be unreasonable. Should this be the case we may be able to make some headway through the use of conventional analytical methods.

What we shall therefore be concerned with substantially is a reformulation of some aspects of the static theory of consumers' demand while permitting the relaxation of one of the basic implicit assumptions of the current theory — namely, that the consumption behaviour of any individual is independent of the consumption of others. This will permit us to take account of consumers' motivations not heretofore incorporated into the theory. To be more specific, the proposed analysis is designed to take account of the desire of people to wear, buy, do, consume, and behave like their fellows; the desire to join the crowd, be "one of the boys," etc. — phenomena of mob motivations and mass psychology either in their grosser or more delicate aspects. This is the type of behaviour involved in what we shall call the "bandwagon effect." On the other hand, we shall also attempt to take account of the search for exclusiveness by individuals through the purchase of distinctive clothing, foods, automobiles, houses, or anything else that individuals may believe will in some way set them off from the mass of mankind — or add to their prestige, dignity, and social status. In other words, we shall be concerned with the impact on the theory created by the potential nonfunctional utilities inherent in many commodities.

2. *The Past Literature*

The past literature on the interpersonal aspects of utility and demand can be divided into three categories: sociology, welfare economics, and pure theory. The sociological writings deal with the phenomena of fashions and conspicuous consumption and their relationship to social status and human behaviour. This treatment of the subject was made famous by Veblen — although Veblen, contrary to the notions of many, was neither the discoverer nor the first to elaborate upon the theory of conspicuous consumption. John Rae, writing before 1834, has quite an extensive treatment of conspicuous consumption, fashions, and related matters pretty much along Veblenian lines.[5] Rae attributes many of these ideas to earlier

5. John Rae, *The Sociological Theory of Capital* (London: The Macmillan Co., 1905), especially Chap. XIII, "Of Economic Stratification," and Appendix I, "Of Luxury," pp. 218–276.

writers, going so far as to find the notion of conspicuous consumption in the Roman poet Horace; and a clear statement of the "keeping up with the Joneses" idea in the verse of Alexander Pope.[6] An excellent account of how eighteenth and nineteenth century philosophers and economists handled the problem of fashion is given in Norine Foley's article "Fashion."[7] For the most part, these treatments are of a "sociological" nature.

The economist concerned with public policy will probably find the "economic welfare" treatment of the problem most interesting. Here, if we examine the more recent contributions first and then go backward, we find examples of current writers believing they have stumbled upon something new, although they had only rediscovered what had been said many years before. Thus, Professor Melvin Reder in his recent treatment of the theory of welfare economics claims that " . . . there is another type of external repercussion which is rarely, *if ever*, recognized in discussions of welfare economics. It occurs where the utility function of one individual contains, as variables, the quantities of goods consumed by other persons."[8] It can only be lack of awareness of the past literature that causes Reder to imply that this consideration has not been taken up before. Among those who considered the problem earlier are J. E. Meade,[9] A. C. Pigou,[1] Henry Cunynghame,[2] and John Rae.[3]

The similarity in the treatment of this matter by Reder and Rae is at times striking. For example, Reder suggests that legislation forbidding "invidious expenditure" may result in an increase in welfare by freeing resources from "competitive consumption" to other uses.[4] In a similar vein Rae argued that restrictions on the trade of "pure luxuries" can only be a gain to some and a loss to none, in view of the labor saved in avoiding the production of "pure luxuries." It is quite clear from the context that what Rae calls "pure luxuries" is exactly the same as Reder's commodities that enter into "competitive consumption."[5]

6. *Ibid.*, pp. 249 and 253.
7. *Economic Journal*, 1893, pp. 458–474.
8. *Studies in the Theory of Welfare Economics* (New York: Columbia University Press, 1947), p. 64. Italics mine.
9. "Mr. Lerner on the Economics of Control," *Economic Journal*, 1945, pp. 51–56.
1. *The Economics of Welfare* (4th Edition, 1929), pp. 190–192, 225–226, 808.
2. "Some Improvements in Simple Geometrical Methods of Treating Exchange Value, Monopoly, and Rent," *Economic Journal*, 1892, pp. 35–39.
3. Rae, *op. cit.*, pp. 277–296.
4. Reder, *op. cit.*, pp. 65–66.
5. Rae, *op. cit.*, pp. 282–288.

One reason why the interpersonal effects on demand have been ignored in current texts may be the fact that Marshall did not consider the matter in his *Principles*. We know, however, from Marshall's correspondence,[6] that he was aware of the problem. Both Cunynghame and Pigou pointed out that Marshall's treatment of consumers' surplus did not take into account interpersonal effects on utility. Marshall seemed to feel that this would make the diagrammatical treatment too complex. Recently, Reder[7] and Samuelson[8] noticed that external economies and diseconomies of consumption may vitiate (or, at best, greatly complicate) their "new" welfare analysis, and hence, in true academic fashion, they assume the problem away. This, however, is not the place to examine the question in detail.

The only attack on the problem from the point of view of pure theory that the writer could find[9] is a short article by Professor Pigou.[1] In this article Pigou sets out to inquire under what circumstances the assumption of the additivity of the individual demand curves "adequately conforms to the facts, and, when it does not so conform, what alternative assumption ought to be substituted for it."[2] It is obvious that the particular choice of alternative assumptions will determine (*a*) whether a solution can, given the existing analytical tools, be obtained, and (*b*) whether such a solution is relevant to the real world. Pigou's treatment of the problem is, unfortunately, exceedingly brief. He attempts to deal with non-additivity in both supply and demand curves within the confines of six pages. In examining the additivity assumption he points out that it is warranted when (1) the demand for the commodity is wholly for the direct satisfaction yielded by it or, (2) where disturbances to equilibrium are so small that aggregate output is not greatly changed.

6. Pigou, *Memorials of Alfred Marshall*, pp. 433 and 450. These are Marshall's letters to Pigou and Cunynghame which indicate that Marshall had read the articles (*E. J.* 1892, and *E. J.* 1903), where Pigou and Cunynghame consider the matter.

7. Reder, *op. cit.*, p. 67. "We shall assume, throughout its remainder, that the satisfaction of one individual does not depend on the consumption of another."

8. *Foundations of Economic Analysis*, p. 224.

9. James S. Duesenberry, in his recent book, *Income, Saving, and the Theory of Consumer Behavior* (Harvard University Press, 1949), considers problems of a somewhat similar nature but handles them in quite a different manner. Chapter VI on interdependent preferences and the "new" welfare analysis is especially worthy of mention. Duesenberry's treatment of the problem helps considerably to fill an important gap in the current theory. Unfortunately, Mr. Duesenberry's work came to the attention of the writer too late to be given the detailed consideration it deserves.

1. "The Interdependence of Different Sources of Demand and Supply in a Market," *Economic Journal*, 1913, pp. 18–24.

2. *Ibid.*, p. 18.

After briefly suggesting some of the complexities of non-additivity he concludes that the " . . . problems, for the investigation of which it is necessary to go behind the demand schedule of the market as a whole, are still, theoretically, soluble; there are a sufficient number of equations to determine the unknowns."[3] This last point, which is not demonstrated in Pigou's article, is hardly satisfying since it has been shown that the equality of equations and unknowns is not a sufficient condition for a determinate solution, or indeed for any solution, to exist.[4]

3. *The Approach and Limits of the Ensuing Analysis*

It should, perhaps, be pointed out at the outset that the ensuing exposition is limited to statics. In all probability, the most interesting parts of the problem, and also those most relevant to real problems, are its dynamic aspects. However, a static analysis is probably necessary, and may be of significance, in order to lay a foundation for a dynamic analysis. In view of the limitations to be set on the following analysis, it becomes necessary to demarcate clearly the conceptual borderline between statics and dynamics.

There are, unfortunately, numerous definitions of statics and there seems to be some confusion on the matter. In view of this it will not be possible to give *the* definition of statics. All that we can hope to do is to choose *a* definition that will be consistent with and useful for our purposes — and also one that at the same time does not stray too far from some of the generally accepted notions about statics. Because of the fact that we live in a dynamic world most definitions of statics will imply a state of affairs that contradicts our general experience. But this is of necessity the case. What we must insist on is internal consistency but we need not, at this stage, require "realism."

Our task, then, is to define a static situation — a situation in which static economics is applicable. Ordinarily, it is thought that statics is in some way "timeless." This need not be the case. For our purposes, a static situation is not a "timeless" situation, nor is static economics timeless economics. It is, however, "temporally orderless" economics. That is, we shall define a static situation as one in which the order of events is of no significance. We, therefore,

3. *Ibid.*, p. 24.

4. On this point cf. Morgenstern, "Professor Hicks on Value and Capital," *Journal of Political Economy*, June 1941, pp. 368–376. See also part of an article by Don Patinkin, "The Indeterminacy of Absolute Prices in Classical Economic Theory," *Econometrica*, January 1949, pp. 310–311, which sets out the conditions under which systems of homogeneous equations will possess no solution.

abstract from the consequences of the temporal order of events.[5] The above definition is similar to, but perhaps on a slightly higher level of generality than, Hicks's notion that statics deals with "those parts of economic theory where we do not have to trouble about dating."[6]

In order to preserve internal consistency, it is necessary to assume that the period of reference is one in which the consumer's income and expenditure pattern is synchronized. And, we have to assume also that this holds true for all consumers. In other words, we assume that both the income patterns and the expenditure patterns repeat themselves *every* period. There is thus no overlapping of expenditures from one period into the next. This implies, of course, that the demand curve reconstitutes itself every period.[7] The above implies also that only one price can exist during any unit period and that price can change only from period to period. A disequilibrium can, therefore, be corrected only over two or more periods.

II. Functional and Nonfunctional Demand

At the outset it is probably best to define clearly some of the basic terms we are going to use and to indicate those aspects of demand that we are going to treat. The demand for consumers' goods and services may be classified according to motivation. The following classification, which we shall find useful, is on a level of abstraction which, it is hoped, includes most of the motivations behind consumers' demand.

A. Functional
B. Nonfunctional
   1. External effects on utility
      (a) Bandwagon effect
      (b) Snob effect
      (c) Veblen effect
   2. Speculative
   3. Irrational

By functional demand is meant that part of the demand for a commodity which is due to the qualities inherent in the commodity

5. An excellent discussion of the above problem, the relationship between the notions of time in economics and various definitions of statics and dynamics, can be found in W. C. Hood, "Some Aspects of the Treatment of Time in Economic Theory," *The Canadian Journal of Economics and Political Science*, 1948, pp. 453–468.

6. *Value and Capital*, p. 115.

7. The above assumptions are necessary in order to take care of some of the difficulties raised by Professor Morgenstern in "Demand Theory Reconsidered."

itself. By nonfunctional demand is meant that portion of the demand for a consumers' good which is due to factors other than the qualities inherent in the commodity. Probably the most important kind of nonfunctional demand is due to external effects on utility. That is, the utility derived from the commodity is enhanced or decreased owing to the fact that others are purchasing and consuming the same commodity, or owing to the fact that the commodity bears a higher rather than a lower price tag. We differentiate this type of demand into what we shall call the "bandwagon" effect, the "snob" effect, and the "Veblen" effect.[8] By the bandwagon effect, we refer to the extent to which the demand for a commodity is *increased* due to the fact that others are also consuming the same commodity. It represents the desire of people to purchase a commodity in order to get into "the swim of things"; in order to conform with the people they wish to be associated with; in order to be fashionable or stylish; or, in order to appear to be "one of the boys." By the snob effect we refer to the extent to which the demand for a consumers' good is *decreased* owing to the fact that others are also consuming the same commodity (or that others are increasing their consumption of that commodity). This represents the desire of people to be exclusive; to be different; to dissociate themselves from the "common herd." By the Veblen effect we refer to the phenomenon of conspicuous consumption; to the extent to which the demand for a consumers' good is increased because it bears a higher rather than a lower price. We should perhaps emphasize the distinction made between the snob and the Veblen effect — the former is a function of the consumption of others, the latter is a function of price.[9] This paper will deal almost exclusively with these three types of nonfunctional demand.

For the sake of completeness there should perhaps be some explanation as to what is meant by speculative and irrational demand. Speculative demand refers to the fact that people will often "lay in" a supply of a commodity because they expect its price to rise. Irrational demand is, in a sense, a catchall category. It refers to purchases that are neither planned nor calculated but are due to sudden urges, whims, etc., and that serve no rational purpose but that of satisfying sudden whims and desires.

8. It is assumed from here on that the reader will be aware that these terms will be used in the special sense here defined, and hence the quotation marks will hereafter be deleted.

9. Some writers have not made the above distinction but have combined the two effects into what they termed "snob behaviour" (see Morgenstern, *op. cit.*, p. 190). The above does not imply that our distinction is necessarily the "correct" one, but only that it is found useful in our analysis.

In the above it was assumed throughout that income is a parameter. If income is not given but allowed to vary, then the income effect on demand may in most cases be the most important effect of all. Also, it may be well to point out that the above is only one of a large number of possible classifications of the types of consumers' demand — classifications that for some purposes may be superior to the one here employed. We therefore suggest the above classification only for the purposes at hand and make no claims about its desirableness, or effectiveness, in any other use.

III. The Bandwagon Effect

1. *A Conceptual Experiment*

Our immediate task is to obtain aggregate demand curves of various kinds in those cases where the individual demand curves are non-additive. First we shall examine the case where the bandwagon effect is important. In its pure form this is the case where an individual will demand more (less) of a commodity at a given price because some or all other individuals in the market also demand more (less) of the commodity.

One of the difficulties in analyzing this type of demand involves the choice of assumptions about the knowledge that each individual possesses. This implies that everyone knows the quantity that will be demanded by every individual separately, or the quantity demanded by all individuals collectively at any given price — after all the reactions and adjustments that individuals make to each other's demand has taken place. On the other hand, if we assume ignorance on the part of consumers about the demand of others, we have to make assumptions as to the nature and extent of the ignorance — ignorance is a relative concept. A third possibility, and the one that will be employed at first, is to devise some mechanism whereby the consumers obtain accurate information.

Another problem involves the choice of assumptions to be made about the demand behaviour of individual consumers. Three possibilities suggest themselves: (1) The demand of consumer A (at given prices) may be a function of the total demand of all others in the market collectively. Or, (2) the demand of consumer A may be a function of the demand of all other consumers both separately and collectively. In other words, A's demand may be more influenced by the demand of some than by the demand of others. (3) A third possibility is that A's demand is a function of the number of people that demand the commodity rather than the number of units demanded. More complex demand behaviour patterns that combine some of the

elements of the above are conceivable. For present purposes it is best that we assume the simplest one as a first approximation.[1] Initially, therefore, we assume that A's demand is a function of the units demanded by all others collectively. This is the same as saying that A's demand is a function of total market demand at given prices, since A always knows his own demand, and he could always subtract his own demand from the total market demand to get the quantity demanded by all others.

In order to bring out the central principle involved in the ensuing analysis, consider the following *gedankenexperiment.* A known product is to be introduced into a well-defined market at a certain date. The nature of the product is such that its demand depends partially on the functional qualities of the commodity, and partially on whether many or few units are demanded. Our technical problem is to compound the nonadditive individual demand curves into a total market demand curve, given sufficient information about the individual demand functions. Now, suppose that it is possible to obtain an accurate knowledge of the demand function of an individual through a series of questionnaires. Since an individual's demand is, in part, a function of the total market demand, it is necessary to take care of this difficulty in our questionnaires. We can have a potential consumer fill out the first questionnaire by having him assume that the total market demand, at all prices, is a given very small amount — say 400 units. On the basis of this assumption the consumer would tell us the quantities he demands over a reasonable range of prices. Subjecting every consumer to the same questionnaire, we add the results across and obtain a market demand curve that would reflect the demand situation if every consumer believed the total demand were only 400 units. This, however, is not the real market demand function under the assumption of the possession of accurate market information by consumers, since the total demand (at each price) upon which consumers based their replies was not the actual market demand (at each price) as revealed by the results of the survey. Let us call the results of the first survey "schedule No. 1."

We can now carry out a second survey, that is, subject each consumer to a second questionnaire in which each one is told that schedule No. 1 reflects the total quantities demanded, at each price.

1. As is customary in economic theory the ensuing analysis is carried out on the basis of a number of simplifying assumptions. The relaxation of some of the simplifying assumptions and the analysis of more complex situations must await some other occasion. The present writer has attempted these with respect to some of the simplifying assumptions but the results cannot be included within the confines of an article of the usual length.

Aggregating the replies we obtain schedule No. 2. Schedule No. 1 then becomes a parameter upon which schedule No. 2 is based. In a similar manner we can obtain schedules No. 3, No. 4, . . . , No. n in which each schedule is the result of adding the quantities demanded by each consumer (at each price), *if each consumer believes that the total quantities demanded (at each price) are shown by the previous schedule.* Now, the quantities demanded in schedule No. 2 will be greater than or equal to the quantities demanded in schedule No. 1 for the same prices. Some consumers may increase the quantity they demand when they note that the total quantity demanded, at given prices, is greater than they thought it would be. As long as some consumers or potential consumers continue to react positively to increases in the total quantity demanded the results of successive surveys will be different. That is, some or all of the quantities demanded in schedule No. 1 will be less than the quantities demanded at the same prices, in schedule No. 2, which in turn will be equal to or less than the quantities demanded, at the same prices, in schedule No. 3, and so on.

At this point it is appropriate to introduce a new principle with the intention of showing that this process cannot go on indefinitely. Sooner or later two successive schedules will be identical. If two successive surveys yield the same market demand schedules, then an equilibrium situation exists since the total quantities demanded, at each price, upon which individual consumers based their demand, turns out to be correct. Thus, if schedule No. n is identical with schedule No. n-1, then schedule No. n is the actual market demand function for the product on the assumption that consumers have accurate information of market conditions.

The question that arises is whether there is any reason to suppose that sooner or later two successive surveys will yield exactly the same result. This would indeed be the case if we could find good reason to posit a principle to the effect that for every individual there is some point at which he will cease to increase the quantities demanded for a commodity, at given prices, in response to incremental increases in total market demand. Such a principle would imply that beyond a point incremental increases in the demand for the commodity by others have a decreasing influence on a consumer's own demand; and, further, that a point is reached at which these increases in demand by others have no influence whatsoever on his own demand. It would, of course, also be necessary to establish that such a principle holds true for every consumer. It would not be inappropriate to call this the principle of diminishing marginal external consumption effect.

Does such a principle really exist? There are some good reasons for believing that it does. First, the reader may note that the principle is analogous to the principle of diminishing marginal utility. As the total market demand grows larger, incremental increases in total demand become smaller and smaller proportions of the demand. It sounds reasonable, and probably appeals to us intuitively that an individual would be less influenced, and indeed take less notice of, a one per cent increase in total demand, than of a ten per cent increase in total demand, though these percentage increases be the same in absolute amount. Second, we can probably appeal effectively to general experience. There are no cases in which an individual's demand for a consumers' good increases endlessly with increases in total demand. If there were two or more such individuals in a market then the demand for the commodity would increase in an endless spiral. Last but not least, the income constraint is sufficient to establish that there must be a point at which increases in a consumer's demand must fail to respond to increases in demand by others. Since every consumer is subject to the income constraint, it must follow that the principle holds for all consumers.[2]

Now, to get back to our conceptual experiment, we would find that after administering a sufficient number of surveys, we would sooner or later get two surveys that yield identical demand schedules. The result of the last survey would then represent the true demand situation that would manifest itself on the market when the commodity was offered for sale. We may perhaps justly call such a demand function the equilibrium demand function — or demand curve. The equilibrium demand curve is the curve that exists when the marginal external consumption effect for every consumer, but one,[3] at all alternate prices is equal to zero. All other demand curves may be conceived as disequilibrium curves that can exist only because of temporarily imperfect knowledge by consumers of other people's demand. Once the errors in market information were discovered such a curve would move to a new position.

2. *The Bandwagon Effect — Diagrammatical Method*

The major purpose of going through the conceptual experiment with its successive surveys was to illustrate the diminishing marginal

2. If the reader should object to our dignifying the diminishing marginal external consumption effect by calling it a principle or a law, we could point out that if it is not a "law," then it must be an equilibrium condition.

3. The fact that the marginal external consumption effect of one consumer is greater than zero can have no effect on the demand schedule since total market demand, at any given price, cannot increase unless there are at least two consumers who would react on each other's demand.

external consumption effect and to indicate its role in obtaining a determinate demand curve. There is, however, a relatively simple method for obtaining the market demand function in those cases where external consumption effects are significant. This method will allow us to compare some of the properties of the "bandwagon demand curve" with the usual "functional" demand curve; and, it will also allow us to separate the extent to which a change in demand is due to a change in price, and the extent to which it is due to the bandwagon effect.

Given a certain total demand for a commodity as a parameter,[4] every individual will have a demand function based on this total market demand. Let the alternative total market demands that will serve as parameters for alternate individual demand functions be indicated as superscripts $a, b, \ldots n$ (where $a < b < \ldots < n$). Let the individual demand functions be $d_1, d_2, \ldots d_n$; where every subscript indicates a different consumer. Thus d_3^a is the individual demand curve for consumer 3 if the consumer believes that the total market demand is a units. Similarly d_{500}^m is the individual demand curve for the 500th consumer if he believes that the total market demand will be m units. We could now add across $d_1^a, d_2^a, d_3^a, \ldots, d_n^a$ which will give us the market demand curve D^a, which indicates the quantities demanded at alternate prices if all consumers believed that the total demand was a units. In the same manner we can obtain $D^b, D^c, \ldots, D^n$. These hypothetical market demand curves $D^a, D^b, D^c, \ldots, D^n$ are shown in Figure 1. Now, if we assume that buyers have accurate knowledge of market conditions (*i.e.*, of the total quantities demanded at every price) then only one point on any of the curves $D^a, D^b, \ldots, D^n$ could be on the real or equilibrium demand curve. These are the points on each curve $D^a, D^b, \ldots, D^n$ that represent the amounts on which the consumers based their individual demand curves; that is, the amounts that consumers expected to be the total market demand. These points are labeled in Figure 1 as $E^a, E^b, \ldots, E^n$. They are a series of virtual equilibrium points. Given that consumers possess accurate market information, $E^a, E^b, \ldots, E^n$, are the only points that can become actual

4. The reader should note that the analysis in the following pages is based on a somewhat different assumption than the *gedankenexperiment*. In the diagrams that follow each demand curve (other than the equilibrium demand curve) is based on the assumption that consumers believe that a fixed amount will be taken off the market at all prices. There is more than one way of deriving the equilibrium demand curve. The earlier method helped to bring out the nature of the central principle that is involved, while the method which follows will enable us to separate price effects from bandwagon effects and snob effects, etc.

quantities demanded. The locus of all these points D_B is therefore the actual demand curve for the commodity.

It may be of interest, at this point, to break up changes in the quantity demanded due to changes in price into a price effect and a bandwagon effect; that is, the extent of the change that is due to the change in price, and the extent of the change in demand that is due to consumers adjusting to each other's changed consumption.[5] With an eye on Figure 1 consider the effects of a reduction in price from P_2 to P_1. The increase in demand after the change in price is ac. Only part of that increase, however, is due to the reduction in price. To measure the amount due to the reduction in price we go

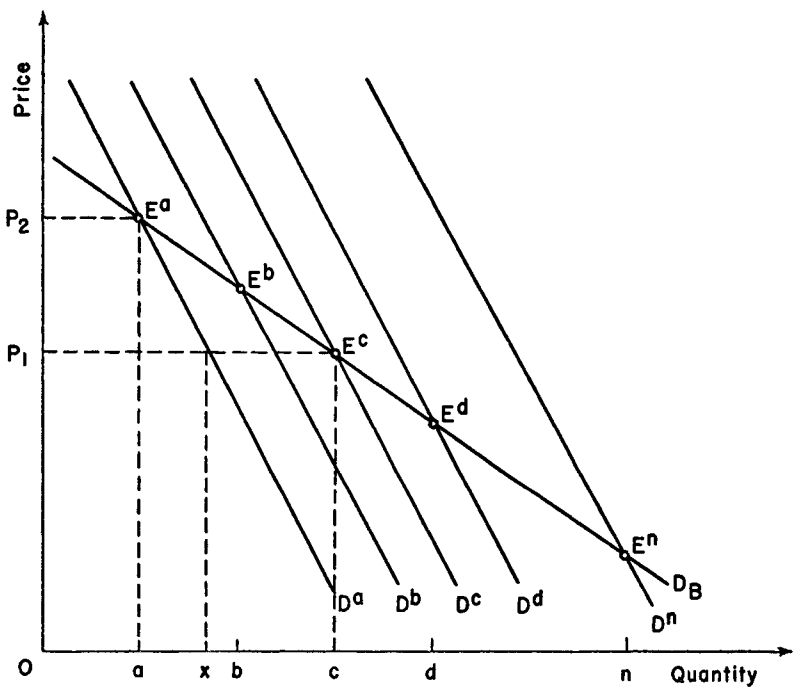

FIGURE 1

along the demand curve D^a to P_1 which tells us the quantity that would be demanded at P_1 if consumers did not adjust to each other's demand. This would result in an increase in demand of ax. Due to

5. We are now really in the area of "comparative statics." It may be recalled that we defined statics and our unit period in such a way that only *one* price holds within any unit period. Thus, when we examine the effects of a change in price we are really examining the reasons for the differences in the quantities demanded at one price in one unit period and another price in the succeeding unit period.

the bandwagon effect, however, an additional number of consumers are induced to enter the market or to increase their demands. There is now an additional increase in demand of xc after consumers have adjusted to each other's increases in consumption. Exactly the same type of analysis can, of course, be carried out for increases as well as for decreases in price.

We may note another thing from Figure 1. The demand curve D_B is more elastic than any of the other demand curves shown in the diagram. This would suggest that, other things being equal, the demand curve will be more elastic if there is a bandwagon effect than if the demand is based only on the functional attributes of the commodity. This, of course, follows from the fact that reactions to price changes are followed by additional reactions, *in the same direction*, to each other's changed consumption.

3. *Social Taboos and the Bandwagon Effect*

Social taboos, to the extent that they affect consumption, are, in a sense, bandwagon effects in reverse gear. That is to say, some people will not buy and consume certain things because other people are not buying and consuming these things. Thus, there may not be any demand for a commodity even though it has a functional utility, although, apart from the taboo, it would be purchased. Individual A will not buy the commodity because individuals B, C, and D do not, while individuals B, C, and D may refrain from consumption for the same reasons. It is not within the competence of the economist to investigate the psychology of this kind of behaviour. For our purposes we need only note that such behaviour exists and attempt to analyze how such behaviour affects the demand function.

We can proceed as follows. Let d_1^x be the demand curve of the least inhibited individual in the market, where the superscript x is the total quantity demanded in the market upon which he bases his individual demand. Suppose that at market demand x consumer 1 will demand at some range of prices one unit of the commodity, but at no price will he demand more. If he believes, however, that the total market demand is less than x units he will refrain from making any purchases. Since, *ex hypothesi*, consumer 1 is the least inhibited consumer, he will, at best, be the only one who will demand one unit of the commodity if consumers expect the total market demand to be x units. It must be clear, then, that x units cannot be a virtual equilibrium point, since only points where the total expected quantity demanded is equal to the actual quantity demanded can be points on the real demand curve, and the quantity x cannot at

any price be a point where expected total demand is equal to actual total demand. Now, if the total expected demand were $x + 1$ the actual demand might increase, say, to 2 units. At expected total demands $x + 2$ and $x + 3$, more would enter the market and the actual demand would be still greater since the fear of being different is considerably reduced as the expected demand is increased. With given increases in the expected total demand there must, at some point, be more than equal increases in the actual demand, because, if a real demand curve exists at all, there must be some point where the expected demand is equal to the actual demand. That point may exist, say, at $x + 10$. That is, at an expected total demand of $x + 10$ units a sufficient number of people have overcome their inhibitions to being different so that, at some prices, they will actually demand $x + 10$ units of the commodity. Let us call this point "T" — it is really the "taboo breaking point." The maximum bid (the point T^1 in Figure 2) of the marginal unit demanded if the total demand were T units now gives us the first point on the real demand curve (the curve D_B.).

How social taboos may affect the demand curve is shown in Figure 2. It will be noted that the price axis shows both positive and negative "prices." A negative price may be thought of as the price it would be necessary to *pay* individuals in order to induce them to consume in public a given amount of the commodity; that is, the price that it would be necessary to pay the consumers in order to induce them to disregard their aversion to be looked upon as odd or peculiar.

As we have already indicated, the point T in Figure 2 is the "taboo breaking point." T represents the number of units at which an *expected* total quantity demanded of T units would result in an *actual* quantity demanded of T units at some *real* price. Now, what has to be explained is why an expected demand of less than T units, say $T - 3$ units, would not yield an actual demand of $T - 3$ units at a positive price but only at a "negative price." Let the curve D^{T-3} be the demand curve that would exist if consumers thought the total demand was $T - 3$. Now, at any positive price, say P_3, the amount demanded would be less than $T - 3$, say $T - 7$. The price P_3 can therefore exist only if there is inaccurate information of the total quantity demanded. Once consumers discovered that at P_3 only $T - 7$ was purchased, and believed that this was the demand that would be sustained, their demand would shift to the D^{T-7} curve. At P_3 the amount purchased would now be less than $T - 7$ and demand would now shift to a curve to the left of the D^{T-7}

curve. This procedure would go on until the demand was zero at P_3. We thus introduce a gap into our demand function and focus attention on an interesting psychological phenomenon that may affect demand. What we are suggesting, essentially, is that given

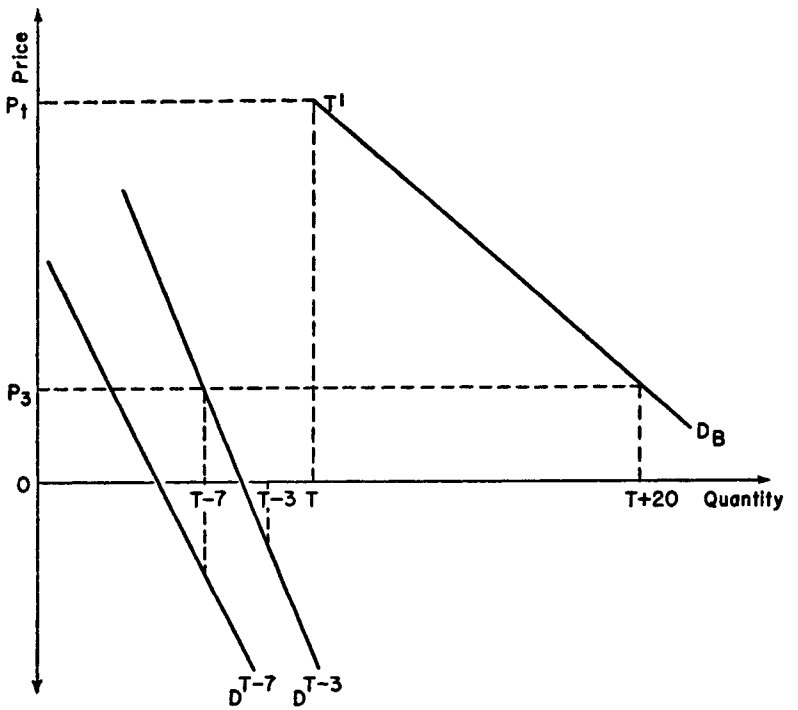

FIGURE 2

"accurate expectations" of the total quantity demanded on the part of consumers, there is a quantity less than which there will not be any quantity demanded at any real price. In other words, this is a case in which a commodity will either "go over big" or not "go over" at all. It will be noted that at P_3 zero units or $T + 20$ units (Figure 2) may be taken off the market given "accurate expectations" of the total quantity demanded. It would seem, therefore, that "accurate expectations" of the total quantity demanded at P_3 can have two values depending upon whether people are generally pessimistic or optimistic about other consumers' demands for the commodity in question. If everybody expects that everybody else would not care much for the commodity, then zero units would be the accurate expectation of the total quantity demanded; if everybody, on the other hand, expects others to take up the commodity with

some degree of enthusiasm,[6] then $T + 20$ units would be the accurate expectation of the total quantity demanded. The factors that would determine one set of expectations rather than the other are matters of empirical investigation in the field of social psychology. The factors involved may be the history of the community, the people's conservatism or lack of conservatism, the type and quantity of advertising about the commodity under consideration, etc.

The really significant point in Figure 2 is T^1, the first point on the real demand curve D_B. As already indicated, it is the point at which the maximum bid of the marginal unit demanded is P_t and the total market demand is T units. If the price were higher than P_t, the T^{th} unit would not be demanded and all buyers would leave the market because of the effect of the taboo at less than a consumption of T units.[7] By way of summary we might say that the whole point of this section is an attempt to show that in cases where social taboos affect demand the real demand curve may not start at the price-axis but that the smallest possible quantity demanded may be some distance to the right of the price-axis.

IV. The Snob Effect

Thus far, in our conceptual experiment and diagrammatic analysis, we have considered only the bandwagon effect. We now consider the reverse effect — the demand behaviour for those commodities with regard to which the individual consumer acts like a snob. Here, too, we assume at first that the quantity demanded by a consumer is a function of price and of the total market demand, but that the individual consumer's demand is negatively correlated with the total market demand. In the snob case it is rather obvious that the external consumption effect must reach a limit although the limit may be where one snob constitutes the only buyer. For most commodities and most buyers, however, the motivation for exclusiveness is not that great; hence the marginal external consumption effect reaches zero before that point. If the commodity is to be purchased at all, the external consumption effect must reach a limit, at some price, where the quantity demanded has a positive value. From this it follows that after a point the principle of the diminishing marginal external consumption effect must manifest itself. We thus have in the snob effect an opposite but completely symmetrical relationship to the bandwagon effect.

6. If consumers have accurate expectations of the degree of enthusiasm with which others will take up the product, then they will expect demand to be $T + 20$ units.

7. This is a "pure" case where *all* buyers are governed by taboo considerations.

The analysis of markets in which all consumers behave as snobs follows along the same lines as our analysis of the bandwagon effect. Because of the similarity we will be able to get through our analysis of the snob effect in short order. We begin, as before, by letting the alternate total market demands that serve as parameters for alternate individual demand curves be indicated by the superscripts $a, b, \ldots, n$ (where $a < b < n$). Let the individual demand functions be $d_1, d_2, \ldots d_n$, where there are n consumers in the market. Again, d_3^a signifies the individual demand curve for consumer 3 on the assumption that he expects the total market demand to be "a" units. By adding

$$\begin{aligned} d_1^a + d_2^a + \cdots + d_n^a &= D^a \\ d_1^b + d_2^b + \cdots + d_n^b &= D^b \\ \vdots \qquad\qquad & \vdots \\ d_1^n + d_2^n + \cdots + d_n^n &= D^n \end{aligned}$$

we obtain the market demand functions on the alternate assumptions of consumers expecting the total market demands to be $a, b, \ldots, n$. Due to snob behaviour the curves $D^a, D^b, \ldots, D^n$ move to the left as the expected total market demand increases. This is shown in Figure 3. Using the same procedure as before we obtain the virtual equilibrium points $E^a, E^b, \ldots, E^n$. They represent the only points on the curves $D^a, D^b, \ldots, D^n$ that are consistent with consumers' expectations (and hence with the assumption of accurate information). The locus of these virtual equilibrium points is the demand curve D_S.

Now, given a price change from P_2 to P_1 we can separate the effect of the price change into a price effect and a snob effect. In Figure 3 we see that the net increase in the quantity demanded due to the reduction in price is ab. The price effect, however, is ax. That is, if every consumer expected no increase in the total quantity demanded then the total quantity demanded at P_1 would be Ox. The more extreme snobs will react to this increase in the total quantity demanded and will leave the market.[8] The total quantity demanded will hence be reduced by bx. The net result is therefore an increase in demand of only ab.

It may be of interest to examine some of the characteristics of the curves in Figure 3. First we may note that all the points on the curves other than D_S (except $E^a, E^b, \ldots, E^n$) are theoretical points that have significance only under conditions of imperfect knowledge.

8. The other snobs will, of course, reduce their demand but not by an amount large enough to leave the market.

Second, we may note from the diagram that the demand curve for snobs is less elastic than the demand curves where there are no snob effects. The reason for this, of course, is that the increase in demand due to a reduction in price is counterbalanced, in part, by some snobs leaving the market because of the increase in total consumption (*i.e.*, the decrease in the snob value of the commodity). It should be clear,

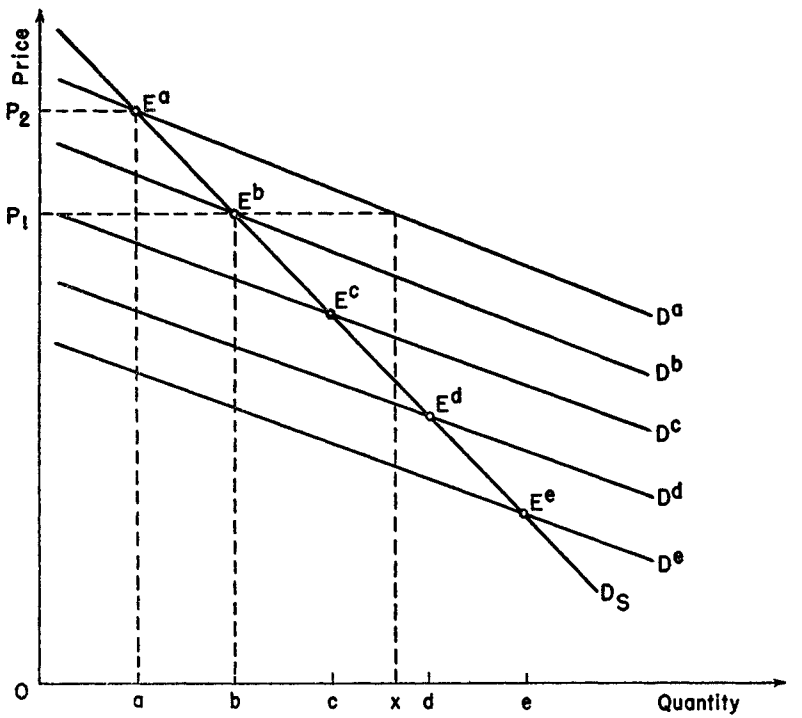

FIGURE 3

however, that the snob effect, as defined, can never be in excess of the price effect since this would lead to a basic contradiction. If the snob effect were greater than the price effect, then the quantity demanded at a lower price would be less than the quantity demanded at a higher price. This implies that some of the snobs in the market at the higher price leave the market when there is a reduction in the total quantity demanded; which, of course, is patently inconsistent with our definition of snob behaviour. It therefore follows that the snob effect is never greater than the price effect. It follows, also, that D_S is monotonically decreasing if D^a, D^b, ..., D^n are monotonically decreasing.[9]

9. We shall see below however that the snob effect plus the Veblen effect combined can be greater than the price effect.

Finally, it may be interesting to note another difference between the usual functional demand curve and the D_S curve. In the usual demand curve the buyers at higher prices always remain in the market at lower prices. That is, from the price point of view, the bids to buy are cumulative downward. This is clearly not the case in the D_S curve. Such terms as intramarginal buyers may be meaningless in snob markets.

V. The Veblen Effect

Although the theory of conspicuous consumption as developed by Veblen and others is quite a complex and subtle sociological

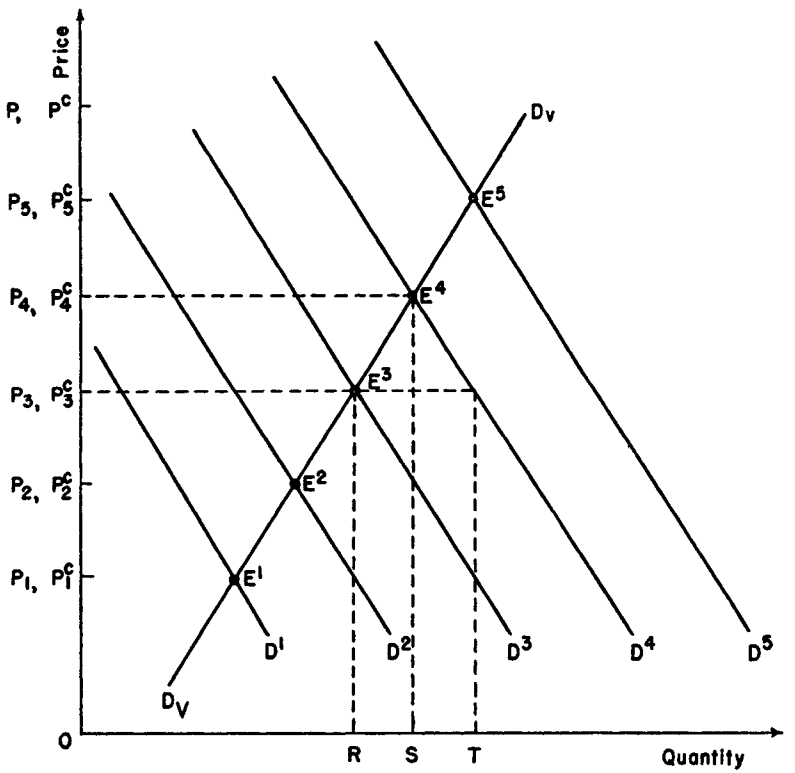

FIGURE 4

Price effect = ST
Veblen effect = − TR
Net effect = − SR

construct we can, for our purposes, quite legitimately abstract from the psychological and sociological elements and address our attention exclusively to the effects that conspicuous consumption has on the

demand function. The essential economic characteristic with which we are concerned is the fact that the utility derived from a unit of a commodity employed for purposes of conspicuous consumption depends not only on the inherent qualities of that unit, but also on the price paid for it. It may, therefore, be helpful to divide the price of a commodity into two categories; the real price and the conspicuous price. By the real price we refer to the price the consumer paid for the commodity in terms of money. The conspicuous price is the price other people think the consumer paid for the commodity[1] and which therefore determines its conspicuous consumption utility. These two prices would probably be identical in highly organized markets where price information is common knowledge. In other markets, where some can get "bargains" or special discounts the real price or conspicuous price need not be identical. In any case, the quantity demanded by a consumer will be a function of both the real price and the conspicuous price.

The market demand curve for commodities subject to conspicuous consumption can be derived through a similar diagrammatical method (summarized in Figure 4). This time we let the superscripts 1, 2, . . . , n stand for the expected conspicuous prices. The real prices are $P_1, P_2, \ldots, P_n$. The individual demand functions are $d_1, d_2, \ldots, d_n$. In this way d_6^3 stands for the demand curve of consumer number 6 if he expects a conspicuous price of P_3^c.[2] We can now add across $d_1^1, d_2^1, \ldots, d_n^1$ and get the market demand curve D^1 which indicates the quantities demanded at alternate prices if all consumers expected a conspicuous price of P_1^c. In a similar manner we obtain $D^2, D^3, \ldots, D^n$. The market demand curves will, of course, up to a point, shift to the right as the expected conspicuous price increases. Now on every curve $D^1, D^2, \ldots, D^n$ in Figure 4 only one point can be a virtual equilibrium point if we assume that consumers possess accurate market information — the point where the real price is equal to the conspicuous price (that is, where $P_1 = P_1^c$, $P_2 = P_2^c, \ldots, P_n = P_n^c$). The locus of these virtual equilibrium points $E^1, E^2, \ldots, E^n$ gives us the demand curve D_V.

As before, we can separate the effects of a change in price into two effects — the price effect, and, what we shall call for want of a better term, the Veblen effect. In Figure 4 it will be seen that a

1. More accurately, the conspicuous price should be the price that the consumer thinks other people think he paid for the commodity.

2. The expected conspicuous prices are distinguished from the real prices by adding the superscript c to the P's. Thus, to the range of real prices $P_1, P_2, \ldots, P_n$, we have a corresponding range of conspicuous prices denoted by $P_1^c, P_2^c, \ldots, P_n^c$.

change in price from P_4 to P_3 will reduce the quantity demanded by RS. The price effect is to increase the quantity demanded by ST; that is, the amount that would be demanded if there were no change in the expected conspicuous price would be OT. However, at the lower price a number of buyers would leave the market because of the reduced utility derived from the commodity at that lower conspicuous price. The Veblen effect is therefore RT.

It should be noted that unlike the D_S curve, the D_V curve can be positively inclined, negatively inclined or a mixture of both. It all depends on whether at alternate price changes the Veblen effect is greater or less than the price effect. It is possible that in one portion of the curve one effect may predominate while in another portion another may predominate. It is to be expected, however, that in most cases, if the curve is not monotonically decreasing it will be shaped like a backward S, as illustrated in Figure 5A. The reasons for this are as follows: First, there must be a price so high that no units of the commodity will be purchased at that price owing to the income constraint (among other reasons). This is the price P_n

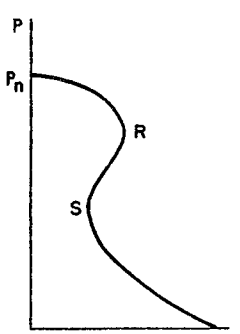

FIGURE 5A

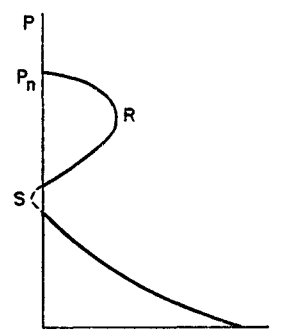

FIGURE 5B

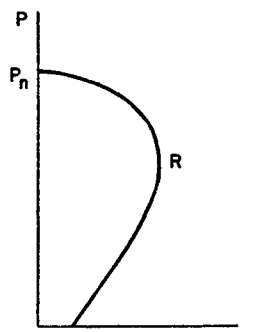

FIGURE 5C

in Figure 5A, and it implies that there must be some point at which the curve shifts from being positively inclined to being negatively inclined as price increases. Second, there must be some point of satiety for the good. This is the point T in Figure 5A. It therefore follows that some portion of the curve must be monotonically decreasing to reach T if there exists some minimum price at which the Veblen effect is zero. It is of course reasonable to assume that there is some low price at which the commodity would cease to have any value for purposes of conspicuous consumption. If this last assumption does not hold, which is unlikely, then the curve could have the shape

indicated in Figure 5C. Otherwise, it would have the general shape indicated in Figure 5A, or it might be in two segments as illustrated in Figure 5B.

VI. Mixed Effects

Any real market for semidurable or durable goods will most likely contain consumers that are subject to one or a combination of the effects discussed heretofore. Combining these effects presents no new formal difficulties with respect to the determination of the market demand curve, although it complicates the diagrammatic analysis considerably. The major principle, however, still holds. For any price there is a quantity demanded such that the marginal external consumption effect (or the marginal Veblen effect) for all buyers but one, is zero. This implies that for every price change there is a point at which people cease reacting to each other's quantity changes, regardless of the direction of these reactions. If this is so, then for every price there is a determinate quantity demanded, and hence the demand curve is determinate.

Now, for every price change we have distinguished between the price effect and some other, such as the snob, the Veblen, or the bandwagon effect. In markets where all four effects are present we should be able to separate out and indicate the direction of each of them that will result from a price change. That is, every price change will result in two positive and two negative effects — two which, other things being equal, will increase the quantity demanded, and two which, other things being equal, will decrease it. Which effects will be positive and which will be negative will depend on the relative strength of the Veblen effect as against the price effect. The Veblen and the price effects will depend directly on the direction of the price change. An increase in price will therefore result in price and bandwagon effects that are negative, and in Veblen and snob effects that are positive, provided that the price effect is greater than the Veblen effect; that is, if the net result is a decrease in the quantity demanded at the higher price. If, on the other hand, the Veblen effect is more powerful than the price effect, given a price increase, then the bandwagon effect would be positive and the snob effect negative. The reverse would of course be true for price declines.

The market demand curve for a commodity where different consumers are subject to different types of effects can be obtained diagrammatically through employing the methods developed above — although the diagrams would be quite complicated. There is no point in adding still more diagrams to illustrate this. Briefly, the

method would be somewhat as follows: (1) Given the demand curves for every individual, in which the expected total quantity demanded is a parameter for each curve, we can add these curves laterally and obtain a map of aggregate demand curves, in which each aggregate curve is based on a given total quantity demanded. (2) The locus of the equilibrium points on each aggregate demand curve (as derived in Figure 1) gives us a market demand curve that accounts for both bandwagon and snob effects. This last curve assumes that only one conspicuous price exists. For every conspicuous price there exists a separate map of aggregate demand curves from which different market demand curves are obtained. (3) This procedure yields a map of market demand curves in which each curve is based on a different conspicuous price. Employing the method used in Figure 4 we obtain our final market demand curve which accounts for bandwagon, snob, and Veblen effects simultaneously.

VII. Conclusion

It is not unusual for a writer in pure theory to end his treatise by pointing out that the science is really very young; that there is a great deal more to be done; that the formulations presented are really of a very tentative nature; and that the best that can be hoped for is that his treatise may in some small way pave the road for future formulations that are more directly applicable to problems in the real world.[3] This is another way of saying that work in pure theory is an investment in the future state of the science where the returns in terms of applications to real problems are really very uncertain. This is probably especially true of value theory where the investment in time and effort is more akin to the purchase of highly speculative stocks rather than the purchase of government bonds. Since this was only a brief essay on one aspect of value theory, the reader will hardly be surprised if the conclusions reached are somewhat less than revolutionary.

Essentially, we have attempted to do two things. First, we have tried to demonstrate that non-additivity is not necessarily an insurmountable obstacle in effecting a transition from individual to collective demand curves. Second, we attempted to take a step or two in the direction of incorporating various kinds of external consumption effects into the theory of consumers' demand. In order to solve our problem, we have introduced what we have called the principle of the diminishing marginal external consumption effect.

3. See, for example, Samuelson, *Foundations of Economic Analysis*, p. 350, and Joan Robinson, *Economics of Imperfect Competition*, p. 327.

We indicated some reasons for believing that for every individual, there is some point at which the marginal external consumption effect is zero. We have attempted to show that if this principle is admitted, then there are various ways of effecting a transition from individual to collective demand curves. The major conclusion reached is that under conditions of perfect knowledge (or accurate expectations) any point on the demand curve, for any given price, will be at that total quantity demanded where the marginal external consumption effect for all consumers but one, is equal to zero.

In comparing the demand curve in those situations where external consumption effects are present with the demand curve as it would be where these external consumption effects are absent, we made three basic points. (1) If the bandwagon effect is the most significant effect, the demand curve is more elastic than it would be if this external consumption effect were absent. (2) If the snob effect is the predominant effect, the demand curve is less elastic than otherwise. (3) If the Veblen effect is the predominant one, the demand curve is less elastic than otherwise, and some portions of it may even be positively inclined; whereas, if the Veblen effect is absent, the curve will be negatively inclined regardless of the importance of the snob effect in the market.

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EXHIBIT GS-19

Network Working Group
Request for Comments: 1035

P. Mockapetris
ISI
November 1987

Obsoletes: RFCs 882, 883, 973

DOMAIN NAMES - IMPLEMENTATION AND SPECIFICATION

1. STATUS OF THIS MEMO

This RFC describes the details of the domain system and protocol, and assumes that the reader is familiar with the concepts discussed in a companion RFC, "Domain Names - Concepts and Facilities" [RFC-1034].

The domain system is a mixture of functions and data types which are an official protocol and functions and data types which are still experimental. Since the domain system is intentionally extensible, new data types and experimental behavior should always be expected in parts of the system beyond the official protocol. The official protocol parts include standard queries, responses and the Internet class RR data formats (e.g., host addresses). Since the previous RFC set, several definitions have changed, so some previous definitions are obsolete.

Experimental or obsolete features are clearly marked in these RFCs, and such information should be used with caution.

The reader is especially cautioned not to depend on the values which appear in examples to be current or complete, since their purpose is primarily pedagogical. Distribution of this memo is unlimited.

Table of Contents

2. INTRODUCTION

2.1. Overview

The goal of domain names is to provide a mechanism for naming resources in such a way that the names are usable in different hosts, networks, protocol families, internets, and administrative organizations.

From the user's point of view, domain names are useful as arguments to a local agent, called a resolver, which retrieves information associated with the domain name. Thus a user might ask for the host address or mail information associated with a particular domain name. To enable the user to request a particular type of information, an appropriate query type is passed to the resolver with the domain name. To the user, the domain tree is a single information space; the resolver is responsible for hiding the distribution of data among name servers from the user.

From the resolver's point of view, the database that makes up the domain space is distributed among various name servers. Different parts of the domain space are stored in different name servers, although a particular data item will be stored redundantly in two or more name servers. The resolver starts with knowledge of at least one name server. When the resolver processes a user query it asks a known name server for the information; in return, the resolver either receives the desired information or a referral to another name server. Using these referrals, resolvers learn the identities and contents of other name servers. Resolvers are responsible for dealing with the distribution of the domain space and dealing with the effects of name server failure by consulting redundant databases in other servers.

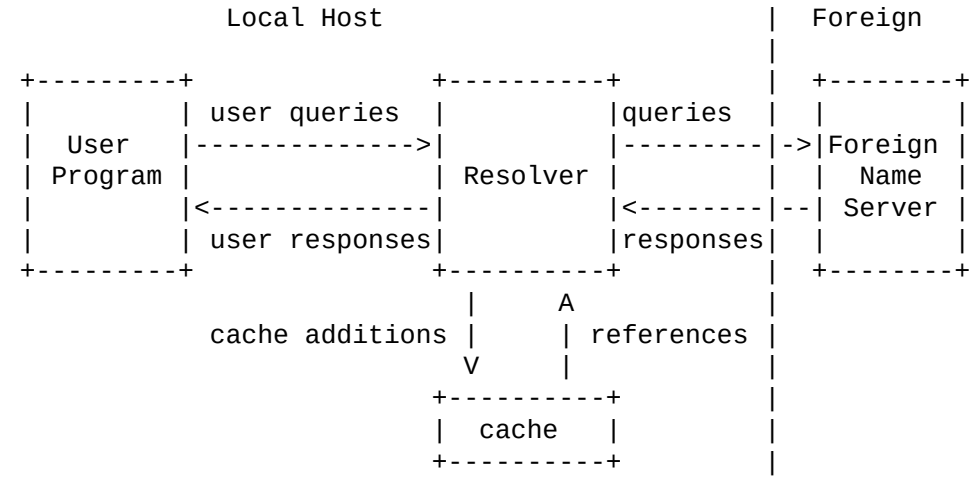
Name servers manage two kinds of data. The first kind of data held in sets called zones; each zone is the complete database for a particular "pruned" subtree of the domain space. This data is called authoritative. A name server periodically checks to make sure that its zones are up to date, and if not, obtains a new copy of updated zones

from master files stored locally or in another name server. The second kind of data is cached data which was acquired by a local resolver. This data may be incomplete, but improves the performance of the retrieval process when non-local data is repeatedly accessed. Cached data is eventually discarded by a timeout mechanism.

This functional structure isolates the problems of user interface, failure recovery, and distribution in the resolvers and isolates the database update and refresh problems in the name servers.

2.2. Common configurations

A host can participate in the domain name system in a number of ways, depending on whether the host runs programs that retrieve information from the domain system, name servers that answer queries from other hosts, or various combinations of both functions. The simplest, and perhaps most typical, configuration is shown below:

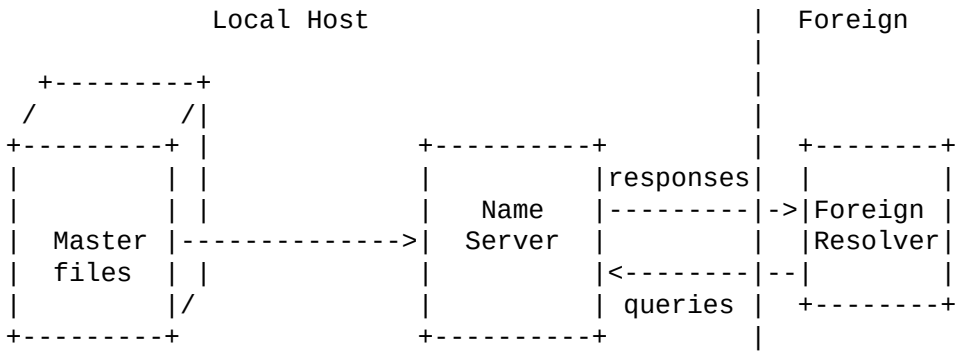


User programs interact with the domain name space through resolvers; the format of user queries and user responses is specific to the host and its operating system. User queries will typically be operating system calls, and the resolver and its cache will be part of the host operating system. Less capable hosts may choose to implement the resolver as a subroutine to be linked in with every program that needs its services. Resolvers answer user queries with information they acquire via queries to foreign name servers and the local cache.

Note that the resolver may have to make several queries to several different foreign name servers to answer a particular user query, and hence the resolution of a user query may involve several network accesses and an arbitrary amount of time. The queries to foreign name servers and the corresponding responses have a standard format described

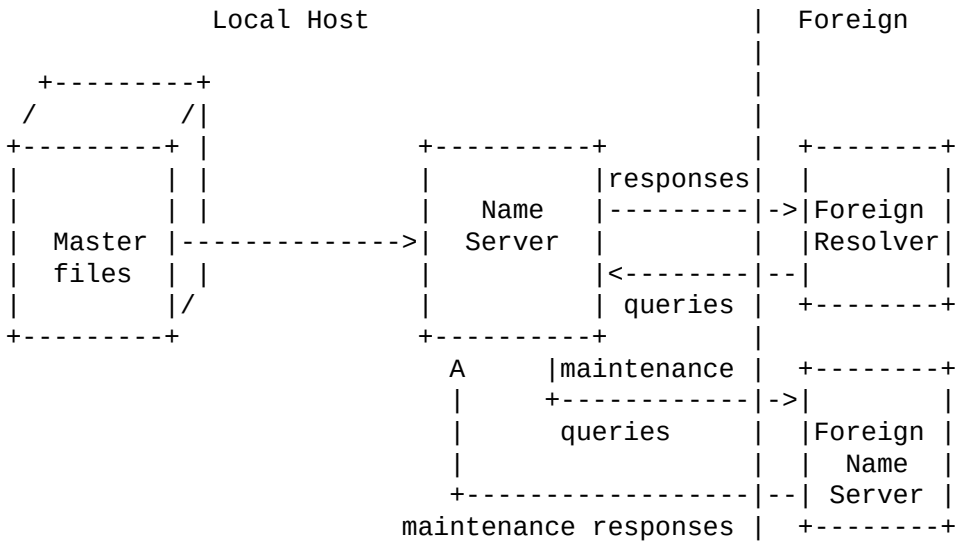
in this memo, and may be datagrams.

Depending on its capabilities, a name server could be a stand alone program on a dedicated machine or a process or processes on a large timeshared host. A simple configuration might be:



Here a primary name server acquires information about one or more zones by reading master files from its local file system, and answers queries about those zones that arrive from foreign resolvers.

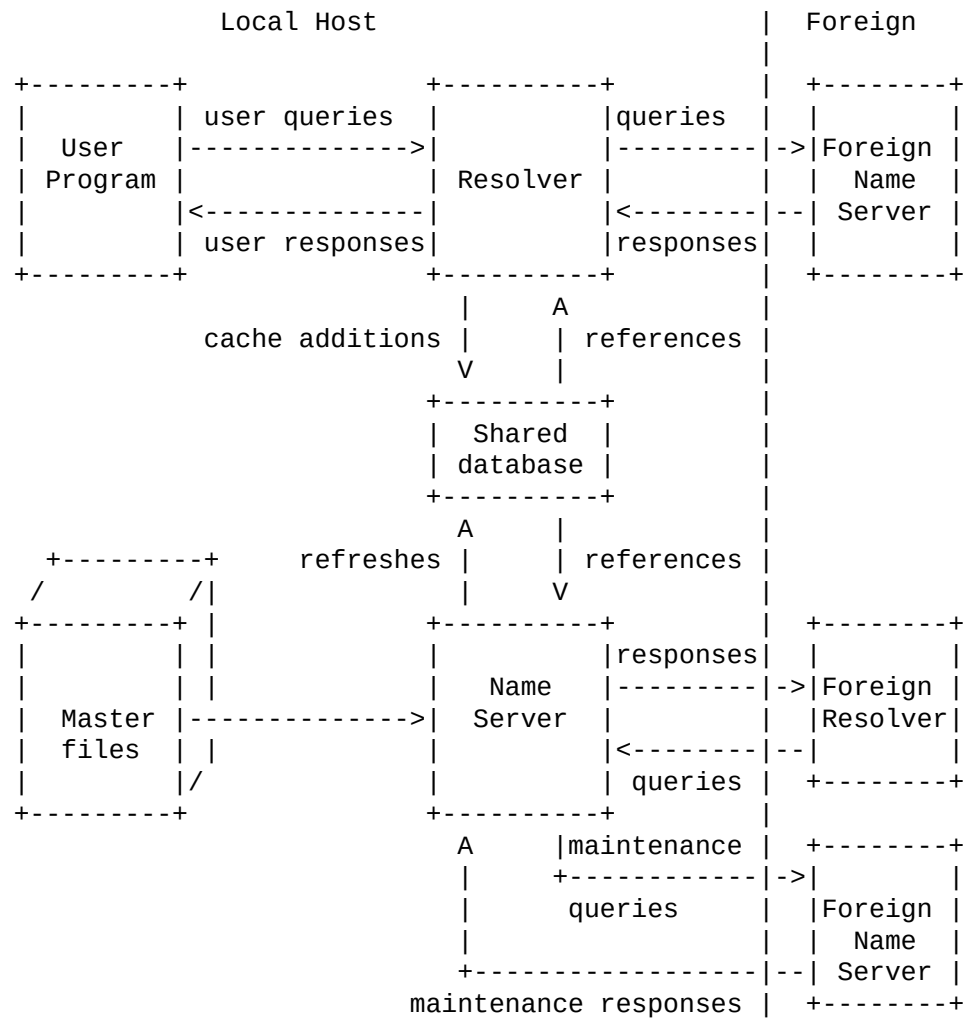
The DNS requires that all zones be redundantly supported by more than one name server. Designated secondary servers can acquire zones and check for updates from the primary server using the zone transfer protocol of the DNS. This configuration is shown below:



In this configuration, the name server periodically establishes a virtual circuit to a foreign name server to acquire a copy of a zone or to check that an existing copy has not changed. The messages sent for

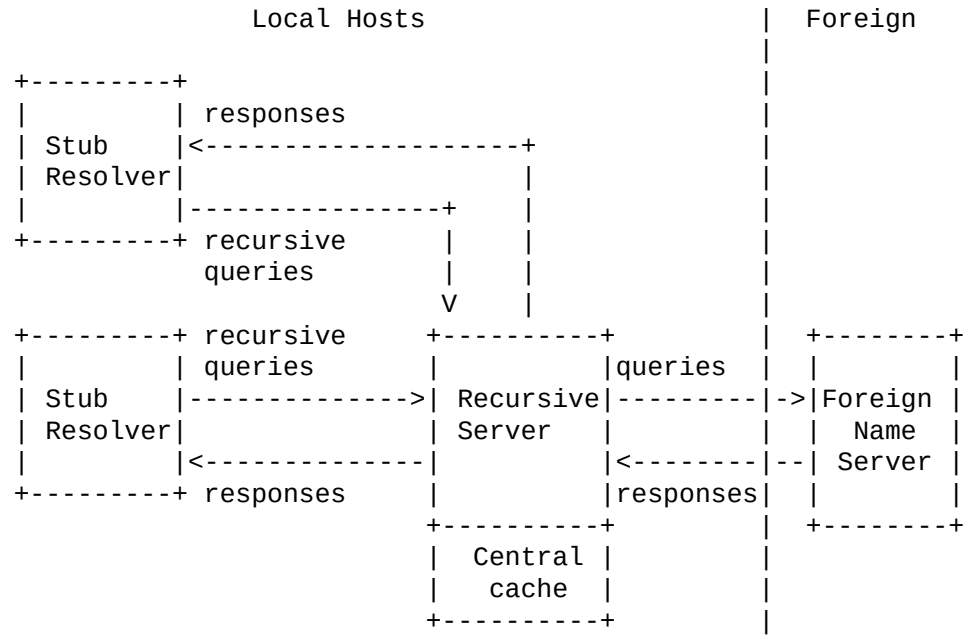
these maintenance activities follow the same form as queries and responses, but the message sequences are somewhat different.

The information flow in a host that supports all aspects of the domain name system is shown below:



The shared database holds domain space data for the local name server and resolver. The contents of the shared database will typically be a mixture of authoritative data maintained by the periodic refresh operations of the name server and cached data from previous resolver requests. The structure of the domain data and the necessity for synchronization between name servers and resolvers imply the general characteristics of this database, but the actual format is up to the local implementor.

Information flow can also be tailored so that a group of hosts act together to optimize activities. Sometimes this is done to offload less capable hosts so that they do not have to implement a full resolver. This can be appropriate for PCs or hosts which want to minimize the amount of new network code which is required. This scheme can also allow a group of hosts can share a small number of caches rather than maintaining a large number of separate caches, on the premise that the centralized caches will have a higher hit ratio. In either case, resolvers are replaced with stub resolvers which act as front ends to resolvers located in a recursive server in one or more name servers known to perform that service:



In any case, note that domain components are always replicated for reliability whenever possible.

2.3. Conventions

The domain system has several conventions dealing with low-level, but fundamental, issues. While the implementor is free to violate these conventions WITHIN HIS OWN SYSTEM, he must observe these conventions in ALL behavior observed from other hosts.

2.3.1. Preferred name syntax

The DNS specifications attempt to be as general as possible in the rules for constructing domain names. The idea is that the name of any existing object can be expressed as a domain name with minimal changes.

However, when assigning a domain name for an object, the prudent user will select a name which satisfies both the rules of the domain system and any existing rules for the object, whether these rules are published or implied by existing programs.

For example, when naming a mail domain, the user should satisfy both the rules of this memo and those in RFC-822. When creating a new host name, the old rules for HOSTS.TXT should be followed. This avoids problems when old software is converted to use domain names.

The following syntax will result in fewer problems with many

applications that use domain names (e.g., mail, TELNET).

<domain> ::= <subdomain> | " "

<subdomain> ::= <label> | <subdomain> "." <label>

<label> ::= <letter> [[<ldh-str>] <let-dig>]

<ldh-str> ::= <let-dig-hyp> | <let-dig-hyp> <ldh-str>

<let-dig-hyp> ::= <let-dig> | "-"

<let-dig> ::= <letter> | <digit>

<letter> ::= any one of the 52 alphabetic characters A through Z in upper case and a through z in lower case

<digit> ::= any one of the ten digits 0 through 9

Note that while upper and lower case letters are allowed in domain names, no significance is attached to the case. That is, two names with the same spelling but different case are to be treated as if identical.

The labels must follow the rules for ARPANET host names. They must start with a letter, end with a letter or digit, and have as interior characters only letters, digits, and hyphen. There are also some restrictions on the length. Labels must be 63 characters or less.

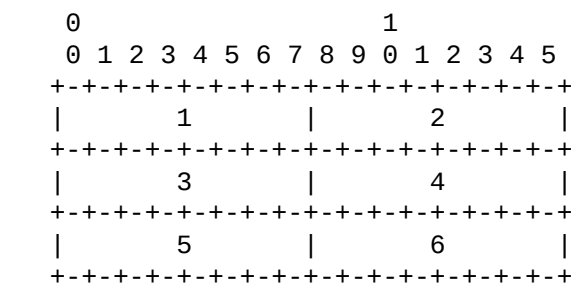
For example, the following strings identify hosts in the Internet:

A.ISI.EDU XX.LCS.MIT.EDU SRI-NIC.ARPA

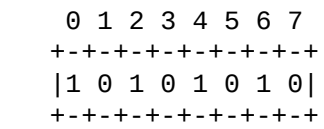
2.3.2. Data Transmission Order

The order of transmission of the header and data described in this document is resolved to the octet level. Whenever a diagram shows a

group of octets, the order of transmission of those octets is the normal order in which they are read in English. For example, in the following diagram, the octets are transmitted in the order they are numbered.



Whenever an octet represents a numeric quantity, the left most bit in the diagram is the high order or most significant bit. That is, the bit labeled 0 is the most significant bit. For example, the following diagram represents the value 170 (decimal).



Similarly, whenever a multi-octet field represents a numeric quantity the left most bit of the whole field is the most significant bit. When a multi-octet quantity is transmitted the most significant octet is transmitted first.

2.3.3. Character Case

For all parts of the DNS that are part of the official protocol, all comparisons between character strings (e.g., labels, domain names, etc.) are done in a case-insensitive manner. At present, this rule is in force throughout the domain system without exception. However, future additions beyond current usage may need to use the full binary octet capabilities in names, so attempts to store domain names in 7-bit ASCII or use of special bytes to terminate labels, etc., should be avoided.

When data enters the domain system, its original case should be preserved whenever possible. In certain circumstances this cannot be done. For example, if two RRs are stored in a database, one at x.y and one at X.Y, they are actually stored at the same place in the database, and hence only one casing would be preserved. The basic rule is that case can be discarded only when data is used to define structure in a database, and two names are identical when compared in a case insensitive manner.

Loss of case sensitive data must be minimized. Thus while data for x.y and X.Y may both be stored under a single location x.y or X.Y, data for a.x and B.X would never be stored under A.x, A.X, b.x, or b.X. In general, this preserves the case of the first label of a domain name, but forces standardization of interior node labels.

Systems administrators who enter data into the domain database should take care to represent the data they supply to the domain system in a case-consistent manner if their system is case-sensitive. The data distribution system in the domain system will ensure that consistent representations are preserved.

2.3.4. Size limits

Various objects and parameters in the DNS have size limits. They are listed below. Some could be easily changed, others are more fundamental.

labels	63 octets or less
names	255 octets or less
TTL	positive values of a signed 32 bit number.
UDP messages	512 octets or less

3. DOMAIN NAME SPACE AND RR DEFINITIONS

3.1. Name space definitions

Domain names in messages are expressed in terms of a sequence of labels. Each label is represented as a one octet length field followed by that number of octets. Since every domain name ends with the null label of the root, a domain name is terminated by a length byte of zero. The high order two bits of every length octet must be zero, and the remaining six bits of the length field limit the label to 63 octets or less.

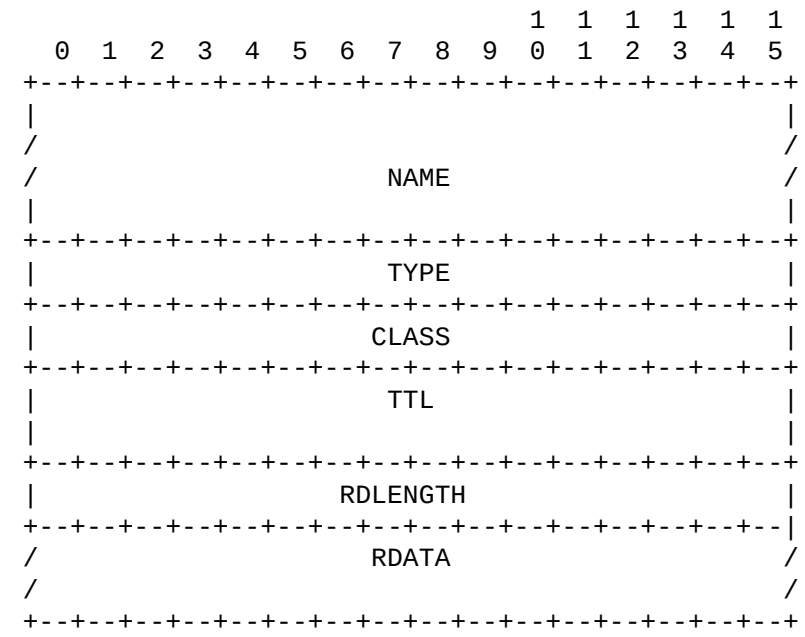
To simplify implementations, the total length of a domain name (i.e., label octets and label length octets) is restricted to 255 octets or less.

Although labels can contain any 8 bit values in octets that make up a label, it is strongly recommended that labels follow the preferred syntax described elsewhere in this memo, which is compatible with existing host naming conventions. Name servers and resolvers must compare labels in a case-insensitive manner (i.e., A=a), assuming ASCII with zero parity. Non-alphabetic codes must match exactly.

3.2. RR definitions

3.2.1. Format

All RRs have the same top level format shown below:



where:

NAME — an owner name, i.e., the name of the node to which this resource record pertains.

TYPE — two octets containing one of the RR TYPE codes.

CLASS — two octets containing one of the RR CLASS codes.

TTL — a 32 bit signed integer that specifies the time interval that the resource record may be cached before the source of the information should again be consulted. Zero values are interpreted to mean that the RR can only be used for the transaction in progress, and should not be cached. For example, SOA records are always distributed with a zero TTL to prohibit caching. Zero values can also be used for extremely volatile data.

RDLENGTH — an unsigned 16 bit integer that specifies the length in octets of the RDATA field.

RDATA	a variable length string of octets that describes the resource. The format of this information varies according to the TYPE and CLASS of the resource record.

3.2.2. TYPE values

TYPE fields are used in resource records. Note that these types are a subset of QTYPEs.

TYPE	value and meaning
A	1 a host address
NS	2 an authoritative name server
MD	3 a mail destination (Obsolete - use MX)
MF	4 a mail forwarder (Obsolete - use MX)
CNAME	5 the canonical name for an alias
SOA	6 marks the start of a zone of authority
MB	7 a mailbox domain name (EXPERIMENTAL)
MG	8 a mail group member (EXPERIMENTAL)
MR	9 a mail rename domain name (EXPERIMENTAL)
NULL	10 a null RR (EXPERIMENTAL)
WKS	11 a well known service description
PTR	12 a domain name pointer
HINFO	13 host information
MINFO	14 mailbox or mail list information
MX	15 mail exchange
TXT	16 text strings

3.2.3. QTYPE values

QTYPE fields appear in the question part of a query. QTYPES are a superset of TYPEs, hence all TYPEs are valid QTYPEs. In addition, the following QTYPEs are defined:

AXFR	252 A request for a transfer of an entire zone
MAILB	253 A request for mailbox-related records (MB, MG or MR)
MAILA	254 A request for mail agent RRs (Obsolete - see MX)
*	255 A request for all records

3.2.4. CLASS values

CLASS fields appear in resource records. The following CLASS mnemonics and values are defined:

IN	1 the Internet
CS	2 the CSNET class (Obsolete - used only for examples in some obsolete RFCs)
CH	3 the CHAOS class
HS	4 Hesiod [Dyer 87]

3.2.5. QCLASS values

QCLASS fields appear in the question section of a query. QCLASS values are a superset of CLASS values; every CLASS is a valid QCLASS. In addition to CLASS values, the following QCLASSes are defined:

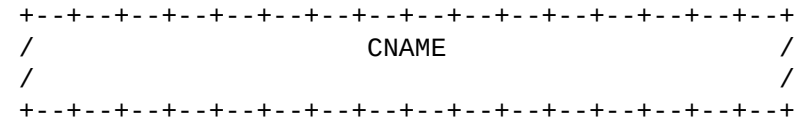
*	255 any class

3.3. Standard RRs

The following RR definitions are expected to occur, at least potentially, in all classes. In particular, NS, SOA, CNAME, and PTR will be used in all classes, and have the same format in all classes. Because their RDATA format is known, all domain names in the RDATA section of these RRs may be compressed.

<domain-name> is a domain name represented as a series of labels, and terminated by a label with zero length. <character-string> is a single length octet followed by that number of characters. <character-string> is treated as binary information, and can be up to 256 characters in length (including the length octet).

3.3.1. CNAME RDATA format

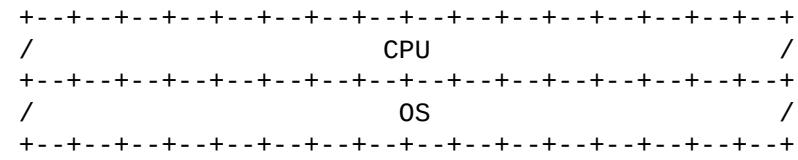


where:

CNAME A <domain-name> which specifies the canonical or primary name for the owner. The owner name is an alias.

CNAME RRs cause no additional section processing, but name servers may choose to restart the query at the canonical name in certain cases. See the description of name server logic in [RFC-1034] for details.

3.3.2. HINFO RDATA format



where:

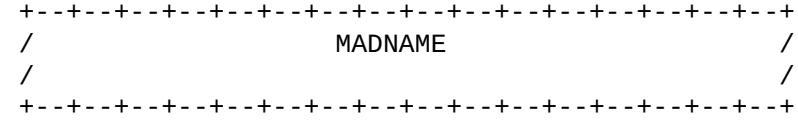
CPU A <character-string> which specifies the CPU type.

OS A <character-string> which specifies the operating system type.

Standard values for CPU and OS can be found in [RFC-1010].

HINFO records are used to acquire general information about a host. The main use is for protocols such as FTP that can use special procedures when talking between machines or operating systems of the same type.

3.3.3. MB RDATA format (EXPERIMENTAL)

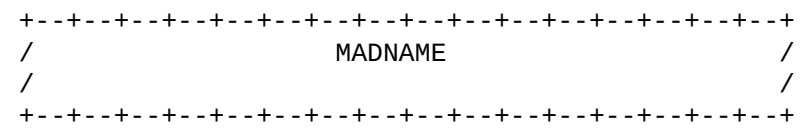


where:

MADNAME A <domain-name> which specifies a host which has the specified mailbox.

MB records cause additional section processing which looks up an A type RRs corresponding to MADNAME.

3.3.4. MD RDATA format (Obsolete)



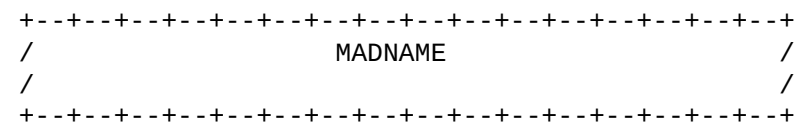
where:

MADNAME A <domain-name> which specifies a host which has a mail agent for the domain which should be able to deliver mail for the domain.

MD records cause additional section processing which looks up an A type record corresponding to MADNAME.

MD is obsolete. See the definition of MX and [RFC-974] for details of the new scheme. The recommended policy for dealing with MD RRs found in a master file is to reject them, or to convert them to MX RRs with a preference of 0.

3.3.5. MF RDATA format (Obsolete)



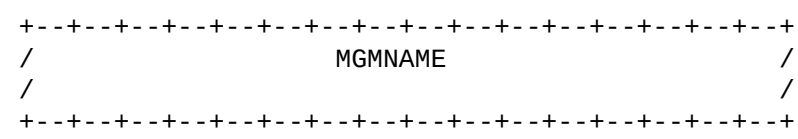
where:

MADNAME A <domain-name> which specifies a host which has a mail agent for the domain which will accept mail for forwarding to the domain.

MF records cause additional section processing which looks up an A type record corresponding to MADNAME.

MF is obsolete. See the definition of MX and [RFC-974] for details ofw the new scheme. The recommended policy for dealing with MD RRs found in a master file is to reject them, or to convert them to MX RRs with a preference of 10.

3.3.6. MG RDATA format (EXPERIMENTAL)

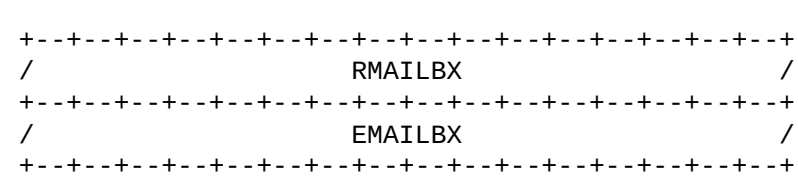


where:

MGMNAME A <domain-name> which specifies a mailbox which is a member of the mail group specified by the domain name.

MG records cause no additional section processing.

3.3.7. MINFO RDATA format (EXPERIMENTAL)



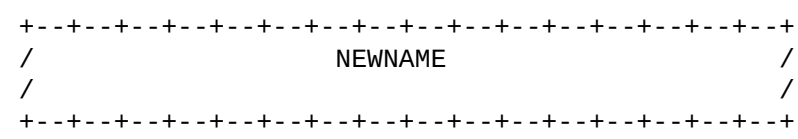
where:

RMAILBX A <domain-name> which specifies a mailbox which is responsible for the mailing list or mailbox. If this domain name names the root, the owner of the MINFO RR is responsible for itself. Note that many existing mailing lists use a mailbox X-request for the RMAILBX field of mailing list X, e.g., Msgroup-request for Msgroup. This field provides a more general mechanism.

EMAILBX A <domain-name> which specifies a mailbox which is to receive error messages related to the mailing list or mailbox specified by the owner of the MINFO RR (similar to the ERRORS-TO: field which has been proposed). If this domain name names the root, errors should be returned to the sender of the message.

MINFO records cause no additional section processing. Although these records can be associated with a simple mailbox, they are usually used with a mailing list.

3.3.8. MR RDATA format (EXPERIMENTAL)

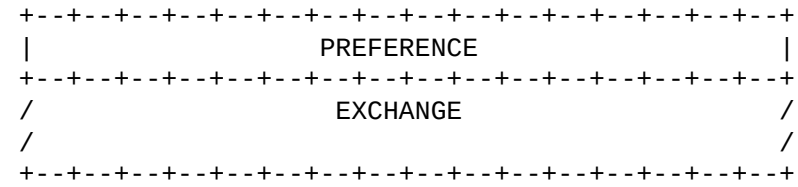


where:

NEWNAME A <domain-name> which specifies a mailbox which is the proper rename of the specified mailbox.

MR records cause no additional section processing. The main use for MR is as a forwarding entry for a user who has moved to a different mailbox.

3.3.9. MX RDATA format



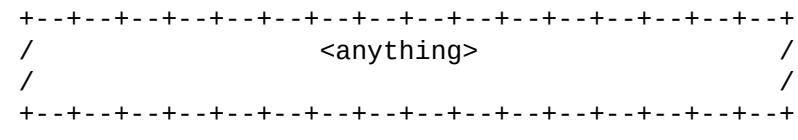
where:

PREFERENCE A 16 bit integer which specifies the preference given to this RR among others at the same owner. Lower values are preferred.

EXCHANGE A <domain-name> which specifies a host willing to act as a mail exchange for the owner name.

MX records cause type A additional section processing for the host specified by EXCHANGE. The use of MX RRs is explained in detail in [RFC-974].

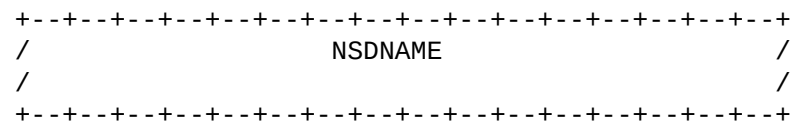
3.3.10. NULL RDATA format (EXPERIMENTAL)



Anything at all may be in the RDATA field so long as it is 65535 octets or less.

NULL records cause no additional section processing. NULL RRs are not allowed in master files. NULLs are used as placeholders in some experimental extensions of the DNS.

3.3.11. NS RDATA format



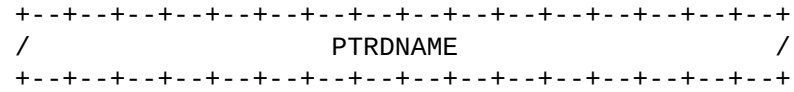
where:

NSDNAME A <domain-name> which specifies a host which should be authoritative for the specified class and domain.

NS records cause both the usual additional section processing to locate a type A record, and, when used in a referral, a special search of the zone in which they reside for glue information.

The NS RR states that the named host should be expected to have a zone starting at owner name of the specified class. Note that the class may not indicate the protocol family which should be used to communicate with the host, although it is typically a strong hint. For example, hosts which are name servers for either Internet (IN) or Hesiod (HS) class information are normally queried using IN class protocols.

3.3.12. PTR RDATA format

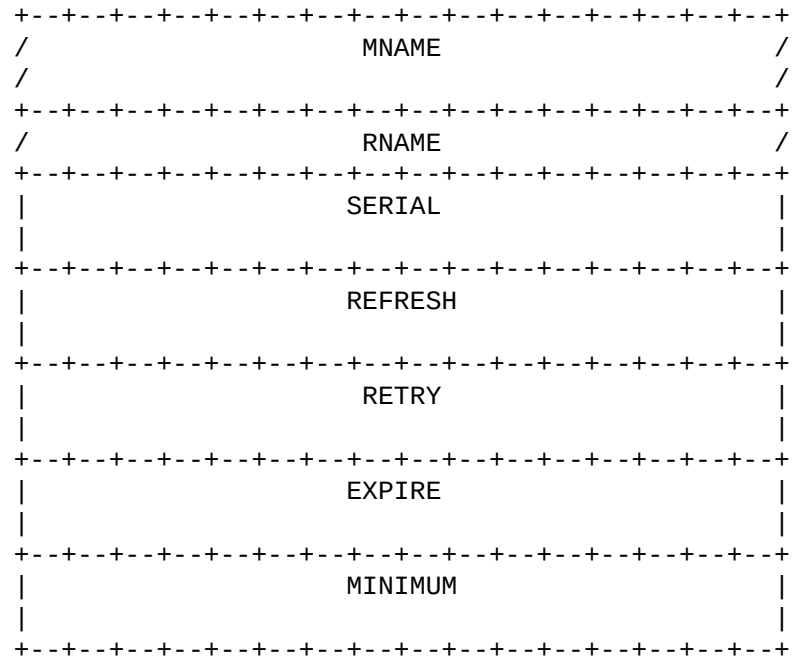


where:

PTRDNAME A <domain-name> which points to some location in the domain name space.

PTR records cause no additional section processing. These RRs are used in special domains to point to some other location in the domain space. These records are simple data, and don’t imply any special processing similar to that performed by CNAME, which identifies aliases. See the description of the IN-ADDR.ARPA domain for an example.

3.3.13. SOA RDATA format



where:

MNAME The <domain-name> of the name server that was the original or primary source of data for this zone.

RNAME A <domain-name> which specifies the mailbox of the person responsible for this zone.

SERIAL The unsigned 32 bit version number of the original copy of the zone. Zone transfers preserve this value. This value wraps and should be compared using sequence space arithmetic.

REFRESH A 32 bit time interval before the zone should be refreshed.

RETRY A 32 bit time interval that should elapse before a failed refresh should be retried.

EXPIRE A 32 bit time value that specifies the upper limit on the time interval that can elapse before the zone is no longer authoritative.

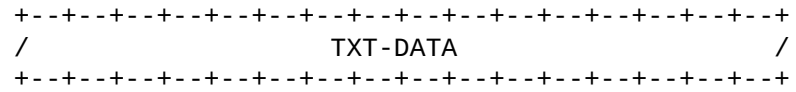
MINIMUM The unsigned 32 bit minimum TTL field that should be exported with any RR from this zone.

SOA records cause no additional section processing.

All times are in units of seconds.

Most of these fields are pertinent only for name server maintenance operations. However, MINIMUM is used in all query operations that retrieve RRs from a zone. Whenever a RR is sent in a response to a query, the TTL field is set to the maximum of the TTL field from the RR and the MINIMUM field in the appropriate SOA. Thus MINIMUM is a lower bound on the TTL field for all RRs in a zone. Note that this use of MINIMUM should occur when the RRs are copied into the response and not when the zone is loaded from a master file or via a zone transfer. The reason for this provison is to allow future dynamic update facilities to change the SOA RR with known semantics.

3.3.14. TXT RDATA format



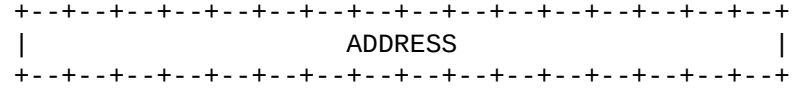
where:

TXT-DATA One or more <character-string>s.

TXT RRs are used to hold descriptive text. The semantics of the text depends on the domain where it is found.

3.4. Internet specific RRs

3.4.1. A RDATA format



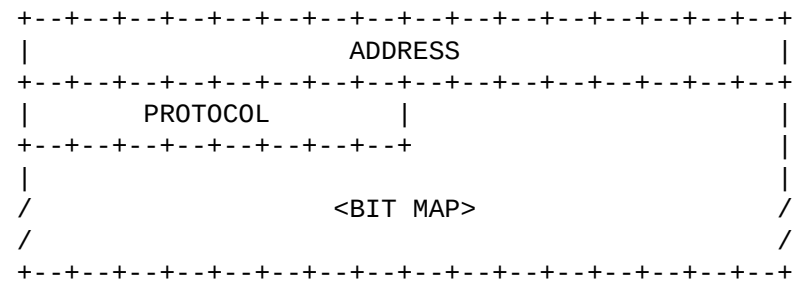
where:

ADDRESS A 32 bit Internet address.

Hosts that have multiple Internet addresses will have multiple A records.

A records cause no additional section processing. The RDATA section of an A line in a master file is an Internet address expressed as four decimal numbers separated by dots without any imbedded spaces (e.g., "10.2.0.52" or "192.0.5.6").

3.4.2. WKS RDATA format



where:

ADDRESS	An 32 bit Internet address
PROTOCOL	An 8 bit IP protocol number
<BIT MAP>	A variable length bit map. The bit map must be a multiple of 8 bits long.

The WKS record is used to describe the well known services supported by a particular protocol on a particular internet address. The PROTOCOL field specifies an IP protocol number, and the bit map has one bit per port of the specified protocol. The first bit corresponds to port 0, the second to port 1, etc. If the bit map does not include a bit for a protocol of interest, that bit is assumed zero. The appropriate values and mnemonics for ports and protocols are specified in [RFC-1010].

For example, if PROTOCOL=TCP (6), the 26th bit corresponds to TCP port 25 (SMTP). If this bit is set, a SMTP server should be listening on TCP port 25; if zero, SMTP service is not supported on the specified address.

The purpose of WKS RRs is to provide availability information for servers for TCP and UDP. If a server supports both TCP and UDP, or has multiple Internet addresses, then multiple WKS RRs are used.

WKS RRs cause no additional section processing.

In master files, both ports and protocols are expressed using mnemonics or decimal numbers.

3.5. IN-ADDR.ARPA domain

The Internet uses a special domain to support gateway location and Internet address to host mapping. Other classes may employ a similar strategy in other domains. The intent of this domain is to provide a guaranteed method to perform host address to host name mapping, and to facilitate queries to locate all gateways on a particular network in the Internet.

Note that both of these services are similar to functions that could be performed by inverse queries; the difference is that this part of the domain name space is structured according to address, and hence can guarantee that the appropriate data can be located without an exhaustive search of the domain space.

The domain begins at IN-ADDR.ARPA and has a substructure which follows the Internet addressing structure.

Domain names in the IN-ADDR.ARPA domain are defined to have up to four labels in addition to the IN-ADDR.ARPA suffix. Each label represents one octet of an Internet address, and is expressed as a character string for a decimal value in the range 0-255 (with leading zeros omitted except in the case of a zero octet which is represented by a single zero).

Host addresses are represented by domain names that have all four labels specified. Thus data for Internet address 10.2.0.52 is located at domain name 52.0.2.10.IN-ADDR.ARPA. The reversal, though awkward to read, allows zones to be delegated which are exactly one network of address space. For example, 10.IN-ADDR.ARPA can be a zone containing data for the ARPANET, while 26.IN-ADDR.ARPA can be a separate zone for MILNET. Address nodes are used to hold pointers to primary host names in the normal domain space.

Network numbers correspond to some non-terminal nodes at various depths in the IN-ADDR.ARPA domain, since Internet network numbers are either 1, 2, or 3 octets. Network nodes are used to hold pointers to the primary host names of gateways attached to that network. Since a gateway is, by definition, on more than one network, it will typically have two or more network nodes which point at it. Gateways will also have host level pointers at their fully qualified addresses.

Both the gateway pointers at network nodes and the normal host pointers at full address nodes use the PTR RR to point back to the primary domain names of the corresponding hosts.

For example, the IN-ADDR.ARPA domain will contain information about the ISI gateway between net 10 and 26, an MIT gateway from net 10 to MIT's

net 18, and hosts A.ISI.EDU and MULTICS.MIT.EDU. Assuming that ISI gateway has addresses 10.2.0.22 and 26.0.0.103, and a name MILNET-GW.ISI.EDU, and the MIT gateway has addresses 10.0.0.77 and 18.10.0.4 and a name GW.LCS.MIT.EDU, the domain database would contain:

```
10.IN-ADDR.ARPA.           PTR MILNET-GW.ISI.EDU.
10.IN-ADDR.ARPA.           PTR GW.LCS.MIT.EDU.
18.IN-ADDR.ARPA.           PTR GW.LCS.MIT.EDU.
26.IN-ADDR.ARPA.           PTR MILNET-GW.ISI.EDU.
22.0.2.10.IN-ADDR.ARPA.    PTR MILNET-GW.ISI.EDU.
103.0.0.26.IN-ADDR.ARPA.   PTR MILNET-GW.ISI.EDU.
77.0.0.10.IN-ADDR.ARPA.    PTR GW.LCS.MIT.EDU.
4.0.10.18.IN-ADDR.ARPA.    PTR GW.LCS.MIT.EDU.
103.0.3.26.IN-ADDR.ARPA.   PTR A.ISI.EDU.
6.0.0.10.IN-ADDR.ARPA.     PTR MULTICS.MIT.EDU.
```

Thus a program which wanted to locate gateways on net 10 would originate a query of the form QTYPE=PTR, QCLASS=IN, QNAME=10.IN-ADDR.ARPA. It would receive two RRs in response:

```
10.IN-ADDR.ARPA.           PTR MILNET-GW.ISI.EDU.
10.IN-ADDR.ARPA.           PTR GW.LCS.MIT.EDU.
```

The program could then originate QTYPE=A, QCLASS=IN queries for MILNET-GW.ISI.EDU. and GW.LCS.MIT.EDU. to discover the Internet addresses of these gateways.

A resolver which wanted to find the host name corresponding to Internet host address 10.0.0.6 would pursue a query of the form QTYPE=PTR, QCLASS=IN, QNAME=6.0.0.10.IN-ADDR.ARPA, and would receive:

```
6.0.0.10.IN-ADDR.ARPA.     PTR MULTICS.MIT.EDU.
```

Several cautions apply to the use of these services:

- Since the IN-ADDR.ARPA special domain and the normal domain for a particular host or gateway will be in different zones, the possibility exists that that the data may be inconsistent.

- Gateways will often have two names in separate domains, only one of which can be primary.

- Systems that use the domain database to initialize their routing tables must start with enough gateway information to guarantee that they can access the appropriate name server.

- The gateway data only reflects the existence of a gateway in a manner equivalent to the current HOSTS.TXT file. It doesn't replace the dynamic availability information from GGP or EGP.

3.6. Defining new types, classes, and special namespaces

The previously defined types and classes are the ones in use as of the date of this memo. New definitions should be expected. This section makes some recommendations to designers considering additions to the existing facilities. The mailing list Contact Information Redacted is the forum where general discussion of design issues takes place.

In general, a new type is appropriate when new information is to be added to the database about an existing object, or we need new data formats for some totally new object. Designers should attempt to define types and their RDATA formats that are generally applicable to all classes, and which avoid duplication of information. New classes are appropriate when the DNS is to be used for a new protocol, etc which requires new class-specific data formats, or when a copy of the existing name space is desired, but a separate management domain is necessary.

New types and classes need mnemonics for master files; the format of the master files requires that the mnemonics for type and class be disjoint.

TYPE and CLASS values must be a proper subset of QTYPEs and QCLASSes respectively.

The present system uses multiple RRs to represent multiple values of a type rather than storing multiple values in the RDATA section of a single RR. This is less efficient for most applications, but does keep RRs shorter. The multiple RRs assumption is incorporated in some experimental work on dynamic update methods.

The present system attempts to minimize the duplication of data in the database in order to insure consistency. Thus, in order to find the address of the host for a mail exchange, you map the mail domain name to a host name, then the host name to addresses, rather than a direct mapping to host address. This approach is preferred because it avoids the opportunity for inconsistency.

In defining a new type of data, multiple RR types should not be used to create an ordering between entries or express different formats for equivalent bindings, instead this information should be carried in the body of the RR and a single type used. This policy avoids problems with caching multiple types and defining QTYPEs to match multiple types.

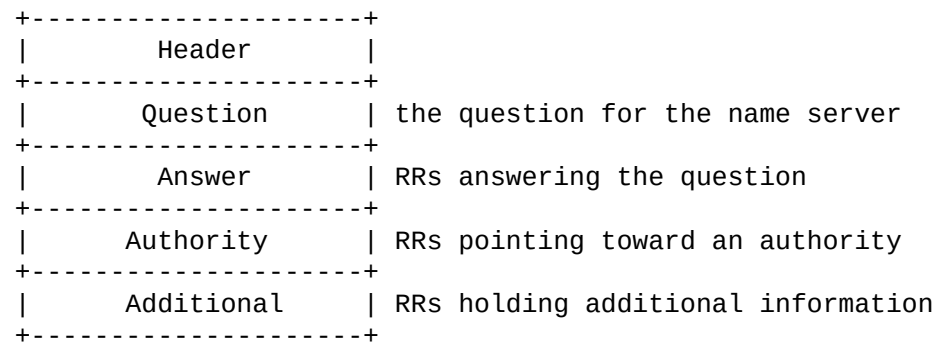
For example, the original form of mail exchange binding used two RR types one to represent a "closer" exchange (MD) and one to represent a "less close" exchange (MF). The difficulty is that the presence of one RR type in a cache doesn't convey any information about the other because the query which acquired the cached information might have used a QTYPE of MF, MD, or MAILA (which matched both). The redesigned

service used a single type (MX) with a "preference" value in the RDATA section which can order different RRs. However, if any MX RRs are found in the cache, then all should be there.

4. MESSAGES

4.1. Format

All communications inside of the domain protocol are carried in a single format called a message. The top level format of message is divided into 5 sections (some of which are empty in certain cases) shown below:

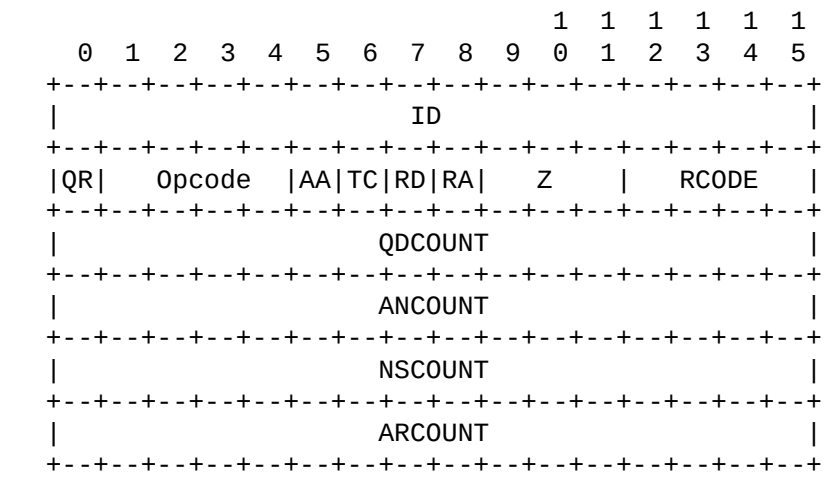


The header section is always present. The header includes fields that specify which of the remaining sections are present, and also specify whether the message is a query or a response, a standard query or some other opcode, etc.

The names of the sections after the header are derived from their use in standard queries. The question section contains fields that describe a question to a name server. These fields are a query type (QTYPE), a query class (QCLASS), and a query domain name (QNAME). The last three sections have the same format: a possibly empty list of concatenated resource records (RRs). The answer section contains RRs that answer the question; the authority section contains RRs that point toward an authoritative name server; the additional records section contains RRs which relate to the query, but are not strictly answers for the question.

4.1.1. Header section format

The header contains the following fields:



where:

ID — A 16 bit identifier assigned by the program that generates any kind of query. This identifier is copied the corresponding reply and can be used by the requester to match up replies to outstanding queries.

QR — A one bit field that specifies whether this message is a query (0), or a response (1).

OPCODE — A four bit field that specifies kind of query in this message. This value is set by the originator of a query and copied into the response. The values are:

0	a standard query (QUERY)
1	an inverse query (IQUERY)
2	a server status request (STATUS)
3-15	reserved for future use

AA — Authoritative Answer - this bit is valid in responses, and specifies that the responding name server is an authority for the domain name in question section.

Note that the contents of the answer section may have multiple owner names because of aliases. The AA bit

corresponds to the name which matches the query name, or the first owner name in the answer section.

TC — TrunCation - specifies that this message was truncated due to length greater than that permitted on the transmission channel.

RD — Recursion Desired - this bit may be set in a query and is copied into the response. If RD is set, it directs the name server to pursue the query recursively. Recursive query support is optional.

RA — Recursion Available - this be is set or cleared in a response, and denotes whether recursive query support is available in the name server.

Z — Reserved for future use. Must be zero in all queries and responses.

RCODE — Response code - this 4 bit field is set as part of responses. The values have the following interpretation:

0	No error condition
1	Format error - The name server was unable to interpret the query.
2	Server failure - The name server was unable to process this query due to a problem with the name server.
3	Name Error - Meaningful only for responses from an authoritative name server, this code signifies that the domain name referenced in the query does not exist.
4	Not Implemented - The name server does not support the requested kind of query.
5	Refused - The name server refuses to perform the specified operation for policy reasons. For example, a name server may not wish to provide the information to the particular requester, or a name server may not wish to perform a particular operation (e.g., zone

transfer) for particular data.

6-15 Reserved for future use.

QDCOUNT an unsigned 16 bit integer specifying the number of entries in the question section.

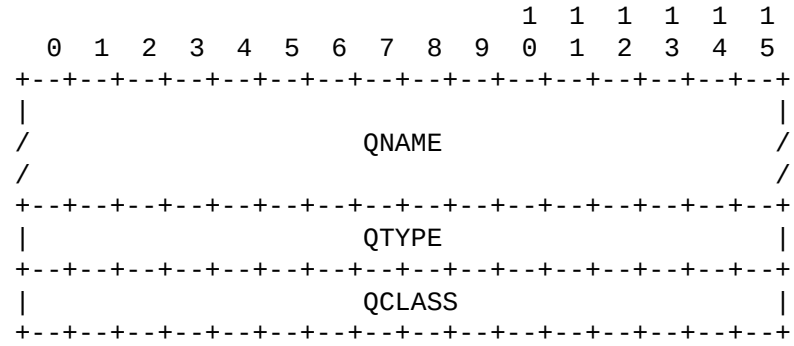
ANCOUNT an unsigned 16 bit integer specifying the number of resource records in the answer section.

NSCOUNT an unsigned 16 bit integer specifying the number of name server resource records in the authority records section.

ARCOUNT an unsigned 16 bit integer specifying the number of resource records in the additional records section.

4.1.2. Question section format

The question section is used to carry the "question" in most queries, i.e., the parameters that define what is being asked. The section contains QDCOUNT (usually 1) entries, each of the following format:



where:

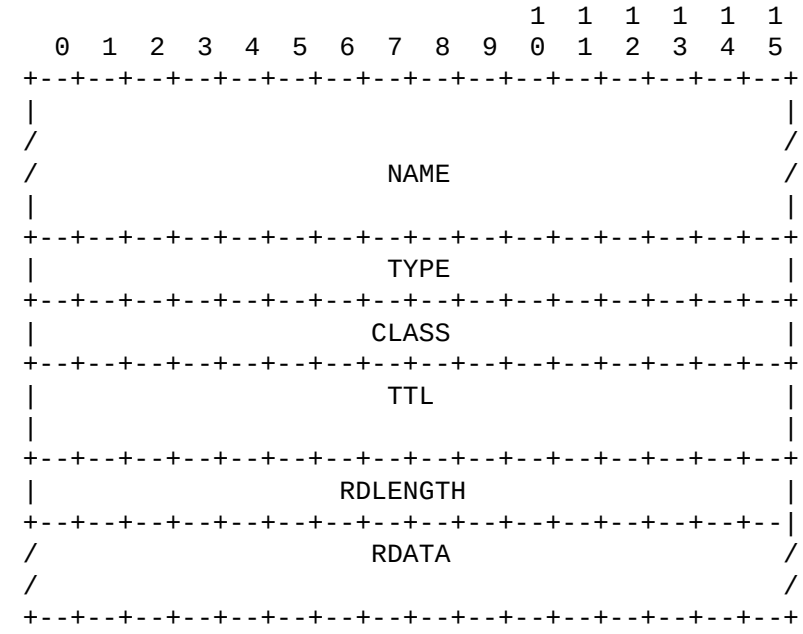
QNAME a domain name represented as a sequence of labels, where each label consists of a length octet followed by that number of octets. The domain name terminates with the zero length octet for the null label of the root. Note that this field may be an odd number of octets; no padding is used.

QTYPE a two octet code which specifies the type of the query. The values for this field include all codes valid for a TYPE field, together with some more general codes which can match more than one type of RR.

QCLASS a two octet code that specifies the class of the query. For example, the QCLASS field is IN for the Internet.

4.1.3. Resource record format

The answer, authority, and additional sections all share the same format: a variable number of resource records, where the number of records is specified in the corresponding count field in the header. Each resource record has the following format:



where:

NAME a domain name to which this resource record pertains.

TYPE two octets containing one of the RR type codes. This field specifies the meaning of the data in the RDATA field.

CLASS two octets which specify the class of the data in the RDATA field.

TTL a 32 bit unsigned integer that specifies the time interval (in seconds) that the resource record may be cached before it should be discarded. Zero values are interpreted to mean that the RR can only be used for the transaction in progress, and should not be cached.

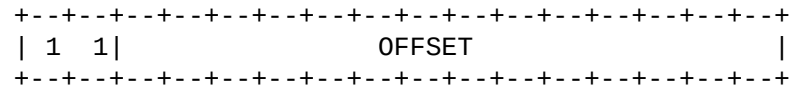
RDLENGTH an unsigned 16 bit integer that specifies the length in octets of the RDATA field.

RDATA a variable length string of octets that describes the resource. The format of this information varies according to the TYPE and CLASS of the resource record. For example, the if the TYPE is A and the CLASS is IN, the RDATA field is a 4 octet ARPA Internet address.

4.1.4. Message compression

In order to reduce the size of messages, the domain system utilizes a compression scheme which eliminates the repetition of domain names in a message. In this scheme, an entire domain name or a list of labels at the end of a domain name is replaced with a pointer to a prior occurance of the same name.

The pointer takes the form of a two octet sequence:



The first two bits are ones. This allows a pointer to be distinguished from a label, since the label must begin with two zero bits because labels are restricted to 63 octets or less. (The 10 and 01 combinations are reserved for future use.) The OFFSET field specifies an offset from the start of the message (i.e., the first octet of the ID field in the domain header). A zero offset specifies the first byte of the ID field, etc.

The compression scheme allows a domain name in a message to be represented as either:

- a sequence of labels ending in a zero octet

- a pointer

- a sequence of labels ending with a pointer

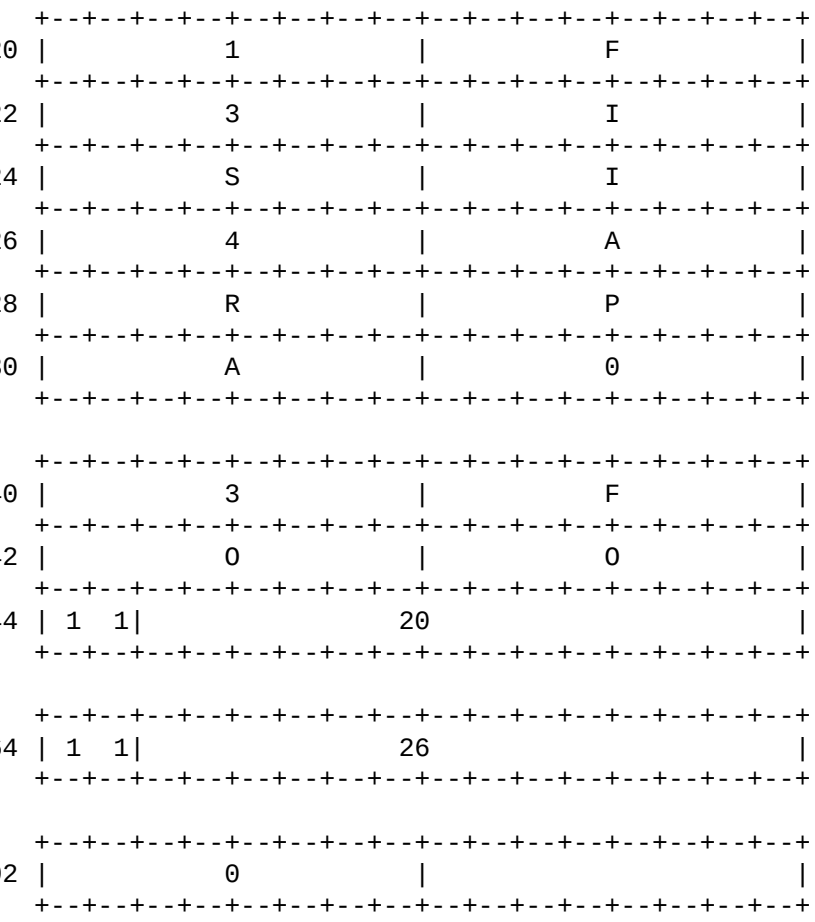
Pointers can only be used for occurances of a domain name where the format is not class specific. If this were not the case, a name server or resolver would be required to know the format of all RRs it handled. As yet, there are no such cases, but they may occur in future RDATA formats.

If a domain name is contained in a part of the message subject to a length field (such as the RDATA section of an RR), and compression is

used, the length of the compressed name is used in the length calculation, rather than the length of the expanded name.

Programs are free to avoid using pointers in messages they generate, although this will reduce datagram capacity, and may cause truncation. However all programs are required to understand arriving messages that contain pointers.

For example, a datagram might need to use the domain names F.ISI.ARPA, FOO.F.ISI.ARPA, ARPA, and the root. Ignoring the other fields of the message, these domain names might be represented as:



The domain name for F.ISI.ARPA is shown at offset 20. The domain name FOO.F.ISI.ARPA is shown at offset 40; this definition uses a pointer to concatenate a label for FOO to the previously defined F.ISI.ARPA. The domain name ARPA is defined at offset 64 using a pointer to the ARPA component of the name F.ISI.ARPA at 20; note that this pointer relies on ARPA being the last label in the string at 20. The root domain name is

defined by a single octet of zeros at 92; the root domain name has no labels.

4.2. Transport

The DNS assumes that messages will be transmitted as datagrams or in a byte stream carried by a virtual circuit. While virtual circuits can be used for any DNS activity, datagrams are preferred for queries due to their lower overhead and better performance. Zone refresh activities must use virtual circuits because of the need for reliable transfer.

The Internet supports name server access using TCP [RFC-793] on server port 53 (decimal) as well as datagram access using UDP [RFC-768] on UDP port 53 (decimal).

4.2.1. UDP usage

Messages sent using UDP user server port 53 (decimal).

Messages carried by UDP are restricted to 512 bytes (not counting the IP or UDP headers). Longer messages are truncated and the TC bit is set in the header.

UDP is not acceptable for zone transfers, but is the recommended method for standard queries in the Internet. Queries sent using UDP may be lost, and hence a retransmission strategy is required. Queries or their responses may be reordered by the network, or by processing in name servers, so resolvers should not depend on them being returned in order.

The optimal UDP retransmission policy will vary with performance of the Internet and the needs of the client, but the following are recommended:

- The client should try other servers and server addresses before repeating a query to a specific address of a server.

- The retransmission interval should be based on prior statistics if possible. Too aggressive retransmission can easily slow responses for the community at large. Depending on how well connected the client is to its expected servers, the minimum retransmission interval should be 2-5 seconds.

More suggestions on server selection and retransmission policy can be found in the resolver section of this memo.

4.2.2. TCP usage

Messages sent over TCP connections use server port 53 (decimal). The message is prefixed with a two byte length field which gives the message

length, excluding the two byte length field. This length field allows the low-level processing to assemble a complete message before beginning to parse it.

Several connection management policies are recommended:

- The server should not block other activities waiting for TCP data.

- The server should support multiple connections.

- The server should assume that the client will initiate connection closing, and should delay closing its end of the connection until all outstanding client requests have been satisfied.

- If the server needs to close a dormant connection to reclaim resources, it should wait until the connection has been idle for a period on the order of two minutes. In particular, the server should allow the SOA and AXFR request sequence (which begins a refresh operation) to be made on a single connection. Since the server would be unable to answer queries anyway, a unilateral close or reset may be used instead of a graceful close.

5. MASTER FILES

Master files are text files that contain RRs in text form. Since the contents of a zone can be expressed in the form of a list of RRs a master file is most often used to define a zone, though it can be used to list a cache's contents. Hence, this section first discusses the format of RRs in a master file, and then the special considerations when a master file is used to create a zone in some name server.

5.1. Format

The format of these files is a sequence of entries. Entries are predominantly line-oriented, though parentheses can be used to continue a list of items across a line boundary, and text literals can contain CRLF within the text. Any combination of tabs and spaces act as a delimiter between the separate items that make up an entry. The end of any line in the master file can end with a comment. The comment starts with a ";" (semicolon).

The following entries are defined:

    <blank>[<comment>]

```
    $ORIGIN <domain-name> [<comment>]

    $INCLUDE <file-name> [<domain-name>] [<comment>]

    <domain-name><rr> [<comment>]

    <blank><rr> [<comment>]
```

Blank lines, with or without comments, are allowed anywhere in the file.

Two control entries are defined: $ORIGIN and $INCLUDE. $ORIGIN is followed by a domain name, and resets the current origin for relative domain names to the stated name. $INCLUDE inserts the named file into the current file, and may optionally specify a domain name that sets the relative domain name origin for the included file. $INCLUDE may also have a comment. Note that a $INCLUDE entry never changes the relative origin of the parent file, regardless of changes to the relative origin made within the included file.

The last two forms represent RRs. If an entry for an RR begins with a blank, then the RR is assumed to be owned by the last stated owner. If an RR entry begins with a <domain-name>, then the owner name is reset.

<rr> contents take one of the following forms:

```
    [<TTL>] [<class>] <type> <RDATA>

    [<class>] [<TTL>] <type> <RDATA>
```

The RR begins with optional TTL and class fields, followed by a type and RDATA field appropriate to the type and class. Class and type use the standard mnemonics, TTL is a decimal integer. Omitted class and TTL values are default to the last explicitly stated values. Since type and class mnemonics are disjoint, the parse is unique. (Note that this order is different from the order used in examples and the order used in the actual RRs; the given order allows easier parsing and defaulting.)

<domain-name>s make up a large share of the data in the master file. The labels in the domain name are expressed as character strings and separated by dots. Quoting conventions allow arbitrary characters to be stored in domain names. Domain names that end in a dot are called absolute, and are taken as complete. Domain names which do not end in a dot are called relative; the actual domain name is the concatenation of the relative part with an origin specified in a $ORIGIN, $INCLUDE, or as an argument to the master file loading routine. A relative name is an error when no origin is available.

<character-string> is expressed in one or two ways: as a contiguous set of characters without interior spaces, or as a string beginning with a " and ending with a ". Inside a " delimited string any character can occur, except for a " itself, which must be quoted using \ (back slash).

Because these files are text files several special encodings are necessary to allow arbitrary data to be loaded. In particular:

of the root.

@ A free standing @ is used to denote the current origin.

\X where X is any character other than a digit (0-9), is used to quote that character so that its special meaning does not apply. For example, "\." can be used to place a dot character in a label.

\DDD where each D is a digit is the octet corresponding to the decimal number described by DDD. The resulting octet is assumed to be text and is not checked for special meaning.

( ) Parentheses are used to group data that crosses a line boundary. In effect, line terminations are not recognized within parentheses.

; Semicolon is used to start a comment; the remainder of the line is ignored.

5.2. Use of master files to define zones

When a master file is used to load a zone, the operation should be suppressed if any errors are encountered in the master file. The rationale for this is that a single error can have widespread consequences. For example, suppose that the RRs defining a delegation have syntax errors; then the server will return authoritative name errors for all names in the subzone (except in the case where the subzone is also present on the server).

Several other validity checks that should be performed in addition to insuring that the file is syntactically correct:

1. All RRs in the file should have the same class.

2. Exactly one SOA RR should be present at the top of the zone.

3. If delegations are present and glue information is required, it should be present.

4. Information present outside of the authoritative nodes in the zone should be glue information, rather than the result of an origin or similar error.

5.3. Master file example

The following is an example file which might be used to define the ISI.EDU zone.and is loaded with an origin of ISI.EDU:

```
@   IN  SOA     VENERA      Action\.domains (
                                 20     ; SERIAL
                                 7200   ; REFRESH
                                 600    ; RETRY
                                 3600000; EXPIRE
                                 60)    ; MINIMUM

        NS      A.ISI.EDU.
        NS      VENERA
        NS      VAXA
        MX      10      VENERA
        MX      20      VAXA

A       A       26.3.0.103

VENERA  A       10.1.0.52
        A       128.9.0.32

VAXA    A       10.2.0.27
        A       128.9.0.33


$INCLUDE <SUBSYS>ISI-MAILBOXES.TXT
```

Where the file <SUBSYS>ISI-MAILBOXES.TXT is:

```
    MOE     MB      A.ISI.EDU.
    LARRY   MB      A.ISI.EDU.
    CURLEY  MB      A.ISI.EDU.
    STOOGES MG      MOE
            MG      LARRY
            MG      CURLEY
```

Note the use of the \ character in the SOA RR to specify the responsible person mailbox " Contact Information Redacted

6. NAME SERVER IMPLEMENTATION

6.1. Architecture

The optimal structure for the name server will depend on the host operating system and whether the name server is integrated with resolver operations, either by supporting recursive service, or by sharing its database with a resolver. This section discusses implementation considerations for a name server which shares a database with a resolver, but most of these concerns are present in any name server.

6.1.1. Control

A name server must employ multiple concurrent activities, whether they are implemented as separate tasks in the host's OS or multiplexing inside a single name server program. It is simply not acceptable for a name server to block the service of UDP requests while it waits for TCP data for refreshing or query activities. Similarly, a name server should not attempt to provide recursive service without processing such requests in parallel, though it may choose to serialize requests from a single client, or to regard identical requests from the same client as duplicates. A name server should not substantially delay requests while it reloads a zone from master files or while it incorporates a newly refreshed zone into its database.

6.1.2. Database

While name server implementations are free to use any internal data structures they choose, the suggested structure consists of three major parts:

- A "catalog" data structure which lists the zones available to this server, and a "pointer" to the zone data structure. The main purpose of this structure is to find the nearest ancestor zone, if any, for arriving standard queries.

- Separate data structures for each of the zones held by the name server.

- A data structure for cached data. (or perhaps separate caches for different classes)

All of these data structures can be implemented an identical tree structure format, with different data chained off the nodes in different parts: in the catalog the data is pointers to zones, while in the zone and cache data structures, the data will be RRs. In designing the tree framework the designer should recognize that query processing will need to traverse the tree using case-insensitive label comparisons; and that

in real data, a few nodes have a very high branching factor (100-1000 or more), but the vast majority have a very low branching factor (0-1).

One way to solve the case problem is to store the labels for each node in two pieces: a standardized-case representation of the label where all ASCII characters are in a single case, together with a bit mask that denotes which characters are actually of a different case. The branching factor diversity can be handled using a simple linked list for a node until the branching factor exceeds some threshold, and transitioning to a hash structure after the threshold is exceeded. In any case, hash structures used to store tree sections must insure that hash functions and procedures preserve the casing conventions of the DNS.

The use of separate structures for the different parts of the database is motivated by several factors:

- The catalog structure can be an almost static structure that need change only when the system administrator changes the zones supported by the server. This structure can also be used to store parameters used to control refreshing activities.

- The individual data structures for zones allow a zone to be replaced simply by changing a pointer in the catalog. Zone refresh operations can build a new structure and, when complete, splice it into the database via a simple pointer replacement. It is very important that when a zone is refreshed, queries should not use old and new data simultaneously.

- With the proper search procedures, authoritative data in zones will always "hide", and hence take precedence over, cached data.

- Errors in zone definitions that cause overlapping zones, etc., may cause erroneous responses to queries, but problem determination is simplified, and the contents of one "bad" zone can’t corrupt another.

- Since the cache is most frequently updated, it is most vulnerable to corruption during system restarts. It can also become full of expired RR data. In either case, it can easily be discarded without disturbing zone data.

A major aspect of database design is selecting a structure which allows the name server to deal with crashes of the name server’s host. State information which a name server should save across system crashes

includes the catalog structure (including the state of refreshing for each zone) and the zone data itself.

6.1.3. Time

Both the TTL data for RRs and the timing data for refreshing activities depends on 32 bit timers in units of seconds. Inside the database, refresh timers and TTLs for cached data conceptually "count down", while data in the zone stays with constant TTLs.

A recommended implementation strategy is to store time in two ways: as a relative increment and as an absolute time. One way to do this is to use positive 32 bit numbers for one type and negative numbers for the other. The RRs in zones use relative times; the refresh timers and cache data use absolute times. Absolute numbers are taken with respect to some known origin and converted to relative values when placed in the response to a query. When an absolute TTL is negative after conversion to relative, then the data is expired and should be ignored.

6.2. Standard query processing

The major algorithm for standard query processing is presented in [RFC-1034].

When processing queries with QCLASS=*, or some other QCLASS which matches multiple classes, the response should never be authoritative unless the server can guarantee that the response covers all classes.

When composing a response, RRs which are to be inserted in the additional section, but duplicate RRs in the answer or authority sections, may be omitted from the additional section.

When a response is so long that truncation is required, the truncation should start at the end of the response and work forward in the datagram. Thus if there is any data for the authority section, the answer section is guaranteed to be unique.

The MINIMUM value in the SOA should be used to set a floor on the TTL of data distributed from a zone. This floor function should be done when the data is copied into a response. This will allow future dynamic update protocols to change the SOA MINIMUM field without ambiguous semantics.

6.3. Zone refresh and reload processing

In spite of a server’s best efforts, it may be unable to load zone data from a master file due to syntax errors, etc., or be unable to refresh a zone within the its expiration parameter. In this case, the name server

should answer queries as if it were not supposed to possess the zone.

If a master is sending a zone out via AXFR, and a new version is created during the transfer, the master should continue to send the old version if possible. In any case, it should never send part of one version and part of another. If completion is not possible, the master should reset the connection on which the zone transfer is taking place.

6.4. Inverse queries (Optional)

Inverse queries are an optional part of the DNS. Name servers are not required to support any form of inverse queries. If a name server receives an inverse query that it does not support, it returns an error response with the "Not Implemented" error set in the header. While inverse query support is optional, all name servers must be at least able to return the error response.

6.4.1. The contents of inverse queries and responses

Inverse queries reverse the mappings performed by standard query operations; while a standard query maps a domain name to a resource, an inverse query maps a resource to a domain name. For example, a standard query might bind a domain name to a host address; the corresponding inverse query binds the host address to a domain name.

Inverse queries take the form of a single RR in the answer section of the message, with an empty question section. The owner name of the query RR and its TTL are not significant. The response carries questions in the question section which identify all names possessing the query RR WHICH THE NAME SERVER KNOWS. Since no name server knows about all of the domain name space, the response can never be assumed to be complete. Thus inverse queries are primarily useful for database management and debugging activities. Inverse queries are NOT an acceptable method of mapping host addresses to host names; use the IN-ADDR.ARPA domain instead.

Where possible, name servers should provide case-insensitive comparisons for inverse queries. Thus an inverse query asking for an MX RR of "Venera.isi.edu" should get the same response as a query for "VENERA.ISI.EDU"; an inverse query for HINFO RR "IBM-PC UNIX" should produce the same result as an inverse query for "IBM-pc unix". However, this cannot be guaranteed because name servers may possess RRs that contain character strings but the name server does not know that the data is character.

When a name server processes an inverse query, it either returns:

1. zero, one, or multiple domain names for the specified resource as QNAMEs in the question section

2. an error code indicating that the name server doesn't support inverse mapping of the specified resource type.

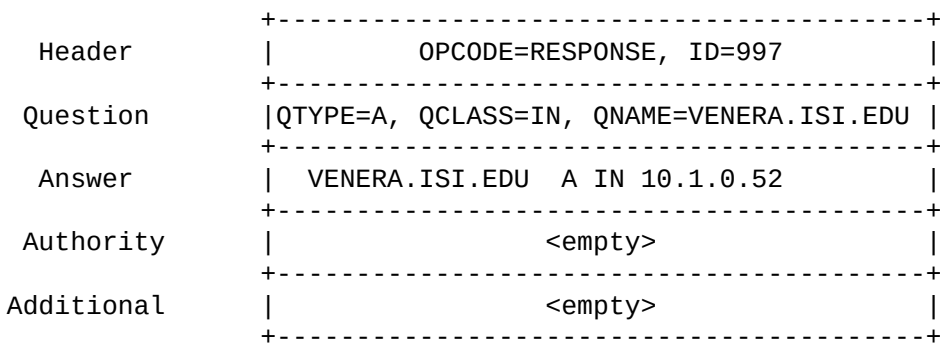
When the response to an inverse query contains one or more QNAMEs, the owner name and TTL of the RR in the answer section which defines the inverse query is modified to exactly match an RR found at the first QNAME.

RRs returned in the inverse queries cannot be cached using the same mechanism as is used for the replies to standard queries. One reason for this is that a name might have multiple RRs of the same type, and only one would appear. For example, an inverse query for a single address of a multiply homed host might create the impression that only one address existed.

6.4.2. Inverse query and response example The overall structure of an inverse query for retrieving the domain name that corresponds to Internet address 10.1.0.52 is shown below:

```
                +-----------------------------------------+
  Header        |          OPCODE=IQUERY, ID=997          |
                +-----------------------------------------+
  Question      |                 <empty>                 |
                +-----------------------------------------+
  Answer        |        <anyname> A IN 10.1.0.52         |
                +-----------------------------------------+
  Authority     |                 <empty>                 |
                +-----------------------------------------+
  Additional    |                 <empty>                 |
                +-----------------------------------------+
```

This query asks for a question whose answer is the Internet style address 10.1.0.52. Since the owner name is not known, any domain name can be used as a placeholder (and is ignored). A single octet of zero, signifying the root, is usually used because it minimizes the length of the message. The TTL of the RR is not significant. The response to this query might be:



Note that the QTYPE in a response to an inverse query is the same as the TYPE field in the answer section of the inverse query. Responses to inverse queries may contain multiple questions when the inverse is not unique. If the question section in the response is not empty, then the RR in the answer section is modified to correspond to be an exact copy of an RR at the first QNAME.

6.4.3. Inverse query processing

Name servers that support inverse queries can support these operations through exhaustive searches of their databases, but this becomes impractical as the size of the database increases. An alternative approach is to invert the database according to the search key.

For name servers that support multiple zones and a large amount of data, the recommended approach is separate inversions for each zone. When a particular zone is changed during a refresh, only its inversions need to be redone.

Support for transfer of this type of inversion may be included in future versions of the domain system, but is not supported in this version.

6.5. Completion queries and responses

The optional completion services described in RFC-882 and RFC-883 have been deleted. Redesigned services may become available in the future.

7. RESOLVER IMPLEMENTATION

The top levels of the recommended resolver algorithm are discussed in [RFC-1034]. This section discusses implementation details assuming the database structure suggested in the name server implementation section of this memo.

7.1. Transforming a user request into a query

The first step a resolver takes is to transform the client's request, stated in a format suitable to the local OS, into a search specification for RRs at a specific name which match a specific QTYPE and QCLASS. Where possible, the QTYPE and QCLASS should correspond to a single type and a single class, because this makes the use of cached data much simpler. The reason for this is that the presence of data of one type in a cache doesn't confirm the existence or non-existence of data of other types, hence the only way to be sure is to consult an authoritative source. If QCLASS=* is used, then authoritative answers won't be available.

Since a resolver must be able to multiplex multiple requests if it is to perform its function efficiently, each pending request is usually represented in some block of state information. This state block will typically contain:

- A timestamp indicating the time the request began.
  The timestamp is used to decide whether RRs in the database can be used or are out of date. This timestamp uses the absolute time format previously discussed for RR storage in zones and caches. Note that when an RRs TTL indicates a relative time, the RR must be timely, since it is part of a zone. When the RR has an absolute time, it is part of a cache, and the TTL of the RR is compared against the timestamp for the start of the request.

  Note that using the timestamp is superior to using a current time, since it allows RRs with TTLs of zero to be entered in the cache in the usual manner, but still used by the current request, even after intervals of many seconds due to system load, query retransmission timeouts, etc.

- Some sort of parameters to limit the amount of work which will be performed for this request.

  The amount of work which a resolver will do in response to a client request must be limited to guard against errors in the database, such as circular CNAME references, and operational problems, such as network partition which prevents the

resolver from accessing the name servers it needs. While local limits on the number of times a resolver will retransmit a particular query to a particular name server address are essential, the resolver should have a global per-request counter to limit work on a single request. The counter should be set to some initial value and decremented whenever the resolver performs any action (retransmission timeout, retransmission, etc.) If the counter passes zero, the request is terminated with a temporary error.

Note that if the resolver structure allows one request to start others in parallel, such as when the need to access a name server for one request causes a parallel resolve for the name server's addresses, the spawned request should be started with a lower counter. This prevents circular references in the database from starting a chain reaction of resolver activity.

- The SLIST data structure discussed in [RFC-1034].

  This structure keeps track of the state of a request if it must wait for answers from foreign name servers.

7.2. Sending the queries

As described in [RFC-1034], the basic task of the resolver is to formulate a query which will answer the client's request and direct that query to name servers which can provide the information. The resolver will usually only have very strong hints about which servers to ask, in the form of NS RRs, and may have to revise the query, in response to CNAMEs, or revise the set of name servers the resolver is asking, in response to delegation responses which point the resolver to name servers closer to the desired information. In addition to the information requested by the client, the resolver may have to call upon its own services to determine the address of name servers it wishes to contact.

In any case, the model used in this memo assumes that the resolver is multiplexing attention between multiple requests, some from the client, and some internally generated. Each request is represented by some state information, and the desired behavior is that the resolver transmit queries to name servers in a way that maximizes the probability that the request is answered, minimizes the time that the request takes, and avoids excessive transmissions. The key algorithm uses the state information of the request to select the next name server address to query, and also computes a timeout which will cause the next action should a response not arrive. The next action will usually be a transmission to some other server, but may be a temporary error to the

client.

The resolver always starts with a list of server names to query (SLIST). This list will be all NS RRs which correspond to the nearest ancestor zone that the resolver knows about. To avoid startup problems, the resolver should have a set of default servers which it will ask should it have no current NS RRs which are appropriate. The resolver then adds to SLIST all of the known addresses for the name servers, and may start parallel requests to acquire the addresses of the servers when the resolver has the name, but no addresses, for the name servers.

To complete initialization of SLIST, the resolver attaches whatever history information it has to the each address in SLIST. This will usually consist of some sort of weighted averages for the response time of the address, and the batting average of the address (i.e., how often the address responded at all to the request). Note that this information should be kept on a per address basis, rather than on a per name server basis, because the response time and batting average of a particular server may vary considerably from address to address. Note also that this information is actually specific to a resolver address / server address pair, so a resolver with multiple addresses may wish to keep separate histories for each of its addresses. Part of this step must deal with addresses which have no such history; in this case an expected round trip time of 5-10 seconds should be the worst case, with lower estimates for the same local network, etc.

Note that whenever a delegation is followed, the resolver algorithm reinitializes SLIST.

The information establishes a partial ranking of the available name server addresses. Each time an address is chosen and the state should be altered to prevent its selection again until all other addresses have been tried. The timeout for each transmission should be 50-100% greater than the average predicted value to allow for variance in response.

Some fine points:

- The resolver may encounter a situation where no addresses are available for any of the name servers named in SLIST, and where the servers in the list are precisely those which would normally be used to look up their own addresses. This situation typically occurs when the glue address RRs have a smaller TTL than the NS RRs marking delegation, or when the resolver caches the result of a NS search. The resolver should detect this condition and restart the search at the next ancestor zone, or alternatively at the root.

- If a resolver gets a server error or other bizarre response from a name server, it should remove it from SLIST, and may wish to schedule an immediate transmission to the next candidate server address.

7.3. Processing responses

The first step in processing arriving response datagrams is to parse the response. This procedure should include:

- Check the header for reasonableness. Discard datagrams which are queries when responses are expected.

- Parse the sections of the message, and insure that all RRs are correctly formatted.

- As an optional step, check the TTLs of arriving data looking for RRs with excessively long TTLs. If a RR has an excessively long TTL, say greater than 1 week, either discard the whole response, or limit all TTLs in the response to 1 week.

The next step is to match the response to a current resolver request. The recommended strategy is to do a preliminary matching using the ID field in the domain header, and then to verify that the question section corresponds to the information currently desired. This requires that the transmission algorithm devote several bits of the domain ID field to a request identifier of some sort. This step has several fine points:

- Some name servers send their responses from different addresses than the one used to receive the query. That is, a resolver cannot rely that a response will come from the same address which it sent the corresponding query to. This name server bug is typically encountered in UNIX systems.

- If the resolver retransmits a particular request to a name server it should be able to use a response from any of the transmissions. However, if it is using the response to sample the round trip time to access the name server, it must be able to determine which transmission matches the response (and keep transmission times for each outgoing message), or only calculate round trip times based on initial transmissions.

- A name server will occasionally not have a current copy of a zone which it should have according to some NS RRs. The resolver should simply remove the name server from the current SLIST, and continue.

7.4. Using the cache

In general, we expect a resolver to cache all data which it receives in responses since it may be useful in answering future client requests. However, there are several types of data which should not be cached:

- When several RRs of the same type are available for a particular owner name, the resolver should either cache them all or none at all. When a response is truncated, and a resolver doesn't know whether it has a complete set, it should not cache a possibly partial set of RRs.

- Cached data should never be used in preference to authoritative data, so if caching would cause this to happen the data should not be cached.

- The results of an inverse query should not be cached.

- The results of standard queries where the QNAME contains "*" labels if the data might be used to construct wildcards. The reason is that the cache does not necessarily contain existing RRs or zone boundary information which is necessary to restrict the application of the wildcard RRs.

- RR data in responses of dubious reliability. When a resolver receives unsolicited responses or RR data other than that requested, it should discard it without caching it. The basic implication is that all sanity checks on a packet should be performed before any of it is cached.

In a similar vein, when a resolver has a set of RRs for some name in a response, and wants to cache the RRs, it should check its cache for already existing RRs. Depending on the circumstances, either the data in the response or the cache is preferred, but the two should never be combined. If the data in the response is from authoritative data in the answer section, it is always preferred.

8. MAIL SUPPORT

The domain system defines a standard for mapping mailboxes into domain names, and two methods for using the mailbox information to derive mail routing information. The first method is called mail exchange binding and the other method is mailbox binding. The mailbox encoding standard and mail exchange binding are part of the DNS official protocol, and are the recommended method for mail routing in the Internet. Mailbox binding is an experimental feature which is still under development and subject to change.

The mailbox encoding standard assumes a mailbox name of the form "<local-part>@<mail-domain>". While the syntax allowed in each of these sections varies substantially between the various mail internets, the preferred syntax for the ARPA Internet is given in [RFC-822].

The DNS encodes the <local-part> as a single label, and encodes the <mail-domain> as a domain name. The single label from the <local-part> is prefaced to the domain name from <mail-domain> to form the domain name corresponding to the mailbox. Thus the mailbox HOSTMASTER@SRI-NIC.ARPA is mapped into the domain name HOSTMASTER.SRI-NIC.ARPA. If the <local-part> contains dots or other special characters, its representation in a master file will require the use of backslash quoting to ensure that the domain name is properly encoded. For example, the mailbox Contact Information Redacted would be represented as Action\.domains.ISI.EDU.

8.1. Mail exchange binding

Mail exchange binding uses the <mail-domain> part of a mailbox specification to determine where mail should be sent. The <local-part> is not even consulted. [RFC-974] specifies this method in detail, and should be consulted before attempting to use mail exchange support.

One of the advantages of this method is that it decouples mail destination naming from the hosts used to support mail service, at the cost of another layer of indirection in the lookup function. However, the addition layer should eliminate the need for complicated "%", "!", etc encodings in <local-part>.

The essence of the method is that the <mail-domain> is used as a domain name to locate type MX RRs which list hosts willing to accept mail for <mail-domain>, together with preference values which rank the hosts according to an order specified by the administrators for <mail-domain>.

In this memo, the <mail-domain> ISI.EDU is used in examples, together with the hosts VENERA.ISI.EDU and VAXA.ISI.EDU as mail exchanges for ISI.EDU. If a mailer had a message for Contact Information Redacted it would route it by looking up MX RRs for ISI.EDU. The MX RRs at ISI.EDU name VENERA.ISI.EDU and VAXA.ISI.EDU, and type A queries can find the host addresses.

8.2. Mailbox binding (Experimental)

In mailbox binding, the mailer uses the entire mail destination specification to construct a domain name. The encoded domain name for the mailbox is used as the QNAME field in a QTYPE=MAILB query.

Several outcomes are possible for this query:

1. The query can return a name error indicating that the mailbox does not exist as a domain name.

   In the long term, this would indicate that the specified mailbox doesn't exist. However, until the use of mailbox binding is universal, this error condition should be interpreted to mean that the organization identified by the global part does not support mailbox binding. The appropriate procedure is to revert to exchange binding at this point.

2. The query can return a Mail Rename (MR) RR.

   The MR RR carries new mailbox specification in its RDATA field. The mailer should replace the old mailbox with the new one and retry the operation.

3. The query can return a MB RR.

   The MB RR carries a domain name for a host in its RDATA field. The mailer should deliver the message to that host via whatever protocol is applicable, e.g., b,SMTP.

4. The query can return one or more Mail Group (MG) RRs.

   This condition means that the mailbox was actually a mailing list or mail group, rather than a single mailbox. Each MG RR has a RDATA field that identifies a mailbox that is a member of the group. The mailer should deliver a copy of the message to each member.

5. The query can return a MB RR as well as one or more MG RRs.

   This condition means the the mailbox was actually a mailing list. The mailer can either deliver the message to the host specified by the MB RR, which will in turn do the delivery to all members, or the mailer can use the MG RRs to do the expansion itself.

In any of these cases, the response may include a Mail Information (MINFO) RR. This RR is usually associated with a mail group, but is legal with a MB. The MINFO RR identifies two mailboxes. One of these identifies a responsible person for the original mailbox name. This mailbox should be used for requests to be added to a mail group, etc. The second mailbox name in the MINFO RR identifies a mailbox that should receive error messages for mail failures. This is particularly appropriate for mailing lists when errors in member names should be reported to a person other than the one who sends a message to the list.

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GS-20

REVIEW PAPER

Price cap regulation: what have we learned from 25 years of experience in the telecommunications industry?

David E. M. Sappington · Dennis L. Weisman

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Abstract Price cap regulation (PCR) has now been employed in the telecommunications industry for more than a quarter century. We review the experience with PCR and offer an explanation for its popularity. PCR's design flexibility, its ability to limit undesirable strategic behavior, declining industry costs, and developing competition all enhanced the appeal of PCR. We also review some surprises that have arisen under PCR and discuss the implications of the experience with PCR in the telecommunications industry for regulatory policy in other industries.

Keywords Price caps · Performance · Telecommunications

JEL Classification L50 · L51 · L96

1 Introduction

Regulators in the United Kingdom (UK) adopted price cap regulation (PCR) in their telecommunications industry in 1984 (Littlechild 1983, 2003a; Crew and Kleindorfer 1996b). Since that time, PCR has been employed extensively in many telecommunication markets throughout the world. With more than 25 years of experience with PCR and other alternatives to rate of return regulation (ROR), it seems appropriate to

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review the experience with PCR and to assess the reasons for its widespread adoption. We offer a first step in this regard.

We examine the adoption of "incentive regulation" (i.e., PCR and other alternatives to ROR) in the telecommunications industry since 1984. We explain how regulators can, and have, varied the parameters of PCR plans to adapt PCR to the environment in which it is implemented. PCR can resemble ROR, affording little pricing discretion to the regulated firm and providing limited incentives for innovation and cost reduction.[1] However, PCR also can afford the firm substantial pricing discretion and provide strong incentives for innovation. The most appropriate variant of PCR depends in part upon regulatory goals and the intensity of market competition.

In addition to reviewing the principles that underlie the design of PCR and other alternatives to ROR, we summarize recent empirical findings regarding the impact of incentive regulation on industry performance. In doing so, we identify several expected effects of incentive regulation as well as some "surprises."

After reviewing the experience with incentive regulation in the telecommunications industry, we consider the implications of this experience for regulatory policy in other industries. Definitive conclusions are difficult in light of important institutional and technological differences across industries. For example, energy conservation concerns can complicate the design of incentive regulation in the energy industry. Although definitive conclusions are elusive, we suggest why some trends in the telecommunications industry seem likely to persist more broadly while others do not.

Our discussion of these issues proceeds as follows. Section 2 reviews the key features of ROR, PCR, and earnings sharing regulation (ESR). Section 3 documents the use of these regulatory policies in selected telecommunications markets around the world. Section 4 notes the need to ensure adequate levels of service quality under incentive regulation plans and explains some of the difficulties in doing so. Section 5 summarizes the findings of recent empirical studies of industry performance under incentive regulation. Section 6 analyzes the key parameters of PCR plans that can be varied to reflect the environment in which PCR is implemented. Section 7 explains how the ability to tailor PCR plans to the prevailing environment has contributed to PCR's popularity. Section 8 recounts some "surprises" that have arisen under incentive regulation in the telecommunications industry. Section 9 concludes, in part by considering the extent to which the experience with incentive regulation in the telecommunications industry can be employed to inform the design of regulatory policy in other industries.[2]

[1] In contrasting ROR and PCR as practiced in the UK, Armstrong et al. (1994, p. 172) note that "As a rough characterization, under rate-of-return regulation reviews are infrequent, and the regulatory lag is endogenous because either side can request a review, whereas under price caps the lag is relatively long, and the date of the next review is fixed in advance. The difference is one of degree rather than kind." (Regulatory lag refers to the time period between rate reviews under ROR.) Crew and Kleindorfer (1996b) describe the differences between the implementation of PCR in the United States (US) and in the UK.

[2] Crew and Kleindorfer (2002) provide a broad review of regulatory theory and practice in several industries in recent years. Our work complements their work by focusing on the design and implementation of PCR in the telecommunications industry and by reviewing the recent empirical literature on the effects of PCR and other alternatives to ROR.

2 Three common regulatory regimes

When competition is unable to impose meaningful discipline on incumbent suppliers of essential services, regulation can be employed as an imperfect substitute for the missing market discipline.[3] ROR, PCR, and ESR have all been called upon to serve this role.

Under ROR, the regulator typically sets the prices that the regulated firm can charge for each of its regulated services. The prices are set to provide the firm with a reasonable opportunity to earn a fair rate of return on its regulated investments. Should the firm's realized rate of return diverge substantially from its expected level under ROR, the regulator can adjust the firm's prices accordingly.[4]

Under PCR, the regulator initially studies the firm's capabilities and its operating environment in order to determine the revenues that would likely allow the firm to secure reasonable earnings. When PCR is first implemented, the regulator often implements rate rebalancing, modifying the rate structure to align prices more closely with underlying costs.[5] The regulator then sets the maximum rate at which the inflation-adjusted prices of the firm's regulated services can increase, on average, each year until the PCR plan is reviewed. Formally, PCR often restricts annual average price increases to be less than the economy-wide rate of price inflation by a specified amount, called the "X factor." To illustrate, suppose the X factor is 3% and the economy-wide inflation rate is 2% during each of the 4 years before the scheduled review of a PCR plan. Under this plan, the regulated firm would be required to reduce the prices that it charges, on average, by 1% annually during the plan (since $2\% - 3\% = -1\%$).

PCR differs from ROR in two important respects. First, PCR grants the firm some discretion in setting prices for its services. Although PCR constrains the rate at which the firm's prices can increase on average, it affords the firm some freedom in setting

[3] Kahn (1970, p. 17) observes that "the single most widely accepted rule for the governance of the regulated industries is regulate them in such a way as to produce the same results as would be produced by effective competition, if it were feasible."

[4] ROR typically functions like other forms of cost of service regulation in that the regulator determines which of the firm's expenditures constitute legitimate costs when calculating the firm's rate of return. This process is typically partitioned into two separate stages a revenue requirement stage and a rate design phase. As Robinson and Nachbar (2008, pp.483–484) observe, "The objective is to find a rate that matches shareholders' expectations, but … the regulators' very act of setting rates creates substantial circularity (because investor expectations are in turn a function of the rates being determined)." Bonbright (1961, pp. 135–136) also discusses the interplay between rate levels and rate structures. He notes that "The levels must suffice to make rates as a whole cover costs as a whole, including (or plus) a proper allowance for interest and profits. But the ability of a company to secure adequate over-all revenues depends on the structure of the rates as well as on their average height …"

[5] Rate rebalancing helps to ensure that PCR promotes industry cost reduction. It does so by encouraging competitors to focus on attracting customers that they can serve at lower cost than the incumbent supplier rather than providing services whose rates have been set well above the incumbent's costs in order to finance below-cost rates for other services. Even when competition is limited, however, rate rebalancing can lead to allocative efficiency gains in the short-run by reducing price-cost margins and in the long-run by increasing the likelihood that rate changes mandated under PCR move prices in the direction of underlying costs.

individual prices that comply with the cap on average prices.[6] Second, the required decline in inflation-adjusted prices under PCR (i.e., the X factor) is not revised before the scheduled review of the price cap plan even if the firm earns considerably more or less profit than originally anticipated.[7]

ROR can foster industry investment by ensuring a high likelihood of a reasonable return on investment.[8] However, to the extent that ROR requires the regulated firm to reduce its prices as its realized production costs decline (and thus its realized earnings rise), ROR can limit the firm's incentive to reduce its operating costs. Thus, although ROR can ensure that the firm's actual return on investment never departs too radically from what is deemed to be a reasonable return, ROR may discourage innovation and cost reduction of all forms (e.g., the elimination of unnecessary perquisites for employees of the regulated firm). In contrast, PCR can promote innovation and cost reduction by severing the link between realized costs and allowed prices (at least temporarily). PCR secures these enhanced incentives by permitting the firm's actual returns to diverge substantially from anticipated returns.

Earnings sharing regulation (ESR)[9] can provide intermediate incentives for innovation and cost reduction by tolerating moderate variation between realized and anticipated earnings. A typical ESR plan specifies a target rate of return on investment (like the 12% target in Fig. 1).[10] It also specifies a "no sharing" range of earnings around the target return (e.g., earnings that generate rates of return between 10 and 14% in Fig. 1). The firm is authorized to keep all earnings that it secures within the no sharing range, and so ESR functions much like PCR in this range.[11] The two policies differ for higher or lower earnings, however. Incremental earnings above and below the no sharing range of earnings are shared with customers.[12] Under the ESR plan illustrated in Fig. 1, the regulated firm and its customers each receive one-half of incremental earnings when earnings are in the range that, after sharing, secures rates of return between 9 and 10% and between 14 and 16%. This plan also incorporates

[6] Some PCR plans limit the amount by which the price of a particular service can change. For example, a PCR plan might prohibit a substantial increase in the price of basic local telephone service regardless of the average level of other prices.

[7] It is important to differentiate PCR from regulatory policies that place an upper bound on the revenue that the regulated firm can earn. As Crew and Kleindorfer (1996a) demonstrate, "revenue caps" can lead the regulated firm to set prices that exceed the unregulated monopoly level, since the firm bears the full cost of output expansion but may not be allowed to secure any of the associated revenue.

[8] This is the case if the regulator truly ensures a high likelihood of a reasonable return on investment. The same is not true if the regulator severely limits the firm's return on all successful investments and forces the firm to bear the full financial consequences of all unsuccessful investments. See Kolbe and Tye (1991) for further discussion of this issue.

[9] ESR is sometimes referred to as sliding-scale regulation (e.g., Braeutigam and Panzar 1993).

[10] This illustration of ESR is drawn from Hauge and Sappington (2010).

[11] Lyon (1996) refers to this zone in which no sharing of earnings occurs as the "deadband."

[12] This sharing can be implemented by reducing prices (perhaps by increasing the X factor) when earnings exceed the upper bound of the no sharing range and by increasing prices when earnings fall below the lower bound of the range. Earnings above the upper bound of the no sharing range can be shared with customers in a variety of ways. For instance, customers might receive direct cash payments or reductions in their monthly bills. Alternatively, the earnings might finance network expansion into regions that are relatively unprofitable to serve.

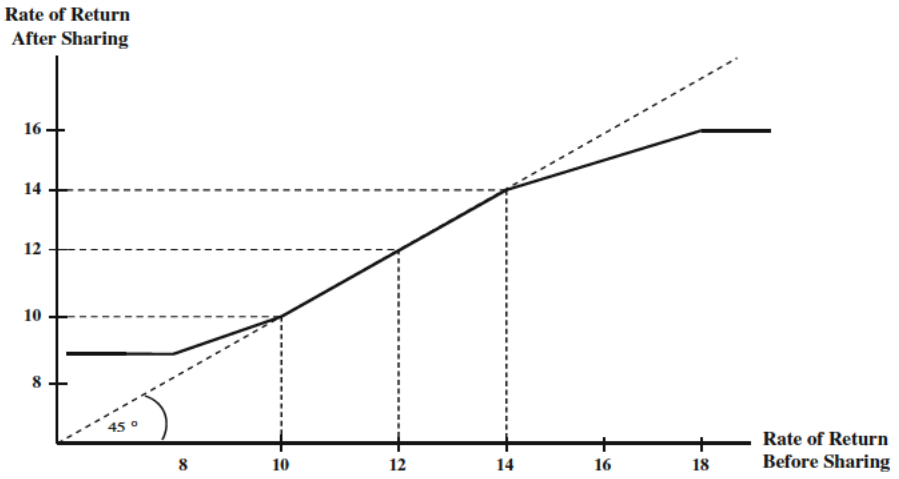

Fig. 1 An Earnings Sharing Regulation Plan

upper (16%) and lower (9%) bounds on the realized rate of return. Such bounds are common in practice. The bounds in Fig. 1 ensure that all incremental earnings above the earnings that provide a 16% return accrue entirely to the firm's customers. In contrast, if the firm would secure less than a 9% return under the prevailing regulated price structure and earnings sharing arrangement, the regulator would increase prices to ensure the firm secures the specified lower bound on the rate of return (9%).[13] Thus, an earnings sharing plan of this type resembles ROR when realized earnings are sufficiently far above or below the target rate of return.[14]

3 Regulatory plans in practice

ROR, PCR, and ESR all are employed in practice throughout the world in many industries. Table 1 summarizes the results of a survey of electricity, gas, and telecommunications regulators in developing and transition countries. Regulators from 60 regulatory bodies in 36 countries responded to the survey conducted by Kirkpatrick

[13] Earnings need not be shared equally under ESR. Furthermore, the share of incremental earnings awarded to customers need not increase as realized earnings increase. To illustrate, consider the ESR plan under which Rochester Telephone (RT) operated in the United States in 1991 and 1992. The plan awarded to RT's customers the first 50 basis points of return in excess of the target return. The next 50 basis points accrued to RT. More pronounced incremental earnings were shared equally by RT and its customers. Earnings sharing plans of this type can provide the regulated firm with strong incentives to secure relatively large reductions in operating costs. See Blackmon (1994, Chap. 4) and Sappington and Weisman (1996a, pp. 142–143) for further discussion of this issue.

[14] ESR plans do not always protect the regulated firm against relatively low earnings, as the plan in Fig. 1 does. (See, for example, Alberta Utilities Commission 2009). ESR plans that require the regulated firm to share relatively high earnings with customers but do not raise prices in the event of relatively low earnings can increase the firm's cost of capital by limiting favorable financial outcomes without mitigating unfavorable financial outcomes.

Table 1 The Number of Developing and Transition Countries Employing the Identified Regulatory Policy

Region	Rate of Return Regulation	Earnings Sharing Regulation	Price Cap Regulation
Africa	7	1	7
Asia	4	2	7
Latin America	2	3	5
Other	4	2	5
Total	17	7	24

Table 2 The Number of US State Telecommunications Regulatory Agencies Employing the Identified Regulatory Policy

Year	Rate of Return Regulation	Earnings Sharing Regulation	Rate Case Moratoria	Price Cap Regulation
1985	50	0	0	0
1987	36	3	10	0
1990	23	14	9	1
1993	17	22	5	3
1995	18	17	3	9
1998	13	2	3	30
2000	7	1	1	39
2003	6	0	0	40
2007	3	0	0	33

et al. (2005). The survey found that PCR was employed in 24 (40%) of these 36 countries, ROR regulation was employed in 17 (28%) of the countries, and ESR was employed in 7 (12%) of the countries. The adoption of PCR was most pronounced in the telecommunications industry. 16 of the 21 countries (76%) that reported use of either PCR or ROR in their telecommunications sector employed PCR.[15]

PCR has also been adopted extensively in telecommunications sectors in developed countries, including Argentina, Australia, Canada, Chile, Columbia, Denmark, Ecuador, France, Germany, Greece, Hungary, Ireland, Mexico, Pakistan, Portugal, Sweden, the UK, the United States (US), and Venezuela.[16] To provide some feel for the pattern of PCR adoption over time, Table 2 reviews the state level experience in the US. The table reports the number of states that employed the identified regulatory

[15] Seven of the 18 countries (39%) that reported use of ROR or PCR in their electricity sector employed PCR.

[16] See Intven and Tétrault (2000, p. 4–24), OECD (1997, pp. 34–35), and Wallsten (2004). Hope and Moore (2007) review the PCR plan in Barbados, and compare it to the PCR plan in Jamaica. Façanha and Resende (2004) describe Brazil's PCR plan. Price cap regulation also has been employed in the postal sector in many countries. See Correia da Silva et al. (2004) and Eccles and Kuipers (2006), for example.

policy in selected years between 1985 and 2007 to regulate the activities of the primary incumbent supplier of telecommunications services in the state.[17]

Table 2 reveals that the use of ROR in the US telecommunications industry has declined steadily since 1985. The use of ESR has also declined steadily since its peak in 1993. ESR is no longer employed by state regulators in the US.[18] Since the turn of the century, PCR has been the predominant form of regulation in the US telecommunications sector.[19] PCR has been the primary form of telecommunications regulation during this period in many other countries as well, including Canada and the UK.

The US experience with alternatives to ROR can be partitioned into three phases. In the late 1980s, rate case moratoria (RCM) were the primary alternative to ROR. RCM suspend rate hearings, which typically are employed under ROR to revise the prices charged by the regulated firm to reflect realized production costs. Thus, RCM functions like PCR in that it reduces the direct link between prices and production costs (at least temporarily). In contrast to PCR, RCM typically does not afford the regulated firm much flexibility to adjust prices. Thus, RCM might be viewed as a form of PCR in which the X factor is set equal to the economy-wide rate of inflation (so prices cannot change, on average) and the firm has little or no freedom to restructure prices. Rate case moratoria typically were adopted for relatively short periods of time (often 1 or 2 years).

PCR was adopted more frequently and RCM were imposed less frequently during the 1990s. The PCR plans adopted in the US during this period typically scheduled reviews only after a substantial period of time had elapsed (often 3 or 4 years). In addition, the plans often afforded the firm considerable pricing flexibility. The X factors under these plans often were set to offset any advantages that regulated telecommunications suppliers were perceived to enjoy relative to other suppliers in the economy. These advantages included less rapid growth in input prices and higher potential productivity growth rates.[20]

Many state regulators in the US employed PCR by the turn of the century. Indeed, 40 of the 50 states (80%) employed PCR in 2003. The PCR plans adopted during this period implemented fairly long time periods between reviews (often 4 or 5 years) and afforded the firm substantial pricing flexibility. Price controls often were applied to a diminishing set of services, as competitive forces were now helping to constrain prices on many telecommunications services.[21] The strengthening of competitive forces also

[17] The statistics reported in Table 2 are drawn from Sappington (2002); Ai et al. (2004), and Pérez-Chavolla (2007).

[18] ESR was never employed in the Canadian or the UK telecommunications sectors.

[19] In recent years, state regulators in the North America have begun to replace PCR with substantial deregulation of all but the most basic access services, just as OFCOM has done in the UK.

[20] See Bernstein and Sappington (1999) for a formal analysis of this approach and Crew and Kleindorfer (1996b) for a critique of the approach. Tardiff and Taylor (2003) report that the average X factor in state PCR plans in the US telecommunications industry was approximately 2.7% as of 2003. Intven and Tétrault (2000, p. 4–24) review the (generally higher) X factors employed in national telecommunications regulation plans in selected countries.

[21] The Telecommunications Act of 1996 (Pub. L. No. 104–104, 110 Stat. 56 (codified at 47 U.S.C. §§ 151 *et seq.*)) opened nearly all US telecommunications markets to competition.

reduced the need for regulators to predict the extent to which regulated suppliers could reasonably achieve more rapid productivity growth than other firms in the economy and to adjust the X factor accordingly. Instead, regulators often set the X factor equal to the rate of inflation (as they had implicitly done under RCM), thereby simply requiring prices not to increase, on average.[22]

The declining adoption of PCR after 2003 identified in Table 2 reflects the growing trend toward deregulation of most or all retail telecommunications services in the US.[23] Retail telecommunications services also were largely deregulated throughout the UK in 2006.[24]

The widespread adoption of PCR in telecommunications markets throughout the world likely reflects in part generally favorable experience with PCR. Before reviewing this experience in Sect. 5, we consider briefly one important dimension of industry experience under incentive regulation—service quality.

4 Designing complementary service quality regulation

The foregoing discussion has focused on the manner in which PCR, ESR, and ROR attempt to secure low prices for consumers. Yet consumers value high levels of service quality just as they value low prices. Consequently, it is important to consider how adequate levels of service quality are secured under ROR and its alternatives.

Under ROR, the regulator typically authorizes higher prices to compensate the firm for the increased costs of delivering higher levels of service quality. In contrast, the firm usually is not automatically reimbursed for the costs of increased service quality under incentive regulation plans like PCR. When it faces a binding price ceiling, a regulated monopolist is unable to capture the full incremental surplus generated by an increase in service quality. Consequently, when the firm bears the full cost of the increased quality, it will deliver less than the surplus-maximizing level of quality. As Spence (1975, p. 420, note 5) observes, "where price is fixed … the firm always sets quality too low."[25]

Because the price controls in incentive regulation plans alone may not provide ideal incentives for the delivery of service quality, the plans often specify service quality standards and associated financial penalties for failure to achieve the standards.[26] For example, some plans specify the speed with which customer service representatives

[22] Substantial price reductions compelled by a very high X factor can discourage competitive entry. UK regulators considered this effect when setting the X factor equal to the rate of inflation in 2003. The regulators noted that "such a safeguard control reduces the risk of distortion of competition" (OFTEL 2003, ¶6.17).

[23] The state of Nebraska was a pioneer in the deregulation of telecommunications services in the US. After limiting regulation to basic local service rates, the Nebraska Public Service Commission announced in 1987 that it would only investigate proposed rate increases for basic local service if these increases exceeded 10% in any year or if more than 2% of the telephone company's customers signed a formal petition requesting regulatory intervention (Mueller 1993).

[24] Hauge and Sappington (2010) review the UK experience with price cap regulation.

[25] In settings where the regulated monopolist faces potential competition, increased quality may help to deter competitive entry by increasing the costs that rival suppliers must incur in order to compete successfully.

[26] Laffont and Tirole (2000, p. 88).

must answer telephone calls. Other plans monitor the frequency and duration of network outages. The number of customer complaints and reports of service trouble are also frequently recorded, and the regulated firm is penalized either formally (through explicit financial penalties) or informally (through less generous treatment on other policy matters) for what is deemed to be sub-standard performance.

The design and enforcement of service quality regulations is challenging for at least three reasons. First, it can be difficult to assess the benefits and the costs of improving service quality. Absent accurate knowledge of the value that consumers place on elevated levels of service quality and the associated costs, it is difficult to identify appropriate service quality standards.[27] It can be particularly challenging to assess the benefits and costs of improved service quality in settings where new products and services are introduced frequently.[28]

Second, the level of service quality that is actually delivered sometimes can be difficult to measure. For example, consumers may value courteous service representatives, and yet the courtesy provided by any particular representative may be difficult to measure precisely. When relevant performance dimensions are difficult to monitor, enforcing desired levels of service quality can be problematic.

Third, it can be difficult to identify the party or parties that bear primary responsibility for realized service quality problems. To illustrate, a customer may lose telephone service because an underground cable is accidentally sliced. This loss of service could be the fault of the telephone company if the company fails to bury the cable at an appropriate depth in the ground or fails to notify appropriate entities of the location of the cable. Alternatively, the loss of service might reflect a lack of due diligence by field workers from other companies who slice a telephone cable that is buried at an appropriate depth and whose location has been clearly identified.[29]

Given the limited incentives for the delivery of high levels of service quality that incentive regulation can provide and given the difficulty in designing and enforcing appropriate service quality standards, relatively low levels of service quality might be anticipated under incentive regulation.[30] The extent to which perceived problems

[27] Much like X factors, service quality standards that are unduly high can limit competitive entry.

[28] In practice, regulated suppliers tend to have better information about both the benefits and the costs of increased service quality than do regulators. Consequently, consumers can be well served by service quality regulations that afford some discretion to the regulated firm. Much like the pricing discretion it is afforded under PCR, the firm might be permitted to reduce service quality on some dimensions provided it increases service quality on other dimensions so as to maintain a specified average level of service quality (e.g., Lynch et al. 1994). De Fraja and Iozzi (2008) propose a novel regulatory policy along these lines. Sappington (2005) reviews the literature on the design of service quality regulation.

[29] Service quality regulation also can be challenging because common policies do not always have their intended effect. As Weisman (2005) observes, penalties for poor service quality can sometimes provide (perverse) incentives to decrease service quality, rather than increase it. This can be true of penalties that take the form of a share of realized revenues. As Sappington and Weisman (1996c) note, revenue sharing can discourage the firm from investing in quality because it requires the firm to bear the full costs of such investments, but allows the firm to retain only a fraction of the resulting revenues.

[30] Given the inherent difficulty in identifying the ideal (i.e., the welfare-maximizing) level of service quality and given the tendency to reimburse the regulated firm for all expenditures on improving service quality under ROR, more than the ideal level of quality may be supplied under ROR. When this is the case, a reduction in service quality under PCR will increase welfare if it reduces the costs of supplying quality by more than it reduces the associated consumer benefits.

with service quality have arisen under incentive regulation in practice is reviewed in the next section.

5 Industry performance under incentive regulation

Many authors have conducted empirical investigations of the impact of PCR and other forms of incentive regulation on performance in telecommunications markets throughout the world. The key studies have been reviewed by Abel (2000), Sappington (2002), and Vogelsang (2002), among others.[31] We will not review the early literature that other authors have surveyed. Instead, we will assess the extent to which recent studies support the broad conclusions drawn from earlier research.

The identified reviews of the empirical literature report substantial gains from PCR and other alternatives to ROR. Abel (2000, pp. 66–68) concludes that:

> Under price-cap regulation, telephone prices have either fallen or remained the same, productivity has generally increased, modern infrastructure has been deployed at a more rapid pace, and firms have performed at least as well financially relative to the other methods of regulation available. … In addition, the evidence so far suggests that the response has been more pronounced under pure price-cap regulation compared to hybrid plans having an earnings sharing component. This result is particularly true along the productivity and network modernization dimensions. Therefore, the existing evidence suggests that it is likely that the introduction of price-cap regulation in the United States telecommunications industry has produced benefits to consumers, producers, and regulators alike.[32]

Sappington (2002, p. 285) concludes that:

> Incentive regulation appears to increase the deployment of modern switching and transmission equipment, to spur an increase in total factor productivity growth, and to foster a modest reduction in certain service prices. There is little evidence, though, that incentive regulation leads to a significant reduction in operating costs.[33] There is some evidence that earnings may be higher under price cap regulation. There is little evidence of a systematic decline in service quality under incentive regulation.

Vogelsang (2002, pp. 11, 13) provides a similar assessment. He concludes that under incentive regulation:

[31] See Hemphill et al. (2003), Joskow (2008), and Kwoka (2009) for additional reviews of relevant studies in telecommunications and energy industries.

[32] See Lehman and Weisman (2000a, pp. 343–356) for further discussion of the Pareto gains that PCR can facilitate.

[33] The lack of systematic evidence of lower operating costs under PCR could reflect in part regulatory vigilance under ROR. Such vigilance can limit the ability of regulated firms to pass unnecessary costs on to customers in the form of higher prices, and thereby limit the incidence of such "cost padding." Limited cost padding under ROR can decrease the potential for cost reduction under PCR. See also note 40 *infra*.

> Little if any operating cost reductions were found … In contrast, there is more evidence for increased productivity growth and substantial evidence for accelerated network modernization. … Taken as a whole, the findings suggest that incentive regulation induced the firms to improve input efficiency, while paying higher prices for inputs and investing in future cost reductions. … [Furthermore,] most studies show a modest decrease in basic local rates under incentive regulation. … [T]here is little empirical evidence to support the contention that quality under price caps has actually deteriorated.

Recent empirical work generally supports these broad conclusions. To illustrate, Ai and Sappington (2002) conclude from their study of the US telecommunications industry between 1986 and 1999 that network modernization is more pronounced under several forms of incentive regulation (including PCR) than under ROR. However, the authors do not find that aggregate investment is higher under incentive regulation than under ROR. The authors report lower operating costs under PCR than under ROR when industry competition is sufficiently intense. This finding suggests that a combination of PCR and competition may spur cost reductions more effectively than PCR alone.

Seo and Shin (2010) study the impact of PCR on productivity growth in the US telecommunications industry between 1988 and 1998. The authors identify a "pronounced positive effect of PCR on productivity growth." They find that 24 of the 25 firms in the sample "experienced an increase in mean technological change" and that 23 of the 25 firms "experienced an increase in annual productivity growth following the implementation of incentive regulation" (Seo and Shin 2010, p. 8).[34]

In her study of local exchange markets in the US between 1991 and 2002, Eckenrod (2006) corroborates earlier findings that price cap regulation is associated with higher earnings for regulated suppliers.[35] She observes that the higher earnings reflect reductions in both prices and production costs. Eckenrod (2006, p. 226) concludes that "The mean marginal cost for basic residential service … decreased by 14.057% following price cap implementation while the mean real residential price decreased by 8.104% following the shift to price cap regulation." The author finds even more pronounced declines for some business services.[36]

Banerjee's (2003) findings about the impact of incentive regulation on service quality are consistent with earlier conclusions. Banerjee examines 12 measures of retail telephone service quality delivered by 49 local exchange carriers in the US between 1991 and 1999. The author reports no significant changes in service quality under incentive regulation plans that entail earnings sharing, but identifies some significant changes under other forms of incentive regulation. However, the changes are

[34] Uri (2001, 2003) finds little impact of incentive regulation on productivity growth rates. Uri's analysis relies upon a distance function that is presumed to take on a convenient (trans-log) form. Uri also employs a corrected least squares methodology. Seo and Shin (2010) employ a stochastic frontier methodology and test explicitly for the appropriate estimation technique. The authors find that ordinary least squares does not provide the best fit to the data. Hope and Moore (2007) report high productivity growth rates under price cap regulation in Barbados.

[35] Hope and Moore (2007) report high earnings under price cap regulation in Barbados.

[36] Ai and Sappington (2002) also report declines in basic local service rates for some business customers under PCR.

neither pronounced nor systematic. To illustrate, Banerjee finds that residential and business customers report fewer problems with their phone service under incentive regulation. However, business customers register more complaints under incentive regulation. The author suggests that the increased number of complaints could reflect "greater service disruptions after markets were opened to local competition" (p. 259). Banerjee's (2003, p. 264) overriding conclusion is that "average ILEC retail service quality, with a few exceptions, has not suffered major lapses despite the significant changes that have marked the US telecommunications industry over the past decade or so."[37]

Façanha and Resende (2004, 2005) identify mixed impacts of incentive regulation on service quality. The authors note that service quality was relatively low in the Brazilian telecommunications industry immediately after the privatization of the industry suppliers in 1998. However, service quality tended to increase between 1998 and 2002, as progressively more stringent price cap controls were implemented. In contrast, the authors find that US local exchange carriers (LECs) that operated under PCR between 1996 and 1998 tended to supply lower levels of service quality than their counterparts that did not operate under PCR. Thus, the authors conclude that "one cannot discard the possibility of an inferior quality-performance of LECs under PCR" (p. 10).[38]

Ai et al. (2004) also find that incentive regulation had mixed effects on retail service quality in the US telecommunications industry between 1991 and 2002. The authors report that incentive regulation was associated with more rapid installation of new telephone service, fewer customer reports of trouble with their telephone service, and increased customer satisfaction. However, suppliers that operated under incentive regulation during this period met a smaller fraction of their commitments to install new telephone service and took longer to resolve reported service problems.

In summarizing the relevant empirical literature on the impacts of incentive regulation on telephone service quality, Ai and Sappington (2005, p. 208) conclude that:

> "recent studies reveal neither a systematic increase nor a systematic decrease in retail telephone service quality under incentive regulation. Service quality has increased on several dimensions under incentive regulation relative to [ROR] … but quality also has declined on some dimensions …"

[37] Uri (2004, p. 13) reports "relatively small" declines in the level of service quality that US local exchange carriers delivered to inter-exchange carriers under price cap regulation between 1991 and 2000. Recall that a decline in service quality relative to the level provided under ROR does not necessarily reduce welfare if the quality supplied under ROR exceeds its welfare-maximizing level.

[38] Recent studies of the impact of incentive regulation in the electricity industry provide corresponding conclusions. To illustrate, Crouch (2006) and Jamasb and Pollitt (2007) report lower retail prices for electricity under incentive regulation in the UK. Jamasb and Pollitt (2007) present evidence of lower costs under incentive regulation in the UK. Ter-Martirosyan (2003) finds that the average duration of service outages tends to be more pronounced under incentive regulation, but Kwoka and Ter-Martirosyan (2010) report that declines in service quality can be avoided with explicit financial penalties for sub-standard levels of service quality.

In summary, recent studies add some support for the general conclusions that incentive regulation plans like PCR tend to promote increased network modernization, productivity growth rates, and lower prices for some services while admitting higher earnings for regulated suppliers.[39] Recent studies also suggest that PCR may promote some cost reduction, particularly in the presence of substantial industry competition.[40] In addition, the studies confirm the lack of a systematic relationship between PCR and service quality.[41]

6 The design of price cap regulation

PCR has been popular in practice in part because of its flexibility. The key elements of a PCR plan can be adjusted to adapt to the environment in which PCR is implemented. These key elements include the X factor, the Z factor, the duration of the plan, the nature of the plan review, and the structure of the basket(s) of regulated services.

6.1 The X factor

The X factor is arguably the most critical element of any PCR plan. Because the X factor determines the rate at which the firm's inflation-adjusted prices must decline on average throughout the scheduled duration of the PCR plan, a small change in the X factor can have a pronounced impact on the firm's earnings for an extended period of time. In particular, an X factor that is "too high" can undermine the regulated firm's financial viability. It can also render industry entry unprofitable. An X factor that is "too low" can enable the regulated firm to earn supra-normal profit. The regulator's challenging task under PCR is to set an X factor that balances these risks appropriately.

Conceptually, the regulator's task in this regard bears some resemblance to the regulator's task in setting an appropriate allowed rate of return under ROR. A key difference is that under ROR, the regulator can revise the prices charged by the regulated firm as information arrives to suggest that the firm's actual rate of return varies substantially from the authorized return. Under PCR, any corresponding reconcilia-

[39] The increased network modernization that arose under PCR may reflect in part the "price" that some regulated suppliers were willing to pay in advance to secure PCR. In such cases, increased network investment may have been mandated as a precondition for PCR rather than motivated by PCR itself. See Sappington and Weisman (1996b) for further discussion of this issue.

[40] It should also be noted that realized innovation and cost reduction likely are influenced by policies other than retail price controls. These policies include the obligation that is often imposed on incumbent telecommunications suppliers to unbundle their networks and share essential network elements with competitors at cost-based rates. Such obligations reduce the private returns to network investment and innovation and so may discourage these activities, as Grajek and Röller (2009) document. (Also see Cambini and Jiang (2009).) See Weisman (2002a) and the Telecommunications Policy Review Panel (2006, pp. 3–35) for further discussion of this issue.

[41] We are not aware of studies that compare price volatility under PCR and ROR. Because it severs the link between prices and costs, PCR may reduce price volatility relative to ROR. Reduced price volatility can benefit risk-averse consumers.

tion of actual and expected return is postponed until the scheduled review of the PCR plan. Consequently, the actual return can depart significantly from the expected return under PCR.[42]

6.2 The Z factor

It can be challenging to specify in advance an X factor that will be "just right" throughout the duration of a PCR plan. Such a specification requires accurate knowledge of the firm's capabilities as well as present and future industry conditions. Because it is difficult for even the most omniscient regulator to anticipate all relevant industry events, many PCR plans include a Z factor. The Z factor adjusts the rate at which inflation-adjusted prices must fall to reflect the financial impact of unanticipated events.[43] An event for which a Z factor adjustment is considered under PCR typically exhibits three distinguishing characteristics. First, the event is beyond the control of the regulated firm. Second, the event has a pronounced financial impact on the firm. Third, the event has a disproportionate effect on the regulated firm that is not accounted for by other elements of the PCR plan. Typical events that may warrant Z factor adjustments include an industry-specific tax change, new legislation, and a *force majeure* or "act of God" (e.g., floods, hurricanes and tornadoes).

Z factor adjustments are designed to insure the regulated firm against large, unanticipated financial shocks that are beyond its control. Absent any prospect of a Z factor adjustment, the regulated firm must deliver its services at the mandated prices regardless of its realized earnings. If unanticipated industry developments arise, the regulated firm may experience wide variation in earnings. Such variation entails risk for investors, which can increase the regulated firm's cost of capital. Appropriately designed Z factor adjustments can reduce the firm's capital costs without limiting the firm's incentive to innovate and reduce its operating costs.[44]

Z factor adjustments are only made for exogenous events to avoid compensating the firm for financial losses that it could reasonably have avoided. To illustrate, the firm might be compensated for the reduction in earnings it suffers due to a new tax on regulated telecommunications services or for the uninsured losses it incurs from facility

[42] Furthermore, because the value of X can influence the firm's incentive to gather valuable planning information and to innovate, X need not be set to generate precisely a fair return on investment. See Littlechild (2003b) for further discussion of this issue.

[43] Formally, the firm's prices are permitted to rise, on average, at the rate of inflation plus the Z factor minus the X factor.

[44] In order to reduce the firm's capital costs without limiting desirable incentives, Z factor adjustments must be designed and implemented appropriately. If, in practice, these adjustments are employed to preclude all windfall gains for the firm but never compensate the firm for unavoidable, unanticipated losses, then Z factors can increase the firm's cost of capital, just as ESR plans can if they limit large financial gains without mitigating severe financial losses. Future research might determine whether regulated firms that incorporate explicit Z-factor adjustments in their PCR plans face higher or lower costs of capital. (Note that if a Z-factor changes the cost of capital, it could affect the rate of growth of input prices and hence the appropriate X factor. Thus, the various parameters in the price cap formulae are intimately linked.)

damage caused by an unanticipated flood.[45] In contrast, the firm would receive no compensation for facility damage caused by faulty design, improper use, or inadequate maintenance.

It can be difficult and time consuming to identify the exact financial impact of an exogenous, unanticipated event. Therefore, to reduce the costs associated with the frequent regulatory hearings that would otherwise be required, Z factor adjustments typically are limited to events with pronounced financial impact.

Z factor adjustments also are reserved for events that affect the regulated firm disproportionately. This restriction helps to avoid compensating or penalizing the firm twice for the same financial shock. To illustrate, suppose the regulated firm incurs a large, unanticipated increase in labor costs due to a pronounced increase in the power of labor unions throughout the economy. A Z factor adjustment for these increased costs typically would not be appropriate under a PCR plan that allows the firm to increase its prices, on average, at the rate of economy-wide price inflation (less the X factor). In this case, the widespread unionization would likely increase inflation throughout the country, and so the regulated firm would be authorized to increase its prices accordingly without a Z factor adjustment.[46]

Z factor adjustments help PCR to replicate the discipline of competitive markets. Suppliers in competitive markets typically can pass along to customers in the form of higher prices unavoidable cost increases that affect the entire industry (e.g., a substantial increase in the cost of essential inputs). In contrast, a supplier that is less diligent than its rivals in controlling its operating costs cannot increase its prices to recover these costs. The supplier's (former) customers will simply purchase the product in question from the more efficient rival suppliers who offer to sell the same product at a lower price.

6.3 The duration of the price cap plan

A PCR plan typically specifies the length of time for which the plan will operate before it is reviewed. A relatively short PCR plan can help to ensure that prices do not diverge too far from underlying production costs and that realized earnings do not depart too far from the target level of earnings for an extended period of time. A short PCR plan can function much like ROR in this regard. A short PCR plan also may function like ROR by diminishing the firm's incentive to innovate and reduce its operating costs. In particular, if the X factor is re-set frequently to pass on to consumers in the form of

[45] A regulated firm might reasonably be required to bear the financial losses associated with a risk against which the firm could have insured at reasonable cost, but declined to do so. Of course, the firm's cost of acquiring insurance should be viewed as a legitimate cost of operation in such a setting.

[46] A Z factor adjustment would be appropriate in this case only to the extent that the exogenous wage inflation affects the regulated supplier disproportionately relative to other firms in the economy. Note, more generally, that Z factor adjustments typically are not "all-or-nothing" adjustments. A regulated firm may ultimately be judged to be responsible for one-half of the financial loss associated with an unanticipated event (e.g., an unusually severe storm). In such a case, the Z factor adjustment should compensate the firm for only half of the financial loss it incurred due to the event.

lower prices any cost reductions that the regulated firm has achieved, then the firm's incentive to secure these cost reductions will be limited.[47]

6.4 The nature of the plan review

Holding constant the length of a PCR plan, the incentives for innovation and cost reduction that the plan provides vary with the nature of the plan review. If the review entails revising the X factor to pass on to consumers any and all cost reductions that the firm has achieved, then PCR will function much like ROR with an exogenous regulatory lag (Pint 1992).[48] In contrast, if the review serves primarily to determine whether the industry has experienced any major structural changes (e.g., a substantial increase in actual or potential competition) since the last review of the PCR plan and to adjust plan parameters only to reflect such changes, then the PCR plan will provide the regulated firm with substantial incentive to innovate and reduce its operating costs.[49]

6.5 Service baskets

For simplicity, the discussion to this point has considered the case in which all of the firm's regulated services are placed in a single basket and the restriction on the rate at which inflation-adjusted prices can rise is applied to this single basket of services. In practice, PCR plans often group the firm's services into distinct baskets of services and apply separate average price restrictions to each basket.

To illustrate, services sold to residential customers can be placed in one basket and services sold to business customers can be placed in a second basket. Such separation can have important implications even if the same constraint on average prices is applied to each basket. When all services are placed in the same basket, a reduction in the price of one service enables an increase in the price of any other service without altering the average price of all services. In contrast, when residential services and business services are placed in distinct baskets, the average price of residential services does not change when the prices of some or all business services are reduced. Therefore, when residential and business services are placed in distinct baskets and a separate average price constraint is imposed on each basket, a reduction in the price of a business service does not automatically authorize the firm to increase the price of a residential service, as would be the case if all services were placed in a single basket.

[47] Armstrong et al. (1995) analyze the optimal duration of a PCR plan.

[48] Such a PCR plan also will function much like earnings sharing regulation in that high earnings are shared (intertemporally) with consumers. In settings where multiple local monopolies operate in similar settings, the X factor for each firm can be adjusted to reflect the recent performance of the other regulated firms. Such adjustments allow X factors to be updated to reflect recent industry changes without penalizing individual firms for exceptional performance. See Shleifer (1985) and Meran and Hirschhausen (2009), for example, for thoughts on how to design such "yardstick regulation."

[49] As noted above, a smaller X factor can be appropriate in the presence of an increased potential for competition so as not to stifle competitive entry unduly. Increased competition also can justify a lower X factor to the extent that it promulgates faster input price growth rates (by bidding up the prices of scarce inputs) or reduces the regulated supplier's operating scale and thereby increases its unit cost of production.

Through appropriate segregation of services into distinct baskets, a PCR plan can ensure reasonable price levels both on average and for particular groups of services. The plan can thereby selectively provide the greatest regulatory protection where it is most needed.[50]

Of course, regulatory protection should be reserved for settings where it is needed. In particular, once competition has developed to the point where it alone can constrain prices effectively on some services, these "competitive" services should be removed from price cap regulation. Otherwise, the prices of non-competitive services may rise unduly. This is the case because, as noted above, PCR permits the firm to increase the prices of non-competitive services when it reduces the prices of competitive services in the same basket of services.

7 The popularity of PCR

Having examined the key elements of PCR plans, we can now consider why PCR has been widely adopted in telecommunications industries throughout the world in recent years. The popularity of PCR likely stems in part from its ability to adapt to the environment in which it is implemented and to the primary goals it is intended to serve.

The design and implementation of PCR may seem to be a daunting task for regulators who have limited knowledge of the regulated firm's capabilities and the environment in which the firm operates. If the regulator cannot specify an X factor that is "just right," the regulated firm may enjoy supra-normal profit or suffer financial distress. However, the regulator can ensure that financial distress is short-lived by scheduling a review of the PCR plan soon after it is implemented. The regulator also can allow Z factor adjustments for moderate financial shocks. Furthermore, the regulator can limit objections to relatively high earnings for the firm by choosing an X factor that guarantees for consumers smaller price increases than they experienced under ROR.

As noted above, enhanced incentives for innovation can produce cost savings that enable gains for both consumers and the regulated firm. The X factor effectively determines how potential gains are shared by the firm and its customers. A key difference between PCR and ESR in this regard is that PCR can guarantee gains for consumers by imposing the same reductions in inflation-adjusted prices regardless of the cost savings that PCR engenders. In contrast, the gains that consumers receive under ESR vary with the cost reductions (and thus the earnings) that the firm ultimately achieves.

Of course, if a PCR plan is reviewed soon after it is implemented and if the X factor is re-set at the review to award to consumers on an ongoing basis the entire productivity gain that the firm has secured, then the plan will function much like ROR. Such a plan is unlikely to foster significant cost reduction. Therefore, a regulator that has reasonable knowledge of the firm's capabilities and industry conditions can implement a PCR

[50] PCR plans can afford special protection to the regulated firm's smallest customers (i.e., those who spend the least on the firm's services) even without placing the services that these customers purchase in a separate basket. This special protection can be achieved by weighting particularly heavily the expenditures of small customers when calculating the average price of the firm's services. See Hauge and Sappington (2010) for a description of this weighting procedure (which has been employed in the UK telecommunications sector).

plan with a longer period of time between reviews. Such a plan can provide the firm with substantial incentive to innovate and reduce its operating cost with little risk of allowing the firm excessive profit or forcing the firm to suffer financial distress.

PCR plans also can be adjusted to afford particular protection to consumers for whom the market provides the least protection. The protection can be provided, for example, by identifying the services that these consumers tend to purchase and by placing separate, stringent controls on the prices charged for these services.

The pricing flexibility that PCR affords the regulated firm can be particularly valuable in settings where the incumbent supplier faces competitive pressure. Competitors often make every effort to attract the incumbent supplier's most profitable customers—a practice known as "cream-skimming." To avoid losing these customers, the incumbent must respond to competitors' price reductions in a timely fashion. PCR facilitates timely responses to targeted competitive challenges and permits a broader restructuring of prices that can help to avoid undue financial stress for the incumbent supplier.[51]

By granting the incumbent supplier substantial flexibility to structure prices, PCR empowers the regulated firm to employ its privileged knowledge of production costs and consumer demand to maximize its profit while delivering the mandated inflation-adjusted average price reductions. With appropriate specification of the X factor and the weights employed to calculate the average price level, PCR can thereby induce the regulated firm to set prices that maximize the welfare of consumers while ensuring the firm a reasonable return on its regulated investments.[52] A regulator that attempts to set prices directly based on her imperfect knowledge of production costs and consumer demand typically would be unable to secure the same outcome.

PCR is well-suited for environments with developing competition for an additional reason. When competitive forces strengthen to the point where they can effectively limit the prices that the incumbent supplier charges for some of its services, it is appropriate to terminate price regulation of these services. Such selective deregulation leaves the incumbent supplier producing both regulated and unregulated services. When these distinct groups of services are produced using the same production facilities, the firm's cost of supplying regulated services can be difficult to measure. Regulatory policies that link prices to measured costs in such settings can be contentious and difficult to implement. PCR can avoid these difficulties by declining to link prices to measured costs.

The widespread adoption of PCR may also reflect the technological changes that, in recent years, have produced reductions in the costs of key inputs (e.g., digital switches and optical fiber) employed to produce telecommunications services. PCR provides

[51] The structure and composition of service baskets can be important in this regard. As noted in Sect. 6, if residential and business services are placed in the same basket of services, then the regulated firm is effectively authorized to increase the prices of residential services when it reduces prices for business services in response to competitive pressures. Such authorization can encourage excessive price reductions for business services (i.e., prices below incremental production costs) by insulating the firm from the financial impact of price reductions. See Armstrong and Vickers (1993) for additional analysis of this possibility.

[52] See Laffont and Tirole (1996). This conclusion holds if all of the regulated firm's services are placed in the same basket, a single constraint on the firm's average price level is applied to this basket, and the weights applied to individual service prices reflect the relative quantities of the services sold at the identified ideal outcome.

a convenient means to pass these (exogenous) cost reductions on to consumers in the form of lower prices without the need for frequent formal rate hearings.

In summary, PCR has enjoyed considerable popularity in telecommunications industries throughout the world in recent years. This popularity likely reflects in part the prevailing industry conditions and in part the ease with which PCR can be adapted to the setting in which it is implemented. The X factor, Z factor policies, the length of the plan, the nature of the plan review, and the structure of service baskets all can be adjusted to reflect prevailing regulatory goals and resources.

In principle, ESR adds an additional element of flexibility that might tend to make ESR even more popular than PCR. ESR permits realized surplus to be divided between consumers and the regulated firm according to the level of earnings that the firm generates. In contrast, PCR effectively guarantees in advance the benefits that consumers will receive and allocates to the regulated firm any incremental surplus that it generates.[53]

Although the ability to vary the division of surplus according to its realized magnitude offers potential advantages, it also introduces important disadvantages. These disadvantages, which are considered in detail in the next section, likely explain why ESR has proved to be less popular than PCR in many jurisdictions.

Before proceeding, we note that PCR has not been universally adopted in telecommunications markets around the world despite its many benefits. Variation in regulatory commitment powers may help to explain different rates of PCR adoption in different jurisdictions. PCR will realize its full potential benefits only if the promise to reward the regulated firm for superior performance is credible. The firm will have little incentive to innovate and discover ways to reduce its operating costs if it believes the regulator will simply pass all of the resulting gains on to consumers in the form of lower prices. In practice, political pressure to reduce substantial earnings by a regulated firm can be intense, regardless of the source of the earnings.[54] When this political pressure is so intense as to preclude substantial earnings for the firm, the potential gains from PCR will be limited, and so PCR may not be implemented.

8 "Surprises" under incentive regulation

For the most part, incentive regulation in general and PCR in particular have played out in practice as predicted by the theory. However, two "surprises" identified above have arisen—the short tenure of ESR and the lack of pervasive, persistent declines in

[53] Because consumer benefits are guaranteed in advance under PCR, consumer advocates may have an incentive to lobby for excessively liberal competitive entry policies. Such policies can benefit consumers in the short run by promoting lower industry prices. In the long run, though, such actions can limit investment by the regulated firm and thereby harm consumers by reducing industry innovation. See Fazzari et al. (1988), Lehman and Weisman (2000a, pp. 343–356), and Weisman (2002a,b) for further discussion of this issue.

[54] As Braeutigam and Panzar (1989, p. 320) note, "A regulatory agency is likely to be subjected to considerable political pressure to change the price cap or price cap formula over time. If a firm regulated by price caps begins to earn large profits, consumers will no doubt petition the regulator to lower the price in the core market." Weisman (1993, pp. 364–365) notes that increased earnings for the regulated firm are sometimes viewed as a failure of regulation itself. This view can place regulators under extreme pressure to limit the firm's earnings, which in turn can reduce the firm's incentive to realize the gains that PCR could otherwise secure. Panteghini and Scarpa (2008) analyze the merits of ESR in settings where the regulator has limited ability to allow exceptionally high earnings.

service quality. We provide additional possible explanations for these surprises in this section. After doing so, we identify and explain a third "surprise" that does not appear to have been anticipated in the early literature on PCR. This surprise pertains to the behavior of regulators rather than the behavior of regulated suppliers.

The short tenure of earnings sharing regulation in the US telecommunications industry may be somewhat surprising for at least three reasons. First, as noted above, earnings sharing coupled with price cap regulation would seem to provide even greater flexibility than pure price cap regulation to adapt to changing industry conditions. Second, the literature suggests that in the presence of limited knowledge of industry conditions, earnings sharing can generate greater consumer welfare than can pure PCR.[55] Third, regulators can face serious political ramifications if the regulated firm's earnings exceed levels that the public deems to be acceptable (Braeutigam and Panzar 1989, p. 320; Weisman 1993, pp. 364–365). Earnings sharing tempers these concerns by automatically delivering a portion of abnormally high earnings to consumers. Hence, the fact that regulators often choose to operate without the "safety net" that ESR can provide may be surprising.

There are at least three possible explanations for this surprise. The first explanation for the short tenure of ESR in the US is that regulators may have discovered fairly quickly that ESR retains many of the drawbacks of ROR. In particular, a plan that allocates more surplus to consumers as realized surplus increases limits the firm's incentive to increase surplus. Thus, ESR does not provide the same strong incentives for cost reduction and innovation that PCR provides.[56] Furthermore, ESR requires precise measurement of earnings. As noted above, such measurement is difficult when the regulated firm supplies both regulated and unregulated services (e.g., basic telephone service and broadband internet access) using the same production facilities. Some allocation of common production costs is required in these settings, and such allocations can be contentious.

The greater is the fraction of common costs allocated to regulated services, the lower are the measured earnings derived from regulated services. Consequently, the regulated firm has an incentive to allocate common costs to regulated services while consumer advocates have an incentive to encourage the allocation of common costs to unregulated services when the regulated firm operates under ESR. Consumer advocates also have an incentive to encourage regulators to disallow costs that the firm has incurred prudently in supplying regulated services. When costs are disallowed, measured earnings rise, thereby increasing the financial benefits that consumers enjoy under ESR.[57] Thus, ESR introduces contentious technical issues that can be difficult and costly to resolve—issues that do not arise under PCR because PCR does not base surplus sharing rules on the level of measured earnings.

[55] See, for example, Schmalensee (1989), Lyon (1996), and Armstrong and Sappington (2007). Blank and Mayo (2009) demonstrate the value of ESR regulation in a setting where consumers and regulated firms lobby for favorable treatment.

[56] Consequently, a lower X factor can be appropriate.

[57] See Braeutigam and Panzar (1993) and Weisman (1993) for additional discussion of these issues.

The costly, contentious issues that ESR can introduce have led regulators to eschew the sharing—and even the reporting—of earnings. As a former regulator in the state of Massachusetts reports (Vasington 2003, p. 459):

> The [Massachusetts regulatory] commission decided that earnings sharing was not appropriate because it introduces many of the cost-of-service disincentives for efficiency that price cap regulation is designed to eliminate. The commission also did not want to have to rule on the prudence of investments in an increasingly risky and speculative industry, which would have been required for an earnings calculation. Also, earnings sharing would require an annual review of earnings, which the commission thought would be a significant administrative burden. Some parties suggested that the calculation of earnings in each annual filing could be a pro-forma exercise, but …the commission's own experience …showed the difficulty, if not impossibility, of limiting the scope or depth of a review of earnings in an administrative proceeding. The commission decided that it did not even want to see a calculation of the company's earnings, and, to this day, such a calculation has not been filed with the Massachusetts commission by Verizon.

Earnings sharing can be viewed as costly insurance against extremely high or extremely low earnings for the regulated firm. Despite the substantial cost of this insurance, regulators may choose to "purchase" the insurance when their knowledge of the capabilities of the regulated firm and the environment in which it operates is limited. In contrast, when regulators are better able to predict the earnings that the regulated firm will generate under a specified X factor and/or when market competition is better able to discipline incumbent suppliers, regulators may implement PCR and thereby avoid the high cost of the insurance provided by ESR.

Such considerations may underlie the pattern of regulatory policy adoption described in Sect. 3. Recall that when US state regulators first considered alternatives to ROR in the 1980s, they often adopted ESR. The primary suppliers of intrastate telecommunications services—the Regional Bell Operating Companies (RBOCs)—were created by the divestiture of AT&T in 1984. Consequently, state regulators had relatively little knowledge about the RBOCs' capabilities in the 1980s. As regulators acquired better knowledge of these capabilities in the 1990s and as competitive forces gained strength, PCR began to replace ESR as the primary alternative to ROR. As noted in Sect. 3, US state regulators had abandoned ESR entirely by 2003.[58]

The second explanation for the short tenure of ESR in the US is that regulated suppliers may have been willing to "bribe" regulators with guaranteed consumer benefits like expanded infrastructure investment and lower retail prices in return for the opportunity to operate under "pure" PCR with no earnings sharing (Sappington and

[58] Similar considerations may also help to explain why ESR has not been phased out as rapidly in some developing countries. (Recall the experience summarized in Table 1, for example.) Regulatory resources are severely constrained in many developing countries. Resource constraints can lead to limited knowledge of the capabilities of regulated suppliers. In the presence of such limited knowledge and in the absence of strong competitive pressures, regulators may opt to "purchase" the insurance against exceptionally high or low profit that ESR can provide.

Weisman 1996a, Chapter 3). Regulators may have determined that these guaranteed gains for consumers exceeded the potential gains that earnings sharing might deliver.[59]

The third possible explanation is that regulators may have been willing to forego earnings sharing because they had other instruments at their disposal to protect against inordinately high earnings on the part of the regulated firm. These other instruments are discussed further below. First, though, we suggest some possible explanations for the second surprise under PCR—the absence of a pervasive, persistent reduction in service quality.

As noted in Sect. 4, Spence (1975) predicted that the imposition of a price ceiling on the supplier of a single product would induce the supplier to reduce its service quality. However, as noted in Sect. 5, the telecommunications industry has not experienced lasting declines in service quality under PCR predicted by the theory. This outcome may reflect at least four considerations.

First, as noted in Sect. 4, incentive regulation plans often stipulate service quality standards and impose financial penalties if the standards were not met. Although the penalties are not always stringent, they may help to limit substantial reductions in service quality.[60]

Second, some early incentive regulation plans were terminated because of perceived problems with service quality.[61] The early terminations signaled to regulated firms that they must maintain desirable levels of service quality if they wish to continue to operate under incentive regulation. Firms that subsequently operated under incentive regulation may have received and heeded the message.

Third, suppliers of regulated telecommunications services often sell additional unregulated services, including long-distance, broadband and wireless services. Consumers who experience poor service quality of regulated telephone service may decline to purchase other services from the regulated supplier.[62] To avoid such erosion of consumer demand for (relatively profitable) unregulated services, a regulated supplier may choose to deliver relatively high levels of service quality for regulated telecommunications services.

Fourth, regulated suppliers may face political and regulatory pressure to maintain high levels of service quality other than the pressure imposed directly by the regulatory plan itself. To illustrate, Ameritech faced an onerous multi-state investigation of perceived shortcomings in its service quality.[63] Concerns about poor service quality also

[59] Regulators may also have realized that an earnings sharing provision would obligate them to raise prices on key services if competition on other services substantially eroded the earnings of the regulated firm, and preferred to avoid this obligation.

[60] Joskow (2008, p. 556-7) provides a corresponding observation with regard to incentive regulation in the energy sector. He notes that "incentive regulation has not led, as some had feared, to deterioration in … service quality. This is likely to have been the case because quality standards and associated mechanisms were included in the portfolio of incentive regulation mechanisms adopted in the UK."

[61] This was the case, for example, in Oregon (Oregon Public Utility Commission 1996).

[62] For example, in a 2001 price cap proceeding in Canada, the Canadian Radio-television and Telephone Commission (CRTC) received numerous letters from customers indicating an intention to switch long distance, wireless, and Internet service providers if local telephone companies increased prices and/or decreased quality for basic local telephone service (CTRC, 2001).

[63] See Banerjee's (2003).

complicated the merger of Ameritech and SBC and the approval of their applications to provide InterLATA long-distance service (Sunderland 2000).

We turn now to the third surprise under PCR, a surprise that pertains to the behavior of regulators rather than the behavior of regulated suppliers. Much like the foregoing discussion, the early literature focuses primarily on the ability of PCR to influence the behavior and performance of regulated firms.[64] The early literature does not emphasize the impact of PCR on the likely behavior of regulators. Consequently, the literature does not predict that PCR might endow regulators with particularly strong incentives to promote the entry and operation of new industry competitors.[65]

By precluding substantial increases in retail prices even when the regulated firm's earnings are very low, PCR can encourage regulators to undertake actions that they believe will benefit consumers, even if the actions reduce the firm's earnings substantially.[66] These actions include facilitating industry competition by, for example, requiring incumbent suppliers to provide unbundled network elements (UNEs) to rival retail competitors at very low prices. The evidence suggests that some regulators may have undertaken such actions. UNE prices tend to be lower in states where PCR is employed than in states where ROR is employed.[67] Such outcomes were not anticipated, and so can be viewed as a surprise. However, the outcomes seem apparent once the incentives that PCR creates for regulators are considered.

The ability of regulators to limit earnings by facilitating competitive entry may also help to explain the short tenure of earnings sharing regulation. The 1996 Telecommunications Act endowed regulators with new instruments (e.g., UNE prices) to control the level of competitive intensity and, in turn, the earnings of the regulated firm. Hence, in giving up earnings sharing in return for guaranteed benefits for consumers, regulators may have given up little more than the sleeves from their vests.[68]

[64] The literature notes, for example, that PCR can enhance the firm's incentive to reduce its operating costs and undertake efficient levels of diversification. The literature also notes that PCR can limit the firm's incentive to misrepresent its production costs, choose inefficient production technologies, and waste resources. See, for example, Braeutigam and Panzar (1989, 1993) Weisman (1993), and Blackmon (1994).

[65] Weisman (2000) refers to this behavior as *regulatory moral hazard*.

[66] In contrast, an earnings deficiency under ESR or ROR typically triggers an increase in the prices of regulated services.

[67] See Weisman (1994, 2002a), Lehman and Weisman (2000a,b), and Onemli (2010, Chapter 3).

[68] The limited evidence of substantial reductions in operating costs under PCR also may be somewhat of a surprise. The limited evidence may reflect in part the difficulty of measuring the costs of producing regulated services when the firm supplies both regulated and unregulated services. Relevant changes in production costs also can be difficult to measure accurately when production technologies, products, and service qualities are changing. It is also possible that regulated suppliers do not secure all potential efficiencies when they operate under PCR because they anticipate that future prices will be revised downward to reflect the achieved efficiencies when the price cap plan is reviewed (Vogelsang 2002). In addition, the obligation to supply unbundled network elements to competitors at cost-based rates may limit an incumbent supplier's incentive to reduce its operating costs. See also note 40 *supra*.

9 Conclusions

As noted at the outset, PCR is a flexible form of regulation that is readily adapted to the environment in which it is implemented. PCR can operate much like ROR, for example, by limiting the regulated firm's pricing discretion, implementing frequent plan reviews, and updating the X factor to deliver to consumers the bulk of realized productivity gains. In contrast, PCR can function more like unfettered market competition by affording the regulated firm considerable pricing discretion, implementing infrequent plan reviews, and avoiding any retroactive usurping of realized earnings. This flexibility of PCR helps to explain its widespread adoption in telecommunications markets throughout the world in recent years.

Because PCR is a flexible form of regulation, it can be structured to pursue different goals in different settings. To illustrate, when a primary goal is to attract the investment required for network expansion, PCR can be structured to operate much like ROR in order to ensure investors consistent, moderate returns. PCR can be adapted to provide enhanced incentives for innovation and cost reduction where these elements of industry performance are more highly valued. PCR also can be structured to afford particular protection to customers who are not adequately protected by market competition.[69] In addition, PCR can be readily adjusted over time as market competition intensifies.[70]

It is difficult to draw from the experience with PCR in one industry definitive conclusions about how PCR would fare in other industries. Political, institutional, technological, and other factors can vary across industries, and each factor can affect industry outcomes. To illustrate, the common concern with energy conservation can complicate the design and implementation of incentive regulation in the energy industry. If the productivity gains fostered by PCR are passed on to consumers in the form of lower energy prices, the price reductions can encourage energy consumption. Therefore, consumption taxes or explicit rewards for reduced energy consumption may be necessary to achieve conservation goals. The best manner in which to modify standard PCR plans in order to achieve goals such as energy conservation awaits further research.

Further research also is necessary to develop a comprehensive assessment of the implications of the experience with PCR in the telecommunications industry for the likely corresponding experience in other industries.[71] However, before concluding, we

[69] As noted in Sect. 4, PCR plans also can protect consumers by including specific service quality requirements.

[70] Thus, PCR is well suited to implement the transition from natural monopoly to competition that Tardiff and Taylor (2003, p. 345) envision: "… industries initially in need of regulation (that is, natural monopoly providers of services essential to consumers and/or competitors) are heavily regulated at first. Yet as competitive conditions change (essentially the erosion of the natural monopoly conditions that called for regulation), regulation itself must evolve in order for it to deliver the economic benefits that competition, supplemented by regulation where necessary, can bring. And that evolution entails both reducing the range of services still subject to regulation and replacing particular regulatory mechanisms when they are no longer effective. The end-state of this evolutionary continuum is full competition with no regulation."

[71] Sappington et al. (2001), Hemphill et al. (2003), and Joskow (2008) discuss alternatives to ROR in the electric power industry. The Alberta Utilities Commission (2009) describes an incentive regulation plan for the electric power industry that resembles some of the earnings sharing plans that were employed in the early stages of incentive regulation in the US telecommunications industry. Also see Weisman and Pfeifenberger (2003).

identify six possible implications of the experience in the telecommunications industry that may warrant consideration when assessing the merits of employing incentive regulation in other industries, such as the energy industry.

First, recall that PCR was adopted in the telecommunications industry in part to facilitate the transition to a more competitive industry by providing incumbent providers with the pricing flexibility they need to respond quickly to competitive pressures. To the extent that energy markets are not experiencing similar opportunities for increased competition, this potential benefit of PCR may be less relevant.[72] However, PCR and other forms of incentive regulation offer potential benefits relative to ROR even in the presence of limited competition. Therefore, alternatives to ROR merit ongoing consideration in energy markets.

Second, as in the telecommunications sector, regulators who are first considering alternatives to ROR in the energy sector may be tempted to err on the side of caution and retain some explicit earnings sharing. The experience in the telecommunications sector suggests that while earnings sharing may provide some insurance against extreme levels of earnings, it may also dampen industry performance on other dimensions (e.g., network modernization, price reductions, and cost reductions). Furthermore, because ESR requires many of the same regulatory considerations and procedures as ROR, ESR is unlikely to streamline the regulatory process.

Third, recall that the regulated suppliers were the primary advocates of PCR in the telecommunications industry. To ensure the adoption of PCR, the suppliers agreed to deliver a variety of consumer benefits, including network modernization. Consequently, as noted in Sect. 5, the increased network modernization that was observed under PCR (Greenstein et al. 1995) may reflect outcomes that were mandated as a prerequisite for PCR rather than motivated by PCR itself (Sappington and Weisman 1996b). In settings where industry suppliers are not avid supporters of alternatives to ROR, they are unlikely to make up-front concessions in order to ensure the implementation of new regulatory regimes. Consequently, the same (mandated) outcomes that were observed in the telecommunications industry may not arise in energy and other industries. More generally, the pattern of initial support for a new regulatory regime can influence the industry performance that is ultimately realized under the regime.

Fourth, although pervasive, persistent reductions in service quality did not arise under PCR in the telecommunications industry, significant transitory declines in service quality arose that raised the ire of public officials. The general public and their representatives are likely to be less tolerant of power outages than disruptions in telephone service. Consequently, energy regulators are likely to be even less tolerant of service outages than their counterparts in the telecommunications industry. Special concern with network reliability may lead energy regulators to implement particularly stringent stipulations to ensure reliability,[73] especially since energy regulators may lack some of the complementary instruments that regulators enjoy in the telecommunications industry.

[72] Joskow (2006b) and Pollitt (2010) provide assessments of competition in the electricity industry.

[73] See the Federal Energy Regulatory Commission (2010).

In particular, unlike telecommunications suppliers, energy suppliers typically do not sell other, relatively profitable, unregulated services. Consequently, energy suppliers typically will not be as concerned with negative financial repercussions in other markets caused by service quality problems in energy markets. In addition, if energy suppliers are not strong proponents of incentive regulation, then the threat of terminating incentive regulation if network outages arise under incentive regulation may not have the same motivational impact that it had in the telecommunications industry.[74]

Fifth, as noted in Sect. 8, the experience in the telecommunications industry suggests that PCR may have influenced the incentives of regulators and regulated firms alike. When assessing the likely impacts of a new regulatory policy in any industry, it is important to consider how the policy will affect the incentives of all relevant parties. In the energy sector, incentive regulation plans that are designed to improve the performance of transmission or distribution companies may affect not only the incentives of regulators, but also the incentives of Independent System Operators (ISOs). Similarly, incentive regulation plans designed to improve the performance of ISOs may affect the incentives of both regulators and transmission and distribution companies. In order to predict the full impacts of regulatory plans, all of the entities affected by the plans and all of the potential interactions among the plans must be carefully assessed.[75]

Sixth, as noted above, PCR can take on a variety of forms. The practice of ROR also can vary across jurisdictions. Consequently, the differences between PCR and ROR can be quite pronounced or relatively minor in practice. This fact may help to explain why several studies identify similar industry performance under PCR and ROR.[76] This fact should also be kept in mind when assessing the likely impacts of incentive regulation in energy and other industries. The impacts will vary with the details of the plan and with its implementation. If, despite its classification as incentive regulation or performance based regulation, a plan functions much like ROR in practice, then the plan should not be expected to produce substantial changes in industry performance.

In closing, we note that just as PCR can be adjusted as the intensity of industry competition varies, PCR also can be adjusted to reflect relevant institutional differences across industries. To illustrate, PCR plans in the telecommunications industry seldom link allowed prices directly to realized input costs. However, such linkage is natural in settings where the regulated supplier's production costs are influenced heavily by exogenous input prices. The linkage might appear in the form of a fuel adjustment clause, for example, whereby the maximum prices that an energy supplier can charge rise and fall as the price of the fuel that the supplier employs to generate electricity (or as the cost of energy that a distribution company delivers) increases or decreases.

In settings where infrastructure investment is of critical importance, PCR plans can be modified to enhance investment incentives. For instance, the X factor in a PCR plan can be reduced as the regulated firm undertakes more extensive (prudent)

[74] Because the "owners" of a municipal energy supplier are also the customers, the owners may exert substantial pressure on the supplier to achieve high levels of service quality.

[75] See Joskow (2006a) for further thoughts on the importance of coordinating the distinct elements of an incentive regulation plan (or plans).

[76] Kridel et al. (1996) summarize early evidence of similar industry performance under PCR and ROR.

investments.[77] Such adjustments can further blur the distinction between PCR and ROR in practice.[78]

These potential adjustments and others render PCR a flexible regulatory policy that has the potential to secure substantial gains in many industries. Future research should document the key differences among PCR plans that are implemented in different industries and assess the performance of PCR plans and other forms of incentive regulation in different industries. In the meantime, the experience with incentive regulation in the telecommunications industry may help to inform the policy debate about the most appropriate forms of regulation to employ in other industries.[79]

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[77] Saal and Parker (2001) review the use and performance of such "K-factor" adjustments under PCR plans in the UK water and sewerage industries.

[78] See Joskow (2006a, 2008) and Vogelsang (2010) for additional thoughts on how the revenues of regulated suppliers can be linked to their investments in order to encourage necessary investment while discouraging unnecessary investment.

[79] The forms of regulation that merit consideration include the oversight of settlements negotiated by industry participants. See Doucet and Littlechild (2006) and Littlechild (2009a,b), for example.

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EXHIBIT GS-21

GS-21

ICANN (Internet Corporation for Assigned Names and Numbers) Announces Important Milestones in Making the Internet More Accessible to All

In the past several days, ICANN (Internet Corporation for Assigned Names and Numbers) has announced recent milestones regarding changes in how the Internet community will use the Internet in the near future. These important developments include the plan for deployment of Internationalized Domain Names (IDNs (Internationalized Domain Names)) in the next few months and significant progress in developing the model for delegating new generic top-level domains (gTLDs).

Proposed Final Implementation Plan: IDN ccTLD (Country Code Top Level Domain) Fast Track Process

http://www.icann.org/en/topics/idn/fast-track/idn-cctld-implementation-plan-30sep09-en.pdf (/en/topics/idn/fast-track/idn-cctld-implementation-plan-30sep09-en.pdf)

ICANN (Internet Corporation for Assigned Names and Numbers) is pleased to announce the public posting of the Proposed Final Implementation Plan for the IDN ccTLD (Country Code Top Level Domain) Fast Track Process (for the full announcement go here (/en/announcements/announcement-2-30sep09-en.htm)).

The IDN ccTLD (Country Code Top Level Domain) Fast Track Process is an important step at making the Internet equally accessible for everyone. It will enable the introduction of a

limited number of internationalized country-code top level domain names (IDN ccTLDs). As noted by ICANN (Internet Corporation for Assigned Names and Numbers) CEO Rod Beckstrom, once implemented, this will be the first time that users can obtain a domain name with the entire string in characters other than ASCII (or Latin) characters, "this is one of the most exciting developments for the users of the Internet globally in years. IDNs (Internationalized Domain Names) will enable the people the world over to use domain name addresses in their own language." The process will be available to all countries and territories where the official language is based on scripts other than the Latin (extended) script. IDNs (Internationalized Domain Names), like the Affirmation of Commitments announced last week (www.icann.org (/)) are another step towards making the Internet more truly global to achieve our goal of "one world, one Internet, everyone connected."

The proposed final plan is scheduled for ICANN (Internet Corporation for Assigned Names and Numbers) Board consideration at the ICANN (Internet Corporation for Assigned Names and Numbers) meeting in Seoul, Korea, 26-30 October 2009.

The proposed launch date for the IDN ccTLD (Country Code Top Level Domain) Fast Track Process is 16 November 2009.

ICANN (Internet Corporation for Assigned Names and Numbers) is looking forward to feedback on the final plan in the public comment forum designated for that purpose.

The proposed final plan has been developed based on responses to community comments and discussions. See the latest status update at: http://www.icann.org/en/announcements/announcement-2-09sep09-en.htm (/en/announcements/announcement-2-09sep09-en.htm).

The official announcement for the publication of the final implementation plan can be found at: http://www.icann.org/en/announcements/announcement-2-30sep09-en.htm (/en/announcements/announcement-2-30sep09-en.htm)

Responding to Public Comment: Version 3 of New gTLD (generic Top Level Domain) Applicant Guidebook A Work In Progress

http://www.icann.org/en/topics/new-gtlds/comments-3-en.htm (/en/topics/new-gtlds/comments-3-en.htm)

The latest draft of the Applicant Guidebook that describes the process of applying for new generic top-level domains (gTLDs) was released today. New gTLDs are expected to bring innovative services and greater choice to Internet users through increased competition and engender broad participation through the introduction of IDNs (Internationalized Domain Names) and community-based TLDs into the Domain Name (Domain Name) System.

In the last three months, the community has joined in extensive collaborative efforts on technical, intellectual property, potential for malicious conduct, and other matters, with global consultations in New York, Sydney, London, Hong Kong and Abu Dhabi.

The Guidebook has been changed significantly. As indicated by ICANN (Internet Corporation for Assigned Names and Numbers) Chief Operating Officer, Doug Brent, "this third version of draft guidebook represents months of outstanding effort by many in the ICANN (Internet Corporation for Assigned Names and Numbers) community - working to resolve the few, challenging remaining issues. This version is being released with materials that describe how public comment has influenced the changes presented in it." In all,

there are over 50 areas of change, clearly indicated in the "redline" version of the Guidebook. In addition to specific trademark protections (described below) the new Guidebook includes:

- Measures to prevent or mitigate potential for malicious conduct including a proposal to create high-security zones;
- Enhanced stability / security measures, requiring DNSSEC (DNS Security Extensions) deployment and prohibiting use of wildcards;
- Protecting registrants by taking step to ensure registry viability: defining a financial instrument that will ensure ongoing registry operations in the event of failure, and specifying certain pre-delegation registry tests; and
- Enhanced contractual tools through the development of post-delegation dispute procedures including one to ensure that community-based TLDs adhere to their self-described purpose.

Like all previous versions, this draft is posted for public comment. It has been released prior to the ICANN (Internet Corporation for Assigned Names and Numbers) meeting to be held in Seoul from October 25-30. During the Seoul meeting ICANN (Internet Corporation for Assigned Names and Numbers) will conduct several sessions to facilitate discussion of this version of the Applicant Guidebook and finding solutions to the outstanding issues. Information about additional events will be available on the Seoul Meeting schedule at: http://sel.icann.org/full-sched (http://sel.icann.org/full-sched).

Trademark Protection Measures – Where to next?

http://www.icann.org/en/topics/new-gtlds/gnso-consultations-reports-en.htm (/en/topics/new-gtlds/gnso-consultations-reports-en.htm)

Specific trademark protection mechanisms are still to be decided upon by the Board.

After receiving trademark protection recommendations from the Implementation Recommendation Team and others, taking extensive comment and conducting consultation with the broad community, ICANN (Internet Corporation for Assigned Names and Numbers) has drafted a set of implementation recommendations related to intellectual property protections for the new gTLD (generic Top Level Domain) program. Additional rights protection included in the Guidebook are the:

- requirement to maintain a "thick" Whois database, and
- specification of a post-delegation dispute procedure so that trademark holders can lodge complaints of abusive behavior against registries when merited.

For other proposed rights protection mechanisms, the Board is providing the Generic Names Supporting Organization (Supporting Organization) (the policy organization that developed the new gTLDs policy) with the opportunity to offer focused input on this specific area of the proposed implementation plan that is being published now. Those proposed rights protection mechanisms are:

- The creation of an IP (Internet Protocol or Intellectual Property) Clearinghouse, which is a database of validated trademarks to be utilized by new gTLD (generic Top Level Domain) registry operators in implementing either an IP (Internet Protocol or Intellectual Property) Claims service or Sunrise process during TLD (Top Level Domain) launch; and

- The creation of a Uniform Rapid Suspension process for use in clear-cut, blatant cases of trademark infringement.

The community at-large may also comment on these specific issues, and of course, any other new gTLD (generic Top Level Domain) issues through comment fora found on the new gTLD (generic Top Level Domain) pages.

The public comment period on these trademark protection solutions will be open until 22 November 2009.

Please continue checking the New gTLD (generic Top Level Domain) program webpage for updates.

Prior to implementation, ICANN (Internet Corporation for Assigned Names and Numbers) will work with the community to address remaining issues including: competition, consumer protection, security, stability and resiliency, malicious abuse issues, sovereignty concerns, and rights protection.

Related links

New gTLD (generic Top Level Domain) program webpage: http://www.icann.org/en/topics/new-gtld-program.htm (/en/topics/new-gtld-program.htm)

Seoul meeting: http://sel.icann.org/ (http://sel.icann.org/)

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EXHIBIT GS-22

GS-22

Criteria for Assessing TLD Proposals

15 August 2000

Criteria for Assessing TLD Proposals

ICANN expects to receive many applications to sponsor or operate new top-level domains (TLDs). In this year's application program, it is likely that only a few of these will be selected by the ICANN Board for negotiations toward registry sponsor and operator agreements. To the extent possible, as this process continues ICANN will provide additional guidance on the likely number of TLDs to be included.

The ICANN staff is responsible for gathering information about submitted applications, evaluating the applications and associated information, and making recommendations to the Board based on the applications, associated information, and evaluations. In its evaluations, the ICANN staff currently intends to consider at least the factors described below. Applicants are invited to **be creative** and to explain the value of their proposals in the context of these and any other relevant factors.

1. The need to maintain the Internet's stability.

ICANN's first priority is to preserve the stability of the Internet, including the domain-name system (DNS). Proposals should demonstrate specific and well-thought-out plans, backed by ample, firmly committed resources, to operate in a manner that preserves the Internet's continuing stability. The introduction of the proposed TLD should not disrupt current operations, nor should it create alternate root systems, which threaten the existence of a globally unique public name space. Security and reliability of the DNS are important aspects of stability, and proposals should set forth comprehensive strategies to assure both.

ICANN will undertake a wide-ranging assessment of a proposal's treatment of stability issues. Among the significant aspects of stability ICANN will review are:

a. The prospects for the continued and unimpaired operation of the TLD in the manner proposed by the registry operator or sponsor throughout the period for which the delegation is agreed;

b. Provisions to minimize unscheduled outages of registry or registration systems due to technical failures or malicious activity of others;

c. Provisions to ensure consistent compliance with technical requirements in operation of the TLD;

d. Effects of the new TLD on the operation and performance of the DNS in general and the root-server system in particular;

e. Measures to promote rapid correction of any technical difficulties that occur (whether or not due to the TLD's operation), such as availability of accurate, consistent, and helpful Whois information;

f. The protection of domain-name holders from the effects of registry or registration-system failure, such as procedures for rapid restoration of services from escrowed data in the event of a system outage or failure; and

g. Provisions for orderly and reliable assignment of domain names during the initial period of the TLD's operation.

2. The extent to which selection of the proposal would lead to an effective "proof of concept" concerning the introduction of top-level domains in the future.

Recent experience in the introduction of new TLDs is limited in some respects. The current program of establishing new TLDs is intended to allow the Internet community to evaluate possible additions and enhancements to the DNS and possible methods of implementing them. Stated differently, the current program is intended to serve as a "proof of concept" for ways in which the DNS might evolve in the longer term.

Proposals should be chosen so as to promote effective evaluation of :

- the feasibilty and utility of different types of new TLDs,
- the effectiveness of different procedures for launching new TLDs,
- different policies under which the TLDs can be administered in the longer term,
- different operational models for the registry and registrar functions,
- different business and economic models under which TLDs can be operated;
- the market demand for different types of TLDs and DNS services; and
- different institutional structures for the formulation of registration and operation policies within the TLD.

This factor will be best served by applications that clearly articulate what concept or proposition the proposal would test, how the results of that test should be evaluated, and how the results of the evaluation would assist in the long-range management of the DNS.

3. The enhancement of competition for registration services.

As noted in the White Paper, market mechanisms that support competition and consumer choice should, where possible, drive the management of the DNS. One of ICANN's core principles is the encouragement of competition at both the registry and registrar levels. Though the market will be the ultimate arbiter of competitive merit, the

limited number of new TLDs to be introduced at this time makes it appropriate to make a preliminary evaluation of competitive merit for the "proof of concept."

A proposal's contributions to enhancement of competition can take various forms, depending on the specifics of the proposal. Depending on the characteristics of the TLD proposed, the nature and degree of competition involved may vary. Proposals will be evaluated to determine whether they are responsive to the general goal of enhancing competition for registration services.

Some examples of competitive issues that may be considered in evaluating proposals are:

a. What prospects do the proposed TLD and registry have for effectively competing with other TLDs and registries (either pre-existing or introduced at the same time)? Are the proposed pricing and service levels likely to be competitive with other TLDs and operators having significant market shares? If effective marketing is necessary to make the TLD competitive, does the proposal adequately provide for that marketing? If the proposal is for an unrestricted TLD, are any features proposed to maximize the prospect that the TLD will be attractive to consumers as an alternative to .com?

b. Is the proposal particularly attractive to a significant sub-market in which it can compete effectively? Are distinctive services being proposed that will meet the needs of those not being served adequately by existing services?

c. Is there any significant competitive concern that the proposed TLD is likely to lead to lock-in of domain-name holders, so that inter-TLD competition is constrained? To the extent there is a concern about constrained competition, what measures are proposed or available to ensure competitive operation of the TLD (periodic rebidding of registry, etc.)?

d. What effect would the proposal have on registrar-level competition? Does the proposal restrict the ability of accredited registrars to offer registration services within the TLD on competitive terms? What mechanism is proposed for selecting registrars?

e. If accredited registrars are not permitted to offer registration services within the TLD on a competitive basis, are there other, effective mechanisms for providing competitive choices to domain-name holders seeking to register within the TLD?

f. Would the proposal advance competitive frontiers by introducing an innovative use of the DNS?

g. Would restrictions proposed for a restricted TLD impair (either in principle or in implementation) competition among potential registrants?

4. The enhancement of the utility of the DNS.

One motivation often cited for introducing new TLDs is that doing so might increase the utility of the DNS. Under this view, the appropriateness of adding new TLDs should be evaluated based on whether addition of the new TLDs:

- would sensibly add to the existing DNS hierarchy and
- would not create or add to confusion of Internet users in locating the Internet resources they seek.

At least the following considerations will be considered in this regard:

a. If the TLD is intended for a particular use or purpose, does the TLD label suggest that use? Is this true for a large portion of Internet users globally (i.e. in different languages)?

b. Is the proposed TLD semantically "far" from existing TLDs, so that confusion is avoided? (For example, TLD labels suggesting similar meanings might be more easily confused.) Is it phonetically distinct from existing TLDs? Meanings and pronunciations in different languages may be relevant to these inquiries.

c. Does the proposed TLD avoid names reserved by RFCs (or documents that are nearly RFCs), notably ".local" (from the HTTP State Management draft) and those names listed in RFC 2606.

d. In the case of a restricted TLD, is the restriction one that will assist users in remembering or locating domain names within the TLD? (E.g., users might conclude that "ford.car" is associated with the automobile company, not the modeling agency.)

5. The extent to which the proposal would meet previously unmet types of needs.

The DNS should meet a diversity of needs. Close examination will be given to whether submitted proposals exhibit a well-conceived plan, backed by sufficient resources, to meet presently unmet needs of the Internet community.

6. The extent to which the proposal would enhance the diversity of the DNS and of registration services generally.

One goal of introducing new TLDs should be to enhance the diversity of the DNS and the manner in which registration services are provided. In examining submitted proposals, consideration will be given to the diversity the proposal would add to the DNS. Among the diversity of proposals sought, ICANN hopes to receive proposals for fully open top level domains, restricted and chartered domains with limited scope, noncommercial domains, and personal domains. Diversity in business models and of geographic locations are also advantageous. (Note that this criterion must be judged based on the whole group of selected proposals, rather than any single proposal.)

7. The evaluation of delegation of policy-formulation functions for special-purpose TLDs to appropriate organizations.

As noted in the ICANN-staff-prepared document entitled "ICANN Yokohama Meeting Topic: Introduction of New Top-Level Domains," the DNS is a hierarchical system that facilitates delegation of policy-formulation authority for particular TLDs. In the context of unsponsored TLDs, this can appropriately be accomplished for many operational matters by giving the registry operator flexibility in the registry contract. For restricted TLDs, some have suggested a "sponsorship" model, in which policy-formulation responsibility for the TLD would be delegated to a sponsoring organization that allows participation of the affected segments of the relevant communities. Proposals will be analyzed to determine whether they offer the opportunity for meaningful, real-world evaluation of various structures for appropriate delegation of policy-formulation responsibilities, as well as evaluation of various allocations of policy-formulation responsibilities between ICANN and sponsoring organizations.

8. Appropriate protections of rights of others in connection with the operation of the TLD.

In introducing new TLDs, care should be taken to ensure that the rights of third parties are appropriately protected. Examples of matters to be examined in this regard include:

a. Does the proposal have a well-thought-out plan for allocation of names during the start-up phase of the TLD in a way that protects the legitimate interests of significant stakeholders, including existing domain-name holders, businesses with legally protected names, and others with which conflict is likely?

b. Does the proposal provide for a reasonably accessible and efficient mechanism for resolving domain-name disputes?

c. Has the proponent considered intellectual property interests or otherwise designed protections for third-party interests?

d. Does the proposal make adequate provision for Whois service that strikes an appropriate balance between providing information to the public regarding domain-name registrations in a convenient manner and offering mechanisms to preserve personal privacy?

e. Does the proposal incorporate policies that are likely to discourage abusive registration practices?

9. The completeness of the proposals submitted and the extent to which they demonstrate realistic business, financial, technical, and operational plans and sound analysis of market needs.

The ICANN staff intends to place significant emphasis on the completeness of the proposals and the extent to which they demonstrate that the applicant has a thorough

understanding of what is involved, has carefully thought through all relevant issues, has realistically assessed the business, financial, technical, operational, and marketing requirements for implementing the proposal, has procured firm commitments for all necessary resources, and has formulated sound business and technical plans for executing the proposal. Applicants are strongly encouraged to retain well-qualified professional assistance (e.g., technical, engineering, financial, legal, marketing, and management professionals, as appropriate) in formulating their proposals. Proposals that are presented in a clear, substantive, detailed, and specific manner will be preferred.

Comments concerning the layout, construction and functionality of this site should be sent to Contact Information Redacted

Page Updated 15-August-00.

EXHIBIT GS-23

GS-23

New gTLD Application Submitted to ICANN by: Web.com Group, Inc.

String: web

Originally Posted: 13 June 2012

Application ID: 1-1009-97005

Applicant Information

1. Full legal name

Web.com Group, Inc.

2. Address of the principal place of business

Contact Information Redacted

3. Phone number

Contact Information Redacted

4. Fax number

Contact Information Redacted

5. If applicable, website or URL

http://www.web.com

Primary Contact

6(a). Name

Mr. Robert Conant Wiegand

6(b). Title

Senior Vice President

6(c). Address

6(d). Phone Number

Contact Information Redacted

6(e). Fax Number

6(f). Email Address

Contact Information Redacted

Secondary Contact

7(a). Name

Mr. Matthew Patrick McClure

7(b). Title

Chief Legal Officer

7(c). Address

7(d). Phone Number

Contact Information Redacted

7(e). Fax Number

7(f). Email Address

Contact Information Redacted

Proof of Legal Establishment

8(a). Legal form of the Applicant

Corporation

8(b). State the specific national or other jursidiction that defines the type of entity identified in 8(a).

General Corporation Law of the State of Delaware

8(c). Attach evidence of the applicant's establishment.

Attachments are not displayed on this form.

9(a). If applying company is publicly traded, provide the exchange and symbol.

NASDAQ;WWWW

9(b). If the applying entity is a subsidiary, provide the parent company.

9(c). If the applying entity is a joint venture, list all joint venture partners.

Applicant Background

11(a). Name(s) and position(s) of all directors

Anton J. Levy	Director
David L. Brown	Chairman of the Board
Deborah H. Quazzo	Director
Hugh M. Durden	Director
Phillip J. Facchina	Director
Robert S. McCoy	Director
Timothy I. Maudlin	Director

11(b). Name(s) and position(s) of all officers and partners

David L. Brown	CEO & President
Jason M. Teichman	EVP and Chief Marketing Officer
Kevin M. Carney	EVP and Chief Financial Officer
Matthew P. McClure	Chief Legal Officer & Secretary
Roseann Duran	EVP and Chief People Officer

11(c). Name(s) and position(s) of all shareholders holding at least 15% of shares

NWS Holdings	Not Applicable

11(d). For an applying entity that does not have directors, officers, partners, or shareholders: Name(s) and position(s) of all individuals having legal or executive responsibility

Applied-for gTLD string

13. Provide the applied-for gTLD string. If an IDN, provide the U-label.

web

14(a). If an IDN, provide the A-label (beginning with "xn--").

14(b). If an IDN, provide the meaning or restatement of the string in English, that is, a description of the literal meaning of the string in the opinion of the applicant.

14(c). If an IDN, provide the language of the label (in English).

14(c). If an IDN, provide the language of the label (as referenced by ISO-639-1).

14(d). If an IDN, provide the script of the label (in English).

14(d). If an IDN, provide the script of the label (as referenced by ISO 15924).

14(e). If an IDN, list all code points contained in the U-label according to Unicode form.

15(a). If an IDN, Attach IDN Tables for the proposed registry.

Attachments are not displayed on this form.

15(b). Describe the process used for development of the IDN tables submitted, including consultations and sources used.

15(c). List any variant strings to the applied-for gTLD string according to the relevant IDN tables.

16. Describe the applicant's efforts to ensure that there are no known operational or rendering problems concerning the applied-for gTLD string. If such issues are known, describe steps that will be taken to mitigate these issues in software and other applications.

Web.com Group, Inc. ("Web.com") has taken a number of steps, including consulting with Verisign, our registry services provider to ensure that there are no known operational or rendering problems concerning the .web gTLD string.

Many software applications conduct software validity checks. Applications like web browsers and desktop software will validate the use of URLs either by a validation of the known gTLDs and/or the length of the string. The gTLDs delegated during the

2004 round experienced universal acceptance issues that for the most part are resolved today.

Upon delegation of .web, Web.com intends to conduct thorough integration testing with all major software applications. Further, Web.com intends to assist customers of the .web gTLD as issues arise. Web.com understands that these items cannot be remedied alone, but Web.com will collaborate with software vendors about issues as they are discovered to ensure seamless adoption.

17. (OPTIONAL) Provide a representation of the label according to the International Phonetic Alphabet (http://www.langsci.ucl.ac.uk/ipa/).

Mission/Purpose

18(a). Describe the mission/purpose of your proposed gTLD.

18(a). Describe the mission/purpose of your proposed gTLD.

Web.com Group, Inc ("Web.com") has been in the business of helping our customers establish their online presence for over 15 years. Following our acquisition of Register.com in July 2010 and the subsequent acquisition of Network Solutions, LLC, the oldest ICANN accredited registrar, in October 2011, we have become one of the largest domain name registrars in the world with approximately 3 million customers. Web.com offers a variety of TLDs and a full suite of domain-name services, including registration, management, renewal, expiration protection and privacy services.

The creation of a .web gTLD will help to fulfill ICANN's mission of providing more competition in the online marketplace and Web.com is the perfect candidate for operating .web given its experience, global reach, and brand recognition.

Why .web?

Web.com knows from years of experience that the .com gTLD has played a revolutionary role in the advancement of global commerce and culture. In addition, the .com gTLD has had a powerful and democratizing impact, providing avenues for anyone to participate in online discourse and a growing market. There are, however, a finite number of useful second-level domains that can be applied for in .com, as ICANN knows and understands. Often other gTLDs, such as .org, .info, .biz and others either are unavailable or are not a good fit for a potential second-level domain.

In looking to expand the gTLD landscape beyond the existing robustness of gTLD offerings, an easy-to-remember and intuitively logical gTLD such as .web is a relevant addition. Consumers will instantly understand that a .web domain is an Internet website thereby ensuring quick adoption by users. Due to its ubiquitous nature, .web will compete directly with all gTLDs, both existing ones and others to be approved by ICANN. It has universal appeal to anyone looking to operate on the

World Wide Web. Not only will .web introduce a new and previously unavailable range of domain choices to businesses and individuals around the world but it could also serve as a platform for a number of innovative domain-based services.

The .web gTLD will help customers launch and leverage their presence on the Internet. As a leading global provider of online marketing services to small businesses, Web.com recognizes that finding a relevant and memorable domain name can be challenging. Since many keywords and descriptive phrases associated with existing TLDs have already been registered, it is often difficult to pinpoint a domain name which contains an acceptable number of characters. Consequently, prospective registrants are many times unable to secure a unique and adequate name.

The availability of .web domains will spark competition across all industries engaging customers online by providing more opportunities for registrants to secure easily found domains. Consumer choice will increase, and in doing so, online operators will seek ways to differentiate themselves from their competition with proactive steps to build consumer trust and confidence.

Introducing .web as a gTLD choice also will inject additional inventory into the domain name marketplace. As such, it will increase competition within the Internet registry space, as well as provide avenues for increased registrar competition.

Why Web.com?

As the sole owner of the Web.com® Trademark--issued by the U.S. Patent and Trademark Office-- Web.com seeks to be the sole registry operator for the .web gTLD. Historically, Web.com has offered and will continue to provide pre-registration service for the .web gTLD through www.register.web.com. We remain committed to promoting .web as a new gTLD and to expanding the competitive landscape that permeates the Internet.

Founded in 1997 as Atlantic Teleservices, Web.com has evolved to become a leading provider of Internet services for small- to medium-sized businesses (“SMBs”). Web.com is the parent company of two global domain name registrars, and further meets the Internet needs of consumers and businesses throughout their lifecycle with affordable value-added services. These services include domain-name registration; website design; search engine optimization; search engine marketing; social media and mobile products; local sales leads; ecommerce solutions; and call center services.

Headquartered in Jacksonville, FL, USA, Web.com is a publicly traded company (Nasdaq: WWWW) serving nearly three million customers, with more than 1,700 global employees in fourteen locations in North America, South America and the United Kingdom. In recognition of its rapid progress, Web.com has appeared on Deloitte’s Technology Fast 500™ list in each of the past two years.

One of our primary corporate goals is to provide a broad range of online services and products that enable SMBs to establish, maintain, promote, and optimize their web presence. By providing a comprehensive and best-in-class suite of services, we are able to deliver solutions that enable small and medium-sized businesses to compete and succeed online. Customers can choose to purchase ‘a la carte’ solutions for specific issues, or subscribe to bundled products that meet a variety of needs.

Web.com brings a wealth of experience in providing a seamless process for customers from the first point of registration through the growth of their Internet properties. Following our acquisition of Register.com in July 2010 and the

subsequent acquisition of Network Solutions in October 2011, we have become one of the largest domain name registrars in the world. Web.com offers a variety of TLDs and a full suite of domain-name services, including registration, management, renewal, expiration protection and privacy services. Web.com is also a prominent player in the Internet community through participation in numerous working groups and organizations including the Certificate Authentication Board, Internet Corporation for Assigned Names and Numbers (ICANN) and the Internet standards development community.

Additionally, since the .web gTLD mirrors the Web.com brand, trademarks, and the character string associated with our corporate website address (www.web.com), we believe that Web.com should be the sole operator and administrator of the .web gTLD. The issuance of the .web gTLD to anyone other than Web.com would infringe on the trademark rights in Web.com and be confusingly similar to domains currently in use by Web.com such as www.register.web.com and www.dot.web.com.

18(b). How do you expect that your proposed gTLD will benefit registrants, Internet users, and others?

18(b). How proposed gTLD will benefit registrants, Internet users, and others.

The .web gTLD will benefit registrants, Internet users, and others in a number of ways:

- Increase the domain-name extension inventory: An expanding global population results in more Internet users, coupled with increasing demand for domain name choices. The .web gTLD provides alternatives in every possible imagining of a website, from ecommerce to promotion of free expression.

- Increased availability of generic word domain names. For the first time in decades, generic names that have been locked down by registrants in existing gTLDs will be available in a new and easy-to-remember gTLD, which increases competition and benefits Internet users.

- Increase online innovation: New online properties with the .web gTLD will spur competitors to innovate in ways that will empower consumers, enabling communication instantaneously with others in their own communities and worldwide, at a low cost relative to traditional forms of media. The Internet's unique attributes create new opportunities to collaborate, exchange ideas, and promote scientific, cultural, and economic progress. These opportunities will increase when .web is introduced by ICANN and implemented and operated by Web.com.

Web.com is committed to providing best-in-class service to customers by maintaining our position as an industry leader. Our goal is to enable online users to expand their web presence and we are committed to offering a greater choice in top level domain extensions.

18(b)(i) What is the goal of your proposed TLD in terms of areas of specialty, service levels, of reputation?

Many gTLDs introduced by ICANN will, by their nature, appeal only to certain segments of the online population, whether those communities are industries, ethnicities, or other collections of like-minded individuals and organizations. We are hopeful that the .web gTLD will have the same popularity as that of .com.

Web.com has the scalability and processes required to meet the challenges anticipated with the .web gTLD. Today we manage over 8 million domain names across hundreds of TLDs. We are committed to servicing and/or providing domain-name resolution services that adhere to industry standards. Following our existing standards of industry benchmark performance, we will continuously monitor and proactively defend the .web infrastructure and associated services in order to provide reliable services for each registrant in areas of specialty, service levels, and reputation:

• Specialty: As the first domain-name ICANN-accredited registrar, Web.com's Network Solutions subsidiary brings an unprecedented 25 years of domain industry experience to the community as a whole. The .web gTLD will be the baseline by which customers can incorporate new generation web-based technologies, enabling their web presence to be a highly efficient and effective communication mechanism. The experience and trust associated with Web.com will help ensure that outcome.

• Service Levels: Web.com has a long history of succeeding in its mission of providing world-class domain registration services. Our longstanding commitment to the highest service levels will be replicated with .web. Furthermore, we will meet or exceed the service levels mandated within the Registry Agreement enforced by ICANN as it pertains, but not limited, to the registration and resolution of the .web gTLD zone. Web.com is pleased to be working with Verisign, one of the leading Internet infrastructure companies, to launch .web. Verisign's unmatched performance in the operation of existing TLDs will ensure a high degree of service, stability and reliability.

• Reputation: Given our success over the course of the last 15 years, we are confident that Web.com will continue to serve customers with the best in class service as it pertains to the .web gTLD. Given the proactive safeguards we incorporate, and will continue to incorporate within the .web gTLD, we believe potential customers will register a .web gTLD in order to be associated with a secure, reliable and scalable gTLD. At Web.com, we believe that a website is only as good as the services and support behind it. With the .web gTLD, we have the opportunity to bring this same level of commitment to a gTLD.

18(b)(ii) What do you anticipate your proposed TLD will add to the current space, in terms of competition, differentiation, or innovation?

As stated in 18(a) above, the .web gTLD will have a dramatic impact by increasing competition, providing more differentiation for customers and consumers, while driving innovation.

• Competition: The addition of a .web gTLD will increase competition across all vertical online platforms. Registrars will compete to offer .web and meet the high demand for .web second-level TLDs. Vendors in the online marketplace will seek to expand their existing footprint or pioneer new products and services with a fresh .web website. The universal appeal of a .web URL will provide competition to every TLD, both broad-based existing ones--such as .com, .org, .biz and .info--as well as others that will be approved by ICANN, whether broad-based or narrowly targeted. Internet users will benefit from the dramatically accelerated competitive environment resulting from ICANN's adoption of .web operated by Web.com.

• Differentiation: The .web gTLD will quickly become as ubiquitous as .com. The .web gTLD will be the most versatile gTLD on the World Wide Web. A brand name company might choose .com; a non-profit .org; a start-up .biz; a resource site .info; and so on. But every one of those organizations' sites would be perfectly compatible with a .web second-level domain. More narrow gTLDs will

provide differentiation in certain niches and markets; .web will do so in every conceivable area on the Internet, from commerce to information to community-building. The introduction of generics under a new gTLD also will provide differentiated approaches to reaching Internet users.

• Innovation: There is little room for continued innovation by .com registrants seeking to compete with and differentiate themselves from other .com registrants. That is not a negative reflection on .com, but rather the fact that there are a finite number of short and memorable second-level domains. With many keywords and descriptive phrases already registered, incentives to innovate decrease with each year. A land rush of .web addresses will reverse that decline and drive new innovation in web delivery and customer service.

18(b)(iii) What goals does your proposed TLD have in terms of user experience?

Web.com will provide rewarding user experiences on two levels:

• Registrants: Web.com will incorporate the ability to allow various segments of the market to take advantage of registering the desired .web domain name. This includes providing the IP community with the ability to secure the .web domains affiliated or associated with their brands during a proposed Sunrise period, prior to making registrations publicly available to all. This registrant service is a natural extension of decades of experience on the part of Web.com and its holdings. Web.com may also enable registrants who have already purchased domains in other gTLDs the ability to register those domains in the .web gTLD. For registrants who are looking to improve their domain name or looking to purchase a new one, having .web will open up a new swath of choices in a gTLD that is new, fresh and directly tied to their goals of establishing their web presence. Upon enabling registrations to the general public, Web.com will incorporate a Go to Market Launch plan that will focus on ease of use, perspective registrant outreach program, and proactive communication associated with turn-key customer service. We intend to maintain our leading position that includes the lowest churn rates in the industry, which will be critical to the rollout of .web and its long-term success as a vibrant gTLD.

• Internet users: For users of .web gTLD websites, our enhanced efforts to prevent abusive behavior to protect the rights of others will result in a user experience that is more stable and secure than what they currently experience in other gTLDs. We fully recognize that eliminating abusive and fraudulent behavior is a difficult challenge but it is one that we will stress as we develop our plans to launch .web. Web.com plans to vigorously enforce all provisions we have outlined in the responses to Questions 28 and 29 to ensure a positive experience for all users of the .web gTLD.

18(b)(iv) Provide a complete description of the applicant's intended registration policies in support of the goals listed above.

Web.com takes its responsibilities in the operation of the .web gTLD very seriously. We have implemented a series of measures that, when taken together, will ensure that registrants have the ability to register names of their choice while ensuring that policies are in place to prevent and mitigate abusive behavior as well as protect the rights of others.

These registration policies include:

• An Acceptable Use Policy (AUP) that clearly defines what is considered abuse and what registrants may and may not do with their .web domain names

- A name selection policy that ensures compliance with ICANN mandated restrictions on second level domains

- Support for Uniform Rapid Suspension (URS) and Uniform Domain-Name Dispute-Resolution Policy (UDRP) to mitigate trademark infringement

The gTLD will be launched in multiple phases, ensuring a stable, secure, and controlled introduction:

- Sunrise A: This initial phase will allow the trademark community the ability to secure the .web domains associated with their brands for a 60-day period - double the ICANN minimum.

- Possible Sunrise B: We are also considering a second phase which might be available for previously registered names in other gTLDs.

- Landrush: Following the Sunrise phases, this phase will allow domain registrants to register domains at a premium price point. Multiple submissions will be auctioned, with the auction provider to be named at a later date.

- General Availability: This final phase will be open to the general public. Domains may be registered on a first-come/first-serve basis.

18(b)(v) Will your proposed TLD impose any measures for protecting the privacy or confidential information of registrants or users? If so, please describe any such measures.

Web.com respects the privacy of its customers and the visitors and users of its websites. The .web gTLD will be governed by a strict Privacy Policy to ensure the privacy of information for registrants as well as users. Web.com is an industry leader in providing transparent and rigorous policies on how sensitive information will be used, as well as preventing unauthorized access to information through vigilant use of the latest technological innovations. We will continue our commitment to privacy for our customers and website users by publicly posting our privacy policies on the registry website. Web.com will ensure compliance with all laws and regulations that govern privacy issues.

18(b)(vi) Describe whether and in what ways outreach and communications will help to achieve your projected benefits.

Web.com enables regular dialogue with its registrants by establishing and maintaining clear and secure channels of communication. Web.com has every incentive to ensure that potential and existing .web registrants understand privacy and security measures to protect their information and to assist in their adherence to the AUP in their efforts to protect Internet users.

No other registry is better equipped to deal with the communication challenges inherent in the rollout and maintenance of a gTLD with the appeal and anticipated popularity of .web.

To ensure the success of the .web launch, the company will undertake a global marketing and advertising campaign to create customer awareness and interest in the features and benefits of the .web gTLD.

18(c). What operating rules will you adopt to eliminate or minimize social costs?

18(c) What operating rules will you adopt to minimize social costs (e.g., time or financial resources costs, as well as various types of consumer vulnerabilities? What other steps will you take to minimize negative consequences/costs imposed upon consumers?

As stated earlier, we take our responsibilities in this area very seriously. To demonstrate our commitment to make the .web gTLD more resistant to abusive behavior than other gTLDs that currently exist, Web.com has explored various mechanisms to help prevent abusive registrations. We were particularly impressed with the set of 31 Proposed Security, Stability and Resiliency Requirements for Financial TLDs that were developed by the Security Standards Working Group (SSWG) under the guidance of the financial services industry. Following their recommendation that all potential applicants look at these standards for their own TLDs, Web.com has completed a thorough review to determine which ones might enhance the .web gTLD experience. While not all of the proposed standards are applicable to the .web gTLD, we will endeavor to implement several of them to aid in our efforts to prevent and mitigate abusive registrations. In addition to the mechanisms described in 18 (b)(iv), we will undertake the following efforts:

- An Acceptable Use policy that clearly defines what is considered abuse and what registrants may and may not do with their domain names
- A seasoned abuse mitigation team that has years of experience in dealing with these issues
- Technological measures for removal of orphan glue records
- Efforts and measures to promote accurate and complete 'Whois'
- Requirements for .web accredited registrars to enact measures in support of these efforts
- Extended Sunrise services
- Extended trademark claims service
- Name Selection Policy
- Acceptable Use Policy
- Support for URS and UDRP
- PDDRP
- Rapid takedown or suspension where necessary
- Anti-Abuse Process
- Enhanced Authentication
- Malware Code Identification
- DNSSEC signing service
- Biannual'WHOIS' Verification
- Participation in anti-abuse community activities

18(c)(i) How will multiple applications for a particular domain name be resolved, for example, by auction or on a first-come/first-serve basis?

Web.com will launch the .web gTLD in the following phases:

- Sunrise A: This initial phase will allow the trademark community the ability to secure the .web domains associated with their brands for a 60-day period.

- Possible Sunrise B: This second phase could be available for previously registered names in other gTLDs.

- Landrush: Following the Sunrise phases, Landrush will allow registrants to

register domains at a premium price point. Multiple submissions for the same domain name will be resolved through auction, with an auction provider to be named at a later date.

• General Availability: This final phase will be open to the general public. Domains may be registered on a first-come/first-serve basis.

18(c)(ii) Explain any cost benefits for registrants you intend to implement (e.g., advantageous pricing, introductory discounts, bulk registration discounts).

Web.com, like ICANN, has every incentive to see the .web gTLD become a ubiquitous online presence, serving Internet users globally and spurring online innovation. As such, we will institute necessary incentives to encourage rapid rollout and growing adoption of the .web gTLD, with policies to be developed and adopted in the future as necessary.

18(c)(iii) Note that the Registry Agreement requires that registrars be offered the option to obtain initial domain name registrations for periods of one to ten years at the discretion of the registrar, but no greater than ten years. Additionally, the Registry Agreement requires advance written notice of price increases. Do you intend to make contractual commitments to registrants regarding the magnitude of price escalation? If so, please describe your plans.

Web.com intends to price its domains competitively to maximize sales, while at the same time ensuring profitable, secure, and sustainable operations. It is premature to elaborate on specific policies at this stage in the process, but we intend to be responsive to market demands and share ICANN's desire to ensure a rapid spread and adoption of .web. Web.com will fully comply with all necessary and recommended notification requirements in the event that price increases are necessary.

Community-based Designation

19. Is the application for a community-based TLD?

No

20(a). Provide the name and full description of the community that the applicant is committing to serve.

20(b). Explain the applicant's relationship to the community identified in 20 (a).

20(c). Provide a description of the community-based purpose of the applied-for gTLD.

20(d). Explain the relationship between the applied-for gTLD string and the community identified in 20(a).

20(e). Provide a description of the applicant's intended registration policies in support of the community-based purpose of the applied-for gTLD.

20(f). Attach any written endorsements from institutions/groups representative of the community identified in 20(a).

Attachments are not displayed on this form.

Geographic Names

21(a). Is the application for a geographic name?

No

Protection of Geographic Names

22. Describe proposed measures for protection of geographic names at the second and other levels in the applied-for gTLD.

In order to comply with ICANN requirements and GAC recommendations regarding the protection of geographic names, Web.com Group, Inc. ("Web.com") has developed and will implement the following measures to protect geographical names at the second and all other levels in the .web gTLD:

1. Rules for Reserving Geographical Names

Web.com will comply with Specification 5 "Schedule of Reserved Names at the Second Level in gTLD Registries" Section 5 titled "Country and Territory Names." The country and territory names contained in the following internationally recognized lists shall be initially reserved at the second level and at all other levels within the .web gTLD at which the Web.com provides for registrations:

a. the short form (in English) of all country and territory names contained on the ISO 3166-1 list, as updated from time to time, including the European Union, which is exceptionally reserved on the ISO 3166-1 list, and its scope extended in August 1999 to any application needing to represent the name European Union;
b. the United Nations Group of Experts on Geographical Names, Technical Reference Manual for the Standardization of Geographical Names, Part III Names of Countries of the World; and
c. the list of United Nations member states in 6 official United Nations languages prepared by the Working Group on Country Names of the United Nations Conference on the Standardization of Geographical Names.

2. Incorporation of GAC recommendation regarding second level geographic domains

Web.com will review and seriously consider suggestions from global government entities, public authorities and the IGO's regarding additional names with national or geographic significant at the second level.

Web.com will consider any claims of abuse, including abuse of names with national or geographic significance as serious offenses. The Abuse Prevention and Mitigation Procedures for the .web gTLD will ensure that governments, public authorities or IGO's have the ability to raise cases of concern.

3. Rules for registration and employment of geographical names.

If a decision is made by Web.com to release names reserved in Section 1 above, Web.com will follow the policy and procedures outlined in Specification 5 of the Registry agreement and will work effectively to reach agreement with the applicable government(s), provided, further, that Web.com may also propose release of these reservations, subject to review by ICANN's Governmental Advisory Committee and approval by ICANN.

Registry Services

23. Provide name and full description of all the Registry Services to be provided.

1 CUSTOMARY REGISTRY SERVICES

Please note; all figures, tables and diagrams referenced in the following response can be found in attachment titled "Attachment dot web Q23."

As Web.com Group, Inc.'s ("Web.com") selected provider of backend registry services, Verisign provides a comprehensive system and physical security solution

that is designed to ensure a TLD is protected from unauthorized disclosure, alteration, insertion, or destruction of registry data. Verisign's system addresses all areas of security including information and policies, security procedures, the systems development lifecycle, physical security, system hacks, break-ins, data tampering, and other disruptions to operations. Verisign's operational environments not only meet the security criteria specified in its customer contractual agreements, thereby preventing unauthorized access to or disclosure of information or resources on the Internet by systems operating in accordance with applicable standards, but also are subject to multiple independent assessments as detailed in the response to Question 30, Security Policy. Verisign's physical and system security methodology follows a mature, ongoing lifecycle that was developed and implemented many years before the development of the industry standards with which Verisign currently complies. Please see the response to Question 30, Security Policy, for details of the security features of Verisign's registry services.

Verisign's registry services fully comply with relevant standards and best current practice RFCs published by the Internet Engineering Task Force (IETF), including all successor standards, modifications, or additions relating to the DNS and name server operations including without limitation RFCs 1034, 1035, 1982, 2181, 2182, 2671, 3226, 3596, 3597, 3901, 4343, and 4472. Moreover, Verisign's Shared Registration System (SRS) supports the following IETF Extensible Provisioning Protocol (EPP) specifications, where the Extensible Markup Language (XML) templates and XML schemas are defined in RFC 3915, 5730, 5731, 5732, 5733, and 5734. By strictly adhering to these RFCs, Verisign helps to ensure its registry services do not create a condition that adversely affects the throughput, response time, consistency, or coherence of responses to Internet servers or end systems. Besides its leadership in authoring RFCs for EPP, Domain Name System Security Extensions (DNSSEC), and other DNS services, Verisign has created and contributed to several now well-established IETF standards and is a regular and long-standing participant in key Internet standards forums.

Figure 23-1 summarizes the technical and business components of those registry services, customarily offered by a registry operator (i.e., Verisign), that support this application. These services are currently operational and support both large and small Verisign-managed registries. Customary registry services are provided in the same manner as Verisign provides these services for its existing gTLDs.

Through these established registry services, Verisign has proven its ability to operate a reliable and low-risk registry that supports millions of transactions per day. Verisign is unaware of any potential security or stability concern related to any of these services.

Registry services defined by this application are not intended to be offered in a manner unique to the new generic top-level domain (gTLD) nor are any proposed services unique to this application's registry.

As further evidence of Verisign's compliance with ICANN mandated security and stability requirements, Verisign allocates the applicable RFCs to each of the five customary registry services (items A – E above). For each registry service, Verisign also provides evidence in Figure 23-2 of Verisign's RFC compliance and includes relevant ICANN prior-service approval actions.

1.1 Critical Operations of the Registry

i. Receipt of Data from Registrars Concerning Registration of Domain Names and Name Servers
See Item A in Figure 23-1 and Figure 23-2.

ii. Provision to Registrars Status Information Relating to the Zone Servers

Verisign is Web.com's selected provider of backend registry services. Verisign registry services provisions to registrars status information relating to zone servers for the gTLD. The services also allow a domain name to be updated with clientHold, serverHold status, which removes the domain name server details from zone files. This ensures that DNS queries of the domain name are not resolved temporarily. When these hold statuses are removed, the name server details are written back to zone files and DNS queries are again resolved. Figure 23-3 describes the domain name status information and zone insertion indicator provided to registrars. The zone insertion indicator determines whether the name server details of the domain name exist in the zone file for a given domain name status. Verisign also has the capability to withdraw domain names from the zone file in near real time by changing the domain name statuses upon request by customers, courts, or legal authorities as required.

iii. Dissemination of TLD Zone Files
See Item B in Figure 23-1 and Figure 23-2.

iv. Operation of the Registry Zone Servers
Verisign is Web.com's selected provider of backend registry services. Verisign, as a company, operates zone servers and serves DNS resolution from 76 geographically distributed resolution sites located in North America, South America, Africa, Europe, Asia, and Australia. Currently, 17 DNS locations are designated primary sites, offering greater capacity than smaller sites comprising the remainder of the Verisign constellation. Verisign also uses Anycast techniques and regional Internet resolution sites to expand coverage, accommodate emergency or surge capacity, and support system availability during maintenance procedures. Verisign plans to operate Web.com's .web gTLD from a minimum of eight of its primary sites (two on the East Coast of the United States, two on the West Coast of the United States, two in Europe, and two in Asia) and expand resolution sites based on traffic volume and patterns. Further details of the geographic diversity of Verisign's zone servers are provided in the response to Question 34, Geographic Diversity. Moreover, additional details of Verisign's zone servers are provided in the response to Question 32, Architecture and the response to Question 35, DNS Service.

v. Dissemination of Contact and Other Information Concerning Domain Name Server Registrations
See Item C in Figure 23-1 and Figure 23-2.

2 OTHER PRODUCTS OR SERVICES THE REGISTRY OPERATOR IS REQUIRED TO PROVIDE BECAUSE OF THE ESTABLISHMENT OF A CONSENSUS POLICY
Verisign, Web.com's selected provider of backend registry services, is a proven supporter of ICANN's consensus-driven, bottom-up policy development process whereby community members identify a problem, initiate policy discussions, and generate a solution that produces effective and sustained results. Verisign currently provides all of the products or services (collectively referred to as services) that the registry operator is required to provide because of the establishment of a Consensus Policy. For the .web gTLD, Verisign implements these services using the same proven processes and procedures currently in-place for all registries under Verisign's management. Furthermore, Verisign executes these services on computing platforms comparable to those of other registries under Verisign's management. Verisign's extensive experience with consensus policy required services and its proven processes to implement these services greatly minimize any potential risk to Internet security or stability. Details of these services are provided in the following subsections. It shall be noted that consensus policy services required of registrars (e.g., Whois Reminder, Expired Domain) are not included in this

response. This exclusion is in accordance with the direction provided in the question's Notes column to address registry operator services.

2.1 Inter-Registrar Transfer Policy (IRTP)
Technical Component: In compliance with the IRTP consensus policy, Verisign, Web.com's selected provider of backend registry services, has designed its registration systems to systematically restrict the transfer of domain names within 60 days of the initial create date. In addition, Verisign has implemented EPP and "AuthInfo" code functionality, which is used to further authenticate transfer requests. The registration system has been designed to enable compliance with the five-day transfer grace period and includes the following functionality:

- Allows the losing registrar to proactively 'ACK' or acknowledge a transfer prior to the expiration of the five-day transfer grace period
- Allows the losing registrar to proactively 'NACK' or not acknowledge a transfer prior to the expiration of the five-day transfer grace period
- Allows the system to automatically ACK the transfer request once the five-day transfer grace period has passed if the losing registrar has not proactively ACK'd or NACK'd the transfer request.

Business Component: All requests to transfer a domain name to a new registrar are handled according to the procedures detailed in the IRTP. Dispute proceedings arising from a registrar's alleged failure to abide by this policy may be initiated by any ICANN-accredited registrar under the Transfer Dispute Resolution Policy. Web.com's compliance office serves as the first level dispute resolution provider pursuant to the associated Transfer Dispute Resolution Policy. As needed Verisign is available to offer policy guidance as issues arise.

Security and Stability Concerns: Verisign is unaware of any impact caused by the service on throughput, response time, consistency, or coherence of the responses to Internet servers or end-user systems. By implementing the IRTP in accordance with ICANN policy, security is enhanced as all transfer commands are authenticated using the AuthInfo code prior to processing.

ICANN Prior Approval: Verisign has been in compliance with the IRTP since November 2004 and is available to support Web.com in a consulting capacity as needed.

Unique to the TLD: This service is not provided in a manner unique to the .web gTLD.

2.2 Add Grace Period (AGP) Limits Policy
Technical Component: Verisign's registry system monitors registrars' Add grace period deletion activity and provides reporting that permits Web.com to assess registration fees upon registrars that have exceeded the AGP thresholds stipulated in the AGP Limits Policy. Further, Web.com accepts and evaluates all exemption requests received from registrars and determines whether the exemption request meets the exemption criteria. Web.com maintains all AGP Limits Policy exemption request activity so that this material may be included within Web.com's Monthly Registry Operator Report to ICANN.

Registrars that exceed the limits established by the policy may submit exemption requests to Web.com for consideration. Web.com's compliance office reviews these exemption requests in accordance with the AGP Limits Policy and renders a decision. Upon request, Web.com submits associated reporting on exemption request activity to support reporting in accordance with established ICANN requirements.

Business Component: The Add grace period (AGP) is restricted for any gTLD operator that has implemented an AGP. Specifically, for each operator:

• During any given month, an operator may not offer any refund to an ICANN-accredited registrar for any domain names deleted during the AGP that exceed (i) 10% of that registrar's net new registrations (calculated as the total number of net adds of one-year through ten-year registrations as defined in the monthly reporting requirement of Operator Agreements) in that month, or (ii) fifty (50) domain names, whichever is greater, unless an exemption has been granted by an operator.

• Upon the documented demonstration of extraordinary circumstances, a registrar may seek from an operator an exemption from such restrictions in a specific month. The registrar must confirm in writing to the operator how, at the time the names were deleted, these extraordinary circumstances were not known, reasonably could not have been known, and were outside the registrar's control. Acceptance of any exemption will be at the sole and reasonable discretion of the operator; however "extraordinary circumstances" that reoccur regularly for the same registrar will not be deemed extraordinary.

In addition to all other reporting requirements to ICANN, Web.com identifies each registrar that has sought an exemption, along with a brief description of the type of extraordinary circumstance and the action, approval, or denial taken by the operator.

Security and Stability Concerns: Verisign is unaware of any impact, caused by the policy, on throughput, response time, consistency, or coherence of the responses to Internet servers or end-user systems.

ICANN Prior Approval: Verisign, Web.com's backend registry services provider, has had experience with this policy since its implementation in April 2009 and is available to support Web.com in a consulting capacity as needed.

Unique to the TLD: This service is not provided in a manner unique to the .web gTLD.

2.3 Registry Services Evaluation Policy (RSEP)

Technical Component: Verisign, Web.com's selected provider of backend registry services, adheres to all RSEP submission requirements. Verisign has followed the process many times and is fully aware of the submission procedures, the type of documentation required, and the evaluation process that ICANN adheres to.

Business Component: In accordance with ICANN procedures detailed on the ICANN RSEP website (http://www.icann.org/en/registries/rsep/), all gTLD registry operators are required to follow this policy when submitting a request for new registry services.

Security and Stability Concerns: As part of the RSEP submission process, Verisign, Web.com's backend registry services provider, identifies any potential security and stability concerns in accordance with RSEP stability and security requirements. Verisign never launches services without satisfactory completion of the RSEP process and resulting approval.

ICANN Prior Approval: Not applicable.

Unique to the TLD: gTLD RSEP procedures are not implemented in a manner unique to the .web gTLD.

3 PRODUCTS OR SERVICES ONLY A REGISTRY OPERATOR IS CAPABLE OF PROVIDING BY REASON OF ITS DESIGNATION AS THE REGISTRY OPERATOR

Web.com plans to implement a Premium Name Service as part of launch plans for the .web gTLD. Work is still proceeding on this effort but it will be modeled after similar offerings during recent TLD launches and the reserved Premium Domain Name list will comply with all necessary ICANN regulations related to such efforts. This list will be authoritative and these names will not be available during Sunrise A&B or Landrush.

Verisign, Web.com's selected backend registry services provider, has developed a Registry-Registrar Two-Factor Authentication Service that complements traditional registration and resolution registry services. In accordance with direction provided in Question 23, Verisign details below the technical and business components of the service, identifies any potential threat to registry security or stability, and lists previous interactions with ICANN to approve the operation of the service. The Two-Factor Authentication Service is currently operational, supporting multiple registries under ICANN's purview.

Web.com is unaware of any competition issue that may require the registry service (s) listed in this response to be referred to the appropriate governmental competition authority or authorities with applicable jurisdiction. ICANN previously approved the service(s), at which time it was determined that either the service(s) raised no competitive concerns or any applicable concerns related to competition were satisfactorily addressed.

3.1 Two-Factor Authentication Service

Technical Component: The Registry-Registrar Two-Factor Authentication Service is designed to improve domain name security and assist registrars in protecting the accounts they manage. As part of the service, dynamic one-time passwords augment the user names and passwords currently used to process update, transfer, and/or deletion requests. These one-time passwords enable transaction processing to be based on requests that are validated both by "what users know" (i.e., their user name and password) and "what users have" (i.e., a two-factor authentication credential with a one-time-password).

Registrars can use the one-time-password when communicating directly with Verisign's Customer Service department as well as when using the registrar portal to make manual updates, transfers, and/or deletion transactions. The Two-Factor Authentication Service is an optional service offered to registrars that execute the Registry-Registrar Two-Factor Authentication Service Agreement.

Business Component: There is no charge for the Registry-Registrar Two-Factor Authentication Service. It is enabled only for registrars that wish to take advantage of the added security provided by the service.

Security and Stability Concerns: Verisign is unaware of any impact, caused by the service, on throughput, response time, consistency, or coherence of the responses to Internet servers or end-user systems. The service is intended to enhance domain name security, resulting in increased confidence and trust by registrants.

ICANN Prior Approval: ICANN approved the same Two-Factor Authentication Service for Verisign's use on .com and .net on 10 July 2009 (RSEP Proposal 2009004) and for .name on 16 February 2011 (RSEP Proposal 2011001).

Unique to the TLD: This service is not provided in a manner unique to the .web gTLD.

Demonstration of Technical & Operational Capability

24. Shared Registration System (SRS) Performance

1 ROBUST PLAN FOR OPERATING A RELIABLE SRS

Please note; all figures, tables and diagrams referenced in the following response can be found in attachment titled “Attachment dot web Q24.”

1.1 High-Level Shared Registration System (SRS) System Description

Verisign, Web.com Group, Inc.’s (”Web.com”) selected provider of backend registry services, provides and operates a robust and reliable SRS that enables multiple registrars to provide domain name registration services in the top-level domain (TLD). Verisign’s proven reliable SRS serves approximately 915 registrars, and Verisign, as a company, has averaged more than 140 million registration transactions per day. The SRS provides a scalable, fault-tolerant platform for the delivery of gTLDs through the use of a central customer database, a web interface, a standard provisioning protocol (i.e., Extensible Provisioning Protocol, EPP), and a transport protocol (i.e., Secure Sockets Layer, SSL).

The SRS components include:

- Web Interface: Allows customers to access the authoritative database for accounts, contacts, users, authorization groups, product catalog, product subscriptions, and customer notification messages.
- EPP Interface: Provides an interface to the SRS that enables registrars to use EPP to register and manage domains, hosts, and contacts.
- Authentication Provider: A Verisign developed application, specific to the SRS, that authenticates a user based on a login name, password, and the SSL certificate common name and client IP address.

The SRS is designed to be scalable and fault tolerant by incorporating clustering in multiple tiers of the platform. New nodes can be added to a cluster within a single tier to scale a specific tier, and if one node fails within a single tier, the services will still be available. The SRS allows registrars to manage the .web gTLD domain names in a single architecture. To flexibly accommodate the scale of its transaction volumes, as well as new technologies, Verisign employs the following design practices:

- Scale for Growth: Scale to handle current volumes and projected growth.
- Scale for Peaks: Scale to twice base capacity to withstand “registration add attacks” from a compromised registrar system.
- Limit Database CPU Utilization: Limit utilization to no more than 50 percent during peak loads.
- Limit Database Memory Utilization: Each user’s login process that connects to the database allocates a small segment of memory to perform connection overhead, sorting, and data caching. Verisign’s standards mandate that no more than 40 percent of the total available physical memory on the database server will be allocated for these functions.

Verisign’s SRS is built upon a three-tier architecture as illustrated in Figure 24-1 and detailed here:

- Gateway Layer: The first tier, the gateway servers, uses EPP to communicate with registrars. These gateway servers then interact with application servers, which comprise the second tier.

- Application Layer: The application servers contain business logic for managing and maintaining the registry business. The business logic is particular to each TLD's business rules and requirements. The flexible internal design of the application servers allows Verisign to easily leverage existing business rules to apply to the .web gTLD. The application servers store Web.com's data in the registry database, which comprises the third and final tier. This simple, industry-standard design has been highly effective with other customers for whom Verisign provides backend registry services.
- Database Layer: The database is the heart of this architecture. It stores all the essential information provisioned from registrars through the gateway servers. Separate servers query the database, extract updated zone and Whois information, validate that information, and distribute it around the clock to Verisign's worldwide domain name resolution sites.

Scalability and Performance. Verisign, Web.com's selected backend registry services provider, implements its scalable SRS on a supportable infrastructure that achieves the availability requirements in Specification 10. Verisign employs the design patterns of simplicity and parallelism in both its software and systems, based on its experience that these factors contribute most significantly to scalability and reliable performance. Going counter to feature-rich development patterns, Verisign intentionally minimizes the number of lines of code between the end user and the data delivered. The result is a network of restorable components that provide rapid, accurate updates. Figure 24-2 depicts EPP traffic flows and local redundancy in Verisign's SRS provisioning architecture. As detailed in the figure, local redundancy is maintained for each layer as well as each piece of equipment. This built-in redundancy enhances operational performance while enabling the future system scaling necessary to meet additional demand created by the .web gTLD.

Besides improving scalability and reliability, local SRS redundancy enables Verisign to take down individual system components for maintenance and upgrades, with little to no performance impact. With Verisign's redundant design, Verisign can perform routine maintenance while the remainder of the system remains online and unaffected. For the .web gTLD registry, this flexibility minimizes unplanned downtime and provides a more consistent end-user experience.

1.2 Representative Network Diagrams

Figure 24-3 provides a summary network diagram of Web.com's selected backend registry services provider's (Verisign's) SRS. This configuration at both the primary and alternate-primary Verisign data centers provides a highly reliable backup capability. Data is continuously replicated between both sites to ensure failover to the alternate-primary site can be implemented expeditiously to support both planned and unplanned outages.

1.3 Number of Servers

As Web.com's selected provider of backend registry services, Verisign continually reviews its server deployments for all aspects of its registry service. Verisign evaluates usage based on peak performance objectives as well as current transaction volumes, which drive the quantity of servers in its implementations. Verisign's scaling is based on the following factors:

- Server configuration is based on CPU, memory, disk IO, total disk, and network throughput projections.
- Server quantity is determined through statistical modeling to fulfill overall performance objectives as defined by both the service availability and the server configuration.
- To ensure continuity of operations for the .web gTLD, Verisign uses a minimum of 100 dedicated servers per SRS site. These servers are virtualized to meet demand.

1.4 Description of Interconnectivity with Other Registry Systems
Figure 24-4 provides a technical overview of the Web.com's selected backend registry services provider's (Verisign's) SRS, showing how the SRS component fits into this larger system and interconnects with other system components.

1.5 Frequency of Synchronization Between Servers
As Web.com's selected provider of backend registry services, Verisign uses synchronous replication to keep the Verisign SRS continuously in sync between the two data centers. This synchronization is performed in near-real time, thereby supporting rapid failover should a failure occur or a planned maintenance outage be required.

1.6 Synchronization Scheme
Verisign uses synchronous replication to keep the Verisign SRS continuously in sync between the two data centers. Because the alternate-primary site is continuously up, and built using an identical design to the primary data center, it is classified as a "hot standby."

2 SCALABILITY AND PERFORMANCE ARE CONSISTENT WITH THE OVERALL BUSINESS APPROACH AND PLANNED SIZE OF THE REGISTRY
Verisign is an experienced backend registry provider that has developed and uses proprietary system scaling models to guide the growth of its TLD supporting infrastructure. These models direct Verisign's infrastructure scaling to include, but not be limited to, server capacity, data storage volume, and network throughput that are aligned to projected demand and usage patterns. Verisign periodically updates these models to account for the adoption of more capable and cost-effective technologies.

Verisign's scaling models are proven predictors of needed capacity and related cost. As such, they provide the means to link the projected infrastructure needs of the .web gTLD with necessary implementation and sustainment cost. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its scaling models, Verisign derived the necessary infrastructure required to implement and sustain this gTLD. Verisign's pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as "Total Critical Registry Function Cash Outflows" (Template 1, Line IIb.G) within the Question 46 financial projections response.

3 TECHNICAL PLAN THAT IS ADEQUATELY RESOURCED IN THE PLANNED COSTS DETAILED IN THE FINANCIAL SECTION
Verisign, Web.com's selected provider of backend registry services, is an experienced backend registry provider that has developed a set of proprietary resourcing models to project the number and type of personnel resources necessary to operate a TLD. Verisign routinely adjusts these staffing models to account for new tools and process innovations. These models enable Verisign to continually right-size its staff to accommodate projected demand and meet service level agreements as well as Internet security and stability requirements. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its staffing models, Verisign derived the necessary personnel levels required for this gTLD's initial implementation and ongoing maintenance. Verisign's pricing for the backend registry services provided to Web.com fully accounts for this personnel-related cost, which is provided as "Total Critical Registry Function Cash Outflows" (Template 1, Line IIb.G) within the Question 46 financial projections response.

Verisign employs more than 1,040 individuals of which more than 775 comprise its technical work force. (Current statistics are publicly available in Verisign's quarterly filings.) Drawing from this pool of on-hand and fully committed technical resources, Verisign has maintained DNS operational accuracy and stability 100 percent of the time for more than 13 years for .com, proving Verisign's ability to align personnel resource growth to the scale increases of Verisign's TLD service offerings.

Verisign projects it will use the following personnel roles, which are described in Section 5 of the response to Question 31, Technical Overview of Proposed Registry, to support SRS performance:

- Application Engineers: 19
- Database Administrators: 8
- Database Engineers: 3
- Network Administrators: 11
- Network Architects: 4
- Project Managers: 25
- Quality Assurance Engineers: 11
- SRS System Administrators: 13
- Storage Administrators: 4
- Systems Architects: 9

To implement and manage the .web gTLD as described in this application, Verisign, Web.com's selected backend registry services provider, scales, as needed, the size of each technical area now supporting its portfolio of TLDs. Consistent with its resource modeling, Verisign periodically reviews the level of work to be performed and adjusts staff levels for each technical area.

When usage projections indicate a need for additional staff, Verisign's internal staffing group uses an in-place staffing process to identify qualified candidates. These candidates are then interviewed by the lead of the relevant technical area. By scaling one common team across all its TLDs instead of creating a new entity to manage only the .web gTLD, Verisign realizes significant economies of scale and ensures its TLD best practices are followed consistently. This consistent application of best practices helps ensure the security and stability of both the Internet and this proposed gTLD, as Verisign holds all contributing staff members accountable to the same procedures that guide its execution of the Internet's largest TLDs (i.e., .com and .net). Moreover, by augmenting existing teams, Verisign affords new employees the opportunity to be mentored by existing senior staff. This mentoring minimizes start-up learning curves and helps ensure that new staff members properly execute their duties.

4 EVIDENCE OF COMPLIANCE WITH SPECIFICATION 6 AND 10 TO THE REGISTRY AGREEMENT

Section 1.2 (EPP) of Specification 6, Registry Interoperability and Continuity Specifications. Verisign, Web.com's selected backend registry services provider, provides these services using its SRS, which complies fully with Specification 6, Section 1.2 of the Registry Agreement. In using its SRS to provide backend registry services, Verisign implements and complies with relevant existing RFCs (i.e., 5730, 5731, 5732, 5733, 5734, and 5910) and intends to comply with RFCs that may be published in the future by the Internet Engineering Task Force (IETF), including successor standards, modifications, or additions thereto relating to the provisioning and management of domain names that use EPP. In addition, Verisign's SRS includes a Registry Grace Period (RGP) and thus complies with RFC 3915 and its successors. Details of the Verisign SRS' compliance with RFC SRS/EPP are provided in the response to Question 25, Extensible Provisioning Protocol. Verisign does not use functionality outside the base EPP RFCs, although proprietary EPP extensions are documented in Internet-Draft format following the guidelines described in RFC

3735 within the response to Question 25. Moreover, prior to deployment, Web.com will provide to ICANN updated documentation of all the EPP objects and extensions supported in accordance with Specification 6, Section 1.2.

Specification 10, EPP Registry Performance Specifications. Verisign's SRS meets all EPP Registry Performance Specifications detailed in Specification 10, Section 2. Evidence of this performance can be verified by a review of the .com and .net Registry Operator's Monthly Reports, which Verisign files with ICANN. These reports detail Verisign's operational status of the .com and .net registries, which use an SRS design and approach comparable to the one proposed for the .web gTLD. These reports provide evidence of Verisign's ability to meet registry operation service level agreements (SLAs) comparable to those detailed in Specification 10. The reports are accessible at the following URL: http://www.icann.org/en/tlds/monthly-reports/.

In accordance with EPP Registry Performance Specifications detailed in Specification 10, Verisign's SRS meets the following performance attributes:

- EPP service availability: 〈= 864 minutes of downtime (˜98%)
- EPP session-command round trip time (RTT): 〈=4000 milliseconds (ms), for at least 90 percent of the commands
- EPP query-command RTT: 〈=2000 ms, for at least 90 percent of the commands
- EPP transform-command RTT: 〈=4000 ms, for at least 90 percent of the commands

25. Extensible Provisioning Protocol (EPP)

1 COMPLETE KNOWLEDGE AND UNDERSTANDING OF THIS ASPECT OF REGISTRY TECHNICAL REQUIREMENTS

Please note; all figures, tables and diagrams referenced in the following response can be found in the attachment titled "Attachment dot web Q25." All EPP schemas can be found in the attachment titled "Attachment dot web Q25 EPP schemas."

Verisign, Web.com Group, Inc.'s ("Web.com") selected backend registry services provider, has used Extensible Provisioning Protocol (EPP) since its inception and possesses complete knowledge and understanding of EPP registry systems. Its first EPP implementation— for a thick registry for the .name generic top-level domain (gTLD)—was in 2002. Since then Verisign has continued its RFC-compliant use of EPP in multiple TLDs, as detailed in Figure 25-1.

Verisign's understanding of EPP and its ability to implement code that complies with the applicable RFCs is unparalleled. Mr. Scott Hollenbeck, Verisign's director of software development, authored the Extensible Provisioning Protocol and continues to be fully engaged in its refinement and enhancement (U.S. Patent Number 7299299 – Shared registration system for registering domain names). Verisign has also developed numerous new object mappings and object extensions following the guidelines in RFC 3735 (Guidelines for Extending the Extensible Provisioning Protocol). Mr. James Gould, a principal engineer at Verisign, led and co-authored the most recent EPP Domain Name System Security Extensions (DNSSEC) RFC effort (RFC 5910).

All registry systems for which Verisign is the registry operator or provides backend registry services use EPP. Upon approval of this application, Verisign will use EPP to provide the backend registry services for this gTLD. The .com, .net, and .name registries for which Verisign is the registry operator use an SRS design

and approach comparable to the one proposed for this gTLD. Approximately 915 registrars use the Verisign EPP service, and the registry system performs more than 140 million EPP transactions daily without performance issues or restrictive maintenance windows. The processing time service level agreement (SLA) requirements for the Verisign-operated .net gTLD are the strictest of the current Verisign managed gTLDs. All processing times for Verisign-operated gTLDs can be found in ICANN's Registry Operator's Monthly Reports at http://www.icann.org/en/tlds/monthly-reports/.

Verisign has also been active on the Internet Engineering Task Force (IETF) Provisioning Registry Protocol (provreg) working group and mailing list since work started on the EPP protocol in 2000. This working group provided a forum for members of the Internet community to comment on Mr. Scott Hollenbeck's initial EPP drafts, which Mr. Hollenbeck refined based on input and discussions with representatives from registries, registrars, and other interested parties. The working group has since concluded, but the mailing list is still active to enable discussion of different aspects of EPP.

1.1 EPP Interface with Registrars

Verisign, Web.com's selected backend registry services provider, fully supports the features defined in the EPP specifications and provides a set of software development kits (SDK) and tools to help registrars build secure and stable interfaces. Verisign's SDKs give registrars the option of either fully writing their own EPP client software to integrate with the Shared Registration System (SRS), or using the Verisign-provided SDKs to aid them in the integration effort. Registrars can download the Verisign EPP SDKs and tools from the registrar website (http://www.Verisign.com/domain-name-services/current-registrars/epp-sdk/index.html).

The EPP SDKs provide a host of features including connection pooling, Secure Sockets Layer (SSL), and a test server (stub server) to run EPP tests against. One tool—the EPP tool—provides a web interface for creating EPP Extensible Markup Language (XML) commands and sending them to a configurable set of target servers. This helps registrars in creating the template XML and testing a variety of test cases against the EPP servers. An Operational Test and Evaluation (OT&E) environment, which runs the same software as the production system so approved registrars can integrate and test their software before moving into a live production environment, is also available.

2 TECHNICAL PLAN SCOPE/SCALE CONSISTENT WITH THE OVERALL BUSINESS APPROACH AND PLANNED SIZE OF THE REGISTRY

Verisign, Web.com's selected backend registry services provider, is an experienced backend registry provider that has developed and uses proprietary system scaling models to guide the growth of its TLD supporting infrastructure. These models direct Verisign's infrastructure scaling to include, but not be limited to, server capacity, data storage volume, and network throughput that are aligned to projected demand and usage patterns. Verisign periodically updates these models to account for the adoption of more capable and cost-effective technologies.

Verisign's scaling models are proven predictors of needed capacity and related cost. As such, they provide the means to link the projected infrastructure needs of the .web gTLD with necessary implementation and sustainment cost. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its scaling models, Verisign derived the necessary infrastructure required to implement and sustain the .web gTLD. Verisign's pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as "Total Critical Registry Function Cash Outflows" (Template 1, Line IIb.G)

within the Question 46 financial projections response.

3 TECHNICAL PLAN THAT IS ADEQUATELY RESOURCED IN THE PLANNED COSTS DETAILED IN THE FINANCIAL SECTION

Verisign, Web.com's selected backend registry services provider, is an experienced backend registry provider that has developed a set of proprietary resourcing models to project the number and type of personnel resources necessary to operate a TLD. Verisign routinely adjusts these staffing models to account for new tools and process innovations. These models enable Verisign to continually right-size its staff to accommodate projected demand and meet service level agreements as well as Internet security and stability requirements. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its staffing models, Verisign derived the necessary personnel levels required for this gTLD's initial implementation and ongoing maintenance. Verisign's pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as "Total Critical Registry Function Cash Outflows" (Template 1, Line IIb.G) within the Question 46 financial projections response.

Verisign employs more than 1,040 individuals of which more than 775 comprise its technical work force. (Current statistics are publicly available in Verisign's quarterly filings.) Drawing from this pool of on-hand and fully committed technical resources, Verisign has maintained DNS operational accuracy and stability 100 percent of the time for more than 13 years for .com, proving Verisign's ability to align personnel resource growth to the scale increases of Verisign's TLD service offerings.

Verisign projects it will use the following personnel roles, which are described in Section 5 of the response to Question 31, Technical Overview of Proposed Registry, to support the provisioning of EPP services:

- Application Engineers: 19
- Database Engineers: 3
- Quality Assurance Engineers: 11

To implement and manage the .web gTLD as described in this application, Verisign, Web.com's selected backend registry services provider, scales, as needed, the size of each technical area now supporting its portfolio of TLDs. Consistent with its resource modeling, Verisign periodically reviews the level of work to be performed and adjusts staff levels for each technical area.

When usage projections indicate a need for additional staff, Verisign's internal staffing group uses an in-place staffing process to identify qualified candidates. These candidates are then interviewed by the lead of the relevant technical area. By scaling one common team across all its TLDs instead of creating a new entity to manage only the .web gTLD, Verisign realizes significant economies of scale and ensures its TLD best practices are followed consistently. This consistent application of best practices helps ensure the security and stability of both the Internet and the .web gTLD, as Verisign holds all contributing staff members accountable to the same procedures that guide its execution of the Internet's largest TLDs (i.e., .com and .net). Moreover, by augmenting existing teams, Verisign affords new employees the opportunity to be mentored by existing senior staff. This mentoring minimizes start-up learning curves and helps ensure that new staff members properly execute their duties.

4 ABILITY TO COMPLY WITH RELEVANT RFCS

Verisign, Web.com's selected backend registry services provider, incorporates design reviews, code reviews, and peer reviews into its software development lifecycle (SDLC) to ensure compliance with the relevant RFCs. Verisign's dedicated

QA team creates extensive test plans and issues internal certifications when it has confirmed the accuracy of the code in relation to the RFC requirements. Verisign's QA organization is independent from the development team within engineering. This separation helps Verisign ensure adopted processes and procedures are followed, further ensuring that all software releases fully consider the security and stability of the .web gTLD.

For the .web gTLD, the Shared Registration System (SRS) complies with the following IETF EPP specifications, where the XML templates and XML schemas are defined in the following specifications:

- EPP RGP 3915 (http://www.apps.ietf.org/rfc/rfc3915.html): EPP Redemption Grace Period (RGP) Mapping specification for support of RGP statuses and support of Restore Request and Restore Report (authored by Verisign's Scott Hollenbeck)
- EPP 5730 (http://tools.ietf.org/html/rfc5730): Base EPP specification (authored by Verisign's Scott Hollenbeck)
- EPP Domain 5731 (http://tools.ietf.org/html/rfc5731): EPP Domain Name Mapping specification (authored by Verisign's Scott Hollenbeck)
- EPP Host 5732 (http://tools.ietf.org/html/rfc5732): EPP Host Mapping specification (authored by Verisign's Scott Hollenbeck)
- EPP Contact 5733 (http://tools.ietf.org/html/rfc5733): EPP Contact Mapping specification (authored by Verisign's Scott Hollenbeck)
- EPP TCP 5734 (http://tools.ietf.org/html/rfc5734): EPP Transport over Transmission Control Protocol (TCP) specification (authored by Verisign's Scott Hollenbeck)
- EPP DNSSEC 5910 (http://tools.ietf.org/html/rfc5910): EPP Domain Name System Security Extensions (DNSSEC) Mapping specification (authored by Verisign's James Gould and Scott Hollenbeck)

5 PROPRIETARY EPP EXTENSIONS

Verisign, Web.com's selected backend registry services provider, uses its SRS to provide registry services. The SRS supports the following EPP specifications, which Verisign developed following the guidelines in RFC 3735, where the XML templates and XML schemas are defined in the specifications:

- IDN Language Tag (http://www.verisigninc.com/assets/idn-language-tag.pdf): EPP internationalized domain names (IDN) language tag extension used for IDN domain name registrations
- RGP Poll Mapping (http://www.verisigninc.com/assets/whois-info-extension.pdf): EPP mapping for an EPP poll message in support of Restore Request and Restore Report
- Whois Info Extension (http://www.verisigninc.com/assets/whois-info-extension.pdf): EPP extension for returning additional information needed for transfers
- EPP ConsoliDate Mapping (http://www.verisigninc.com/assets/consolidate-mapping.txt): EPP mapping to support a Domain Sync operation for synchronizing domain name expiration dates
- NameStore Extension (http://www.verisigninc.com/assets/namestore-extension.pdf): EPP extension for routing with an EPP intelligent gateway to a pluggable set of backend products and services
- Low Balance Mapping (http://www.verisigninc.com/assets/low-balance-mapping.pdf): EPP mapping to support low balance poll messages that proactively notify registrars of a low balance (available credit) condition

As part of the 2006 implementation report to bring the EPP RFC documents from Proposed Standard status to Draft Standard status, an implementation test matrix was completed. Two independently developed EPP client implementations based on the RFCs were tested against the Verisign EPP server for the domain, host, and contact transactions. No compliance related issues were identified during this test, providing evidence that these extensions comply with RFC 3735 guidelines and further demonstrating Verisign's ability to design, test, and deploy an RFC-

compliant EPP implementation.

5.1 EPP Templates and Schemas
The EPP XML schemas are formal descriptions of the EPP XML templates. They are used to express the set of rules to which the EPP templates must conform in order to be considered valid by the schema. The EPP schemas define the building blocks of the EPP templates, describing the format of the data and the different EPP commands' request and response formats. The current EPP implementations managed by Verisign, Web.com's selected backend registry services provider, use these EPP templates and schemas, as will the .web gTLD. For each proprietary XML template/schema Verisign provides a reference to the applicable template and includes the schema. These schema can be found in the attachment titled "dot web Q25 EPP Schemas."

6 PROPRIETARY EPP EXTENSION CONSISTENCY WITH REGISTRATION LIFECYCLE
Web.com's selected backend registry services provider's (Verisign's) proprietary EPP extensions, defined in Section 5 above, are consistent with the registration lifecycle documented in the response to Question 27, Registration Lifecycle. Details of the registration lifecycle are presented in that response. As new registry features are required, Verisign develops proprietary EPP extensions to address new operational requirements. Consistent with ICANN procedures Verisign adheres to all applicable Registry Services Evaluation Process (RSEP) procedures.

26. Whois

1 COMPLETE KNOWLEDGE AND UNDERSTANDING OF THIS ASPECT OF REGISTRY TECHNICAL REQUIREMENTS

Please note; all figures, tables and diagrams referenced in the following response can be found in the attachment titled "Attachment dot web Q26."

Verisign, Web.com Group, Inc.'s ("Web.com") selected backend registry services provider, has operated the Whois lookup service for the gTLDs and ccTLDs it manages since 1991, and will provide these proven services for the .web gTLD registry. In addition, it continues to work with the Internet community to improve the utility of Whois data, while thwarting its application for abusive uses.

1.1 High-Level Whois System Description
Like all other components of Web.com's selected backend registry services provider's (Verisign's) registry service, Verisign's Whois system is designed and built for both reliability and performance in full compliance with applicable RFCs. Verisign's current Whois implementation has answered more than five billion Whois queries per month for the TLDs it manages, and has experienced more than 250,000 queries per minute in peak conditions. The .web gTLD will use a Whois system design and approach that is comparable to the current implementation. Independent quality control testing ensures Verisign's Whois service is RFC-compliant through all phases of its lifecycle.

Verisign's redundant Whois databases further contribute to overall system availability and reliability. The hardware and software for its Whois service is architected to scale both horizontally (by adding more servers) and vertically (by adding more CPUs and memory to existing servers) to meet future need.

Verisign can fine-tune access to its Whois database on an individual Internet Protocol (IP) address basis, and it works with registrars to help ensure their services are not limited by any restriction placed on Whois. Verisign provides near

real-time updates for Whois services for the TLDs under its management. As information is updated in the registration database, it is propagated to the Whois servers for quick publication. These updates align with the near real-time publication of Domain Name System (DNS) information as it is updated in the registration database. This capability is important for the .web gTLD registry as it is Verisign's experience that when DNS data is updated in near real time, so should Whois data be updated to reflect the registration specifics of those domain names.

Verisign's Whois response time has been less than 500 milliseconds for 95 percent of all Whois queries in .com, .net, .tv, and .cc. The response time in these TLDs, combined with Verisign's capacity, enables the Whois system to respond to up to 30,000 searches (or queries) per second for a total capacity of 2.6 billion queries per day.

The Whois software written by Verisign complies with RFC 3912. Verisign uses an advanced in-memory database technology to provide exceptional overall system performance and security. In accordance with RFC 3912, Verisign provides a website at whois.nic.〈TLD〉 that provides free public query-based access to the registration data.

Verisign currently operates both thin and thick Whois systems.

Verisign commits to implementing a RESTful Whois service upon finalization of agreements with the IETF (Internet Engineering Task Force).

Provided Functionalities for User Interface
To use the Whois service via port 43, the user enters the applicable parameter on the command line as illustrated here:

- For domain name: whois EXAMPLE.TLD
- For registrar: whois "registrar Example Registrar, Inc."
- For name server: whois "NS1.EXAMPLE.TLD" or whois "name server (IP address)"

To use the Whois service via the web-based directory service search interface:

- Go to http://whois.nic.〈TLD〉
- Click on the appropriate button (Domain, Registrar, or Name Server)
- Enter the applicable parameter:
  - Domain name, including the TLD (e.g., EXAMPLE.TLD)
  - Full name of the registrar, including punctuation (e.g., Example Registrar, Inc.)
  - Full host name or the IP address (e.g., NS1.EXAMPLE.TLD or 198.41.3.39)
- Click on the Submit button.

Provisions to Ensure That Access Is Limited to Legitimate Authorized Users and Is in Compliance with Applicable Privacy Laws or Policies

To further promote reliable and secure Whois operations, Verisign, Web.com's selected backend registry services provider, has implemented rate-limiting characteristics within the Whois service software. For example, to prevent data mining or other abusive behavior, the service can throttle a specific requestor if the query rate exceeds a configurable threshold. In addition, QoS technology enables rate limiting of queries before they reach the servers, which helps protect against denial of service (DoS) and distributed denial of service (DDoS) attacks.

Verisign's software also permits restrictions on search capabilities. For example,

wild card searches can be disabled. If needed, it is possible to temporarily restrict and/or block requests coming from specific IP addresses for a configurable amount of time. Additional features that are configurable in the Whois software include help files, headers and footers for Whois query responses, statistics, and methods to memory map the database. Furthermore, Verisign is European Union (EU) Safe Harbor certified and has worked with European data protection authorities to address applicable privacy laws by developing a tiered Whois access structure that requires users who require access to more extensive data to (i) identify themselves, (ii) confirm that their use is for a specified purpose and (iii) enter into an agreement governing their use of the more extensive Whois data.

1.2 Relevant Network Diagrams

Figure 26-1 provides a summary network diagram of the Whois service provided by Verisign, Web.com's selected backend registry services provider. The figure details the configuration with one resolution/Whois site. For the .web gTLD Verisign provides Whois service from 6 of its 17 primary sites based on the proposed gTLD's traffic volume and patterns. A functionally equivalent resolution architecture configuration exists at each Whois site.

1.3 IT and Infrastructure Resources

Figure 26-2 summarizes the IT and infrastructure resources that Verisign, Web.com's selected backend registry services provider, uses to provision Whois services from Verisign primary resolution sites. As needed, virtual machines are created based on actual and projected demand.

1.4 Description of Interconnectivity with Other Registry Systems

Figure 26-3 provides a technical overview of the registry system provided by Verisign, Web.com's selected backend registry services provider, and shows how the Whois service component fits into this larger system and interconnects with other system components.

1.5 Frequency of Synchronization Between Servers

Synchronization between the SRS and the geographically distributed Whois resolution sites occurs approximately every three minutes. Verisign, Web.com's selected backend registry services provider, uses a two-part Whois update process to ensure Whois data is accurate and available. Every 12 hours an initial file is distributed to each resolution site. This file is a complete copy of all Whois data fields associated with each domain name under management. As interactions with the SRS cause the Whois data to be changed, these incremental changes are distributed to the resolution sites as an incremental file update. This incremental update occurs approximately every three minutes. When the new 12-hour full update is distributed, this file includes all past incremental updates. Verisign's approach to frequency of synchronization between servers meets the Performance Specifications defined in Specification 10 of the Registry Agreement for new gTLDs.

2 TECHNICAL PLAN SCOPE/SCALE CONSISTENT WITH THE OVERALL BUSINESS APPROACH AND PLANNED SIZE OF THE REGISTRY

Verisign, Web.com's selected backend registry services provider, is an experienced backend registry provider that has developed and uses proprietary system scaling models to guide the growth of its TLD supporting infrastructure. These models direct Verisign's infrastructure scaling to include, but not be limited to, server capacity, data storage volume, and network throughput that are aligned to projected demand and usage patterns. Verisign periodically updates these models to account for the adoption of more capable and cost-effective technologies.

Verisign's scaling models are proven predictors of needed capacity and related cost. As such, they provide the means to link the projected infrastructure needs of the .web gTLD with necessary implementation and sustainment cost. Using the

projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its scaling models, Verisign derived the necessary infrastructure required to implement and sustain this gTLD. Verisign's pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as "Total Critical Registry Function Cash Outflows" (Template 1, Line IIb.G) within the Question 46 financial projections response.

3 TECHNICAL PLAN THAT IS ADEQUATELY RESOURCED IN THE PLANNED COSTS DETAILED IN THE FINANCIAL SECTION

Verisign, Web.com's selected backend registry services provider, is an experienced backend registry provider that has developed a set of proprietary resourcing models to project the number and type of personnel resources necessary to operate a TLD. Verisign routinely adjusts these staffing models to account for new tools and process innovations. These models enable Verisign to continually right-size its staff to accommodate projected demand and meet service level agreements as well as Internet security and stability requirements. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its staffing models, Verisign derived the necessary personnel levels required for this gTLD's initial implementation and ongoing maintenance. Verisign's pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as "Total Critical Registry Function Cash Outflows" (Template 1, Line IIb.G) within the Question 46 financial projections response.

Verisign employs more than 1,040 individuals of which more than 775 comprise its technical work force. (Current statistics are publicly available in Verisign's quarterly filings.) Drawing from this pool of on-hand and fully committed technical resources, Verisign has maintained DNS operational accuracy and stability 100 percent of the time for more than 13 years for .com, proving Verisign's ability to align personnel resource growth to the scale increases of Verisign's TLD service offerings.

Verisign projects it will use the following personnel roles, which are described in Section 5 of the response to Question 31, Technical Overview of Proposed Registry, to support Whois services:

- Application Engineers: 19
- Database Engineers: 3
- Quality Assurance Engineers: 11

To implement and manage the .web gTLD as described in this application, Verisign, Web.com's selected backend registry services provider, scales, as needed, the size of each technical area now supporting its portfolio of TLDs. Consistent with its resource modeling, Verisign periodically reviews the level of work to be performed and adjusts staff levels for each technical area.

When usage projections indicate a need for additional staff, Verisign's internal staffing group uses an in-place staffing process to identify qualified candidates. These candidates are then interviewed by the lead of the relevant technical area. By scaling one common team across all its TLDs instead of creating a new entity to manage only the .web gTLD, Verisign realizes significant economies of scale and ensures its TLD best practices are followed consistently. This consistent application of best practices helps ensure the security and stability of both the Internet and the .web gTLD, as Verisign holds all contributing staff members accountable to the same procedures that guide its execution of the Internet's largest TLDs (i.e., .com and .net). Moreover, by augmenting existing teams, Verisign affords new employees the opportunity to be mentored by existing senior staff. This mentoring minimizes start-up learning curves and helps ensure that new

staff members properly execute their duties.

4 COMPLIANCE WITH RELEVANT RFC

Web.com's selected backend registry services provider's (Verisign's) Whois service complies with the data formats defined in Specification 4 of the Registry Agreement. Verisign will provision Whois services for registered domain names and associated data in the top-level domain (TLD). Verisign's Whois services are accessible over Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6), via both Transmission Control Protocol (TCP) port 43 and a web-based directory service at whois.nic.〈TLD〉, which in accordance with RFC 3912, provides free public query-based access to domain name, registrar, and name server lookups. Verisign's proposed Whois system meets all requirements as defined by ICANN for each registry under Verisign management. Evidence of this successful implementation, and thus compliance with the applicable RFCs, can be verified by a review of the .com and .net Registry Operator's Monthly Reports that Verisign files with ICANN. These reports provide evidence of Verisign's ability to meet registry operation service level agreements (SLAs) comparable to those detailed in Specification 10. The reports are accessible at the following URL: http://www.icann.org/en/tlds/monthly-reports/.

5 COMPLIANCE WITH SPECIFICATIONS 4 AND 10 OF REGISTRY AGREEMENT

In accordance with Specification 4, Verisign, Web.com's selected backend registry services provider, provides a Whois service that is available via both port 43 in accordance with RFC 3912, and a web-based directory service at whois.nic.web also in accordance with RFC 3912, thereby providing free public query-based access. Verisign acknowledges that ICANN reserves the right to specify alternative formats and protocols, and upon such specification, Verisign will implement such alternative specification as soon as reasonably practicable.

The format of the following data fields conforms to the mappings specified in Extensible Provisioning Protocol (EPP) RFCs 5730 – 5734 so the display of this information (or values returned in Whois responses) can be uniformly processed and understood: domain name status, individual and organizational names, address, street, city, state/province, postal code, country, telephone and fax numbers, email addresses, date, and times.

Specifications for data objects, bulk access, and lookups comply with Specification 4 and are detailed in the following subsections, provided in both bulk access and lookup modes.

Bulk Access Mode. This data is provided on a daily schedule to a party designated from time to time in writing by ICANN. The specification of the content and format of this data, and the procedures for providing access, shall be as stated below, until revised in the ICANN Registry Agreement.

The data is provided in three files:

- Domain Name File: For each domain name, the file provides the domain name, server name for each name server, registrar ID, and updated date.
- Name Server File: For each registered name server, the file provides the server name, each IP address, registrar ID, and updated date.
- Registrar File: For each registrar, the following data elements are provided: registrar ID, registrar address, registrar telephone number, registrar email address, Whois server, referral URL, updated date, and the name, telephone number, and email address of all the registrar's administrative, billing, and technical contacts.

Lookup Mode. Figures 26-4 through Figure 26-6 provide the query and response format

for domain name, registrar, and name server data objects.

5.1 Specification 10, RDDS Registry Performance Specifications

The Whois service meets all registration data directory services (RDDS) registry performance specifications detailed in Specification 10, Section 2. Evidence of this performance can be verified by a review of the .com and .net Registry Operator's Monthly Reports that Verisign files monthly with ICANN. These reports are accessible from the ICANN website at the following URL: http://www.icann.org/en/tlds/monthly-reports/.

In accordance with RDDS registry performance specifications detailed in Specification 10, Verisign's Whois service meets the following proven performance attributes:

- RDDS availability: 〈=864 min of downtime (~98%)
- RDDS query RTT: 〈=2000 ms, for at least 95% of the queries
- RDDS update time: 〈=60 min, for at least 95% of the probes

6 SEARCHABLE WHOIS

Verisign, Web.com's selected backend registry services provider, provides a searchable Whois service for the .web gTLD. Verisign has experience in providing tiered access to Whois for the .name registry, and uses these methods and control structures to help reduce potential malicious use of the function. The searchable Whois system currently uses Apache's Lucene full text search engine to index relevant Whois content with near-real time incremental updates from the provisioning system.

Features of the Verisign searchable Whois function include:

- Provision of a web-based searchable directory service
- Ability to perform partial match, at least, for the following data fields: domain name, contacts and registrant's name, and contact and registrant's postal address, including all the sub-fields described in EPP (e.g., street, city, state, or province)
- Ability to perform exact match, at least, on the following fields: registrar ID, name server name, and name server's IP address (only applies to IP addresses stored by the registry, i.e., glue records)
- Ability to perform Boolean search supporting, at least, the following logical operators to join a set of search criteria: AND, OR, NOT
- Search results that include domain names that match the selected search criteria

Verisign's implementation of searchable Whois is EU Safe Harbor certified and includes appropriate access control measures that help ensure that only legitimate authorized users can use the service. Furthermore, Verisign's compliance office monitors current ICANN policy and applicable privacy laws or policies to help ensure the solution is maintained within compliance of applicable regulations. Features of these access control measures include:

- All unauthenticated searches are returned as thin results.
- Registry system authentication is used to grant access to appropriate users for thick Whois data search results.
- Account access is granted by the Web.com defined .web gTLD admin user.

Potential Forms of Abuse and Related Risk Mitigation. Leveraging its experience providing tiered access to Whois for the .name registry and interacting with ICANN, data protection authorities, and applicable industry groups, Verisign, Web.com's selected backend registry services provider, is knowledgeable of the likely data

mining forms of abuse associated with a searchable Whois service. Figure 26-7 summarizes these potential forms of abuse and Verisign's approach to mitigate the identified risk.

27. Registration Life Cycle

1 COMPLETE KNOWLEDGE AND UNDERSTANDING OF REGISTRATION LIFECYCLES AND STATES

Please note; all figures, tables and diagrams referenced in the following response can be found in the attachment titled "Attachment dot web Q27."
Starting with domain name registration and continuing through domain name delete operations, Web.com Group, Inc.'s ("Web.com") selected backend registry services provider's (Verisign's) registry implements the full registration lifecycle for domain names supporting the operations in the Extensible Provisioning Protocol (EPP) specification. The registration lifecycle of the domain name starts with registration and traverses various states as specified in the following sections. The registry system provides options to update domain names with different server and client status codes that block operations based on the EPP specification. The system also provides different grace periods for different billable operations, where the price of the billable operation is credited back to the registrar if the billable operation is removed within the grace period. Together Figure 27-1 and Figure 27-2 define the registration states comprising the registration lifecycle and explain the trigger points that cause state-to-state transitions. States are represented as green rectangles within Figure 27-1.

1.1 Registration Lifecycle of Create/Update/Delete
The following section details the create/update/delete processes and the related renewal process that Verisign, Web.com's selected backend registry services provider, follows. For each process, this response defines the process function and its characterization, and as appropriate provides a process flow chart.

Create Process. The domain name lifecycle begins with a registration or what is referred to as a Domain Name Create operation in EPP. The system fully supports the EPP Domain Name Mapping as defined by RFC 5731, where the associated objects (e.g., hosts and contacts) are created independent of the domain name.

Process Characterization. The Domain Name Create command is received, validated, run through a set of business rules, persisted to the database, and committed in the database if all business rules pass. The domain name is included with the data flow to the DNS and Whois resolution services. If no name servers are supplied, the domain name is not included with the data flow to the DNS. A successfully created domain name has the created date and expiration date set in the database. Creates are subject to grace periods as described in Section 1.3 of this response, Add Grace Period, Redemption Grace Period, and Notice Periods for Renewals or Transfers.

The Domain Name Create operation is detailed in Figure 27-3 and requires the following attributes:

- A domain name that meets the string restrictions.
- A domain name that does not already exist.
- The registrar is authorized to create a domain name in .web.
- The registrar has available credit.

- A valid Authorization Information (Auth-Info) value.
- Required contacts (e.g., registrant, administrative contact, technical contact, and billing contact) are specified and exist.
- The specified name servers (hosts) exist, and there is a maximum of 13 name servers.
- A period in units of years with a maximum value of 10 (default period is one year).

Renewal Process. The domain name can be renewed unless it has any form of Pending Delete, Pending Transfer, or Renew Prohibited.

A request for renewal that sets the expiry date to more than ten years in the future is denied. The registrar must pass the current expiration date (without the timestamp) to support the idempotent features of EPP, where sending the same command a second time does not cause unexpected side effects.

Automatic renewal occurs when a domain name expires. On the expiration date, the registry extends the registration period one year and debits the registrar account balance. In the case of an auto-renewal of the domain name, a separate Auto-Renew grace period applies. Renewals are subject to grace periods as described in Section 1.3 of this response, Add Grace Period, Redemption Grace Period, and Notice Periods for Renewals or Transfers.

Process Characterization. The Domain Name Renew command is received, validated, authorized, and run through a set of business rules. The data is updated and committed in the database if it passes all business rules. The updated domain name's expiration date is included in the flow to the Whois resolution service.

The Domain Name Renew operation is detailed in Figure 27-4 and requires the following attributes:

- A domain name that exists and is sponsored by the requesting registrar.
- The registrar is authorized to renew a domain name in .web.
- The registrar has available credit.
- The passed current expiration date matches the domain name's expiration date.
- A period in units of years with a maximum value of 10 (default period is one year). A domain name expiry past ten years is not allowed.

Registrar Transfer Procedures. A registrant may transfer his⁄her domain name from his⁄her current registrar to another registrar. The database system allows a transfer as long as the transfer is not within the initial 60 days, per industry standard, of the original registration date.

The registrar transfer process goes through many process states, which are described in detail below, unless it has any form of Pending Delete, Pending Transfer, or Transfer Prohibited.

A transfer can only be initiated when the appropriate Auth-Info is supplied. The Auth-Info for transfer is only available to the current registrar. Any other registrar requesting to initiate a transfer on behalf of a registrant must obtain the Auth-Info from the registrant.

The Auth-Info is made available to the registrant upon request. The registrant is the only party other than the current registrar that has access to the Auth-Info. Registrar transfer entails a specified extension of the expiry date for the object. The registrar transfer is a billable operation and is charged identically to a renewal for the same extension of the period. This period can be from one to ten

years, in one-year increments.

Because registrar transfer involves an extension of the registration period, the rules and policies applying to how the resulting expiry date is set after transfer are based on the renewal policies on extension.

Per industry standard, a domain name cannot be transferred to another registrar within the first 60 days after registration. This restriction continues to apply if the domain name is renewed during the first 60 days. Transfer of the domain name changes the sponsoring registrar of the domain name, and also changes the child hosts (ns1.sample.xyz) of the domain name (sample .xyz).

The domain name transfer consists of five separate operations:

- Transfer Request (Figure 27-5): Executed by a non-sponsoring registrar with the valid Auth-Info provided by the registrant. The Transfer Request holds funds of the requesting registrar but does not bill the registrar until the transfer is completed. The sponsoring registrar receives a Transfer Request poll message.
- Transfer Cancel (Figure 27-6): Executed by the requesting registrar to cancel the pending transfer. The held funds of the requesting registrar are reversed. The sponsoring registrar receives a Transfer Cancel poll message.
- Transfer Approve (Figure 27-7): Executed by the sponsoring registrar to approve the Transfer Request. The requesting registrar is billed for the Transfer Request and the sponsoring registrar is credited for an applicable Auto-Renew grace period. The requesting registrar receives a Transfer Approve poll message.
- Transfer Reject (Figure 27-8): Executed by the sponsoring registrar to reject the pending transfer. The held funds of the requesting registrar are reversed. The requesting registrar receives a Transfer Reject poll message.
- Transfer Query (Figure 27-9): Executed by either the requesting registrar or the sponsoring registrar of the last transfer.

The registry auto-approves a transfer if the sponsoring registrar takes no action. The requesting registrar is billed for the Transfer Request and the sponsoring registrar is credited for an applicable Auto-Renew grace period. The requesting registrar and the sponsoring registrar receive a Transfer Auto-Approve poll message.

Delete Process. A registrar may choose to delete the domain name at any time.

Process Characterization. The domain name can be deleted, unless it has any form of Pending Delete, Pending Transfer, or Delete Prohibited.

A domain name is also prohibited from deletion if it has any in-zone child hosts that are name servers for domain names. For example, the domain name “sample.xyz” cannot be deleted if an in-zone host “ns.sample.xyz” exists and is a name server for “sample2.xyz.”

If the Domain Name Delete occurs within the Add grace period, the domain name is immediately deleted and the sponsoring registrar is credited for the Domain Name Create. If the Domain Name Delete occurs outside the Add grace period, it follows the Redemption grace period (RGP) lifecycle.

Update Process. The sponsoring registrar can update the following attributes of a domain name:

- Auth-Info
- Name servers

- Contacts (i.e., registrant, administrative contact, technical contact, and billing contact)
- Statuses (e.g., Client Delete Prohibited, Client Hold, Client Renew Prohibited, Client Transfer Prohibited, Client Update Prohibited)

Process Characterization. Updates are allowed provided that the update includes the removal of any Update Prohibited status. The Domain Name Update operation is detailed in Figure 27-10. A domain name can be updated unless it has any form of Pending Delete, Pending Transfer, or Update Prohibited.

1.2 Pending, Locked, Expired, and Transferred

Verisign, Web.com's selected backend registry services provider, handles pending, locked, expired, and transferred domain names as described here. When the domain name is deleted after the five-day Add grace period, it enters into the Pending Delete state. The registrant can return its domain name to active any time within the five-day Pending Delete grace period. After the five-day Pending Delete grace period expires, the domain name enters the Redemption Pending state and then is deleted by the system. The registrant can restore the domain name at any time during the Redemption Pending state.

When a non-sponsoring registrar initiates the domain name transfer request, the domain name enters Pending Transfer state and a notification is mailed to the sponsoring registrar for approvals. If the sponsoring registrar doesn't respond within five days, the Pending Transfer expires and the transfer request is automatically approved.

EPP specifies both client (registrar) and server (registry) status codes that can be used to prevent registry changes that are not intended by the registrant. Currently, many registrars use the client status codes to protect against inadvertent modifications that would affect their customers' high-profile or valuable domain names.

Verisign's registry service supports the following client (registrar) and server (registry) status codes:

- clientHold
- clientRenewProhibited
- clientTransferProhibited
- clientUpdateProhibited
- clientDeleteProhibited
- serverHold
- serverRenewProhibited
- serverTransferProhibited
- serverUpdateProhibited
- serverDeleteProhibited

1.3 Add Grace Period, Redemption Grace Period, and Notice Periods for Renewals or Transfers

Verisign, Web.com's selected backend registry services provider, handles Add grace periods, Redemption grace periods, and notice periods for renewals or transfers as described here.

- Add Grace Period: The Add grace period is a specified number of days following the initial registration of the domain name. The current value of the Add grace period for all registrars is five days.
- Redemption Grace Period: If the domain name is deleted after the five-day grace period expires, it enters the Redemption grace period and then is deleted by the system. The registrant has an option to use the Restore Request command to

restore the domain name within the Redemption grace period. In this scenario, the domain name goes to Pending Restore state if there is a Restore Request command within 30 days of the Redemption grace period. From the Pending Restore state, it goes either to the OK state, if there is a Restore Report Submission command within seven days of the Restore Request grace period, or a Redemption Period state if there is no Restore Report Submission command within seven days of the Restore Request grace period.

- Renew Grace Period: The Renew/Extend grace period is a specified number of days following the renewal/extension of the domain name's registration period. The current value of the Renew/Extend grace period is five days.
- Auto-Renew Grace Period: All auto-renewed domain names have a grace period of 45 days.
- Transfer Grace Period: Domain names have a five-day Transfer grace period.

1.4 Aspects of the Registration Lifecycle Not Covered by Standard EPP RFCs

Web.com's selected backend registry services provider's (Verisign's) registration lifecycle processes and code implementations adhere to the standard EPP RFCs related to the registration lifecycle. By adhering to the RFCs, Verisign's registration lifecycle is complete and addresses each registration-related task comprising the lifecycle. No aspect of Verisign's registration lifecycle is not covered by one of the standard EPP RFCs and thus no additional definitions are provided in this response.

2 CONSISTENCY WITH ANY SPECIFIC COMMITMENTS MADE TO REGISTRANTS AS ADAPTED TO THE OVERALL BUSINESS APPROACH FOR THE PROPOSED gTLD

The registration lifecycle described above applies to the .web gTLD as well as other TLDs managed by Verisign, Web.com's selected backend registry services provider; thus Verisign remains consistent with commitments made to its registrants. No unique or specific registration lifecycle modifications or adaptations are required to support the overall business approach for the .web gTLD.

To accommodate a range of registries, Verisign's registry implementation is capable of offering both a thin and thick Whois implementation, which is also built upon Verisign's award-winning ATLAS infrastructure.

3 COMPLIANCE WITH RELEVANT RFCs

Web.com's selected backend registry services provider's (Verisign's) registration lifecycle complies with applicable RFCs, specifically RFCs 5730 – 5734 and 3915. The system fully supports the EPP Domain Name Mapping as defined by RFC 5731, where the associated objects (e.g., hosts and contacts) are created independent of the domain name.

In addition, in accordance with RFCs 5732 and 5733, the Verisign registration system enforces the following domain name registration constraints:

- Uniqueness/Multiplicity: A second-level domain name is unique in the .web database. Two identical second-level domain names cannot simultaneously exist in .web. Further, a second-level domain name cannot be created if it conflicts with a reserved domain name.
- Point of Contact Associations: The domain name is associated with the following points of contact. Contacts are created and managed independently according to RFC 5733.
- Registrant
- Administrative contact
- Technical contact
- Billing contact
- Domain Name Associations: Each domain name is associated with:

- A maximum of 13 hosts, which are created and managed independently according to RFC 5732
- An Auth-Info, which is used to authorize certain operations on the object
- Status(es), which are used to describe the domain name's status in the registry
- A created date, updated date, and expiry date

4 DEMONSTRATES THAT TECHNICAL RESOURCES REQUIRED TO CARRY THROUGH THE PLANS FOR THIS ELEMENT ARE ALREADY ON HAND OR READILY AVAILABLE

Verisign, Web.com's selected backend registry services provider, is an experienced backend registry provider that has developed a set of proprietary resourcing models to project the number and type of personnel resources necessary to operate a TLD. Verisign routinely adjusts these staffing models to account for new tools and process innovations. These models enable Verisign to continually right-size its staff to accommodate projected demand and meet service level agreements as well as Internet security and stability requirements. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its staffing models, Verisign derived the necessary personnel levels required for the .web gTLD's initial implementation and ongoing maintenance. Verisign's pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as "Total Critical Registry Function Cash Outflows" (Template 1, Line IIb.G) within the Question 46 financial projections response.

Verisign employs more than 1,040 individuals of which more than 775 comprise its technical work force. (Current statistics are publicly available in Verisign's quarterly filings.) Drawing from this pool of on-hand and fully committed technical resources, Verisign has maintained DNS operational accuracy and stability 100 percent of the time for more than 13 years for .com, proving Verisign's ability to align personnel resource growth to the scale increases of Verisign's TLD service offerings.

Verisign projects it will use the following personnel roles, which are described in Section 5 of the response to Question 31, Technical Overview of Proposed Registry, to support the registration lifecycle:

- Application Engineers: 19
- Customer Support Personnel: 36
- Database Administrators: 8
- Database Engineers: 3
- Quality Assurance Engineers: 11
- SRS System Administrators: 13

To implement and manage the .web gTLD as described in this application, Verisign, Web.com's selected backend registry services provider, scales, as needed, the size of each technical area now supporting its portfolio of TLDs. Consistent with its resource modeling, Verisign periodically reviews the level of work to be performed and adjusts staff levels for each technical area.

When usage projections indicate a need for additional staff, Verisign's internal staffing group uses an in-place staffing process to identify qualified candidates. These candidates are then interviewed by the lead of the relevant technical area. By scaling one common team across all its TLDs instead of creating a new entity to manage only the .web gTLD, Verisign realizes significant economies of scale and ensures its TLD best practices are followed consistently. This consistent application of best practices helps ensure the security and stability of both the Internet and the .web gTLD, as Verisign holds all contributing staff members

accountable to the same procedures that guide its execution of the Internet's largest TLDs (i.e., .com and .net). Moreover, by augmenting existing teams, Verisign affords new employees the opportunity to be mentored by existing senior staff. This mentoring minimizes start-up learning curves and helps ensure that new staff members properly execute their duties.

28. Abuse Prevention and Mitigation

1. COMPREHENSIVE ABUSE POLICIES, WHICH INCLUDE CLEAR DEFINITIONS OF WHAT CONSTITUTES ABUSE IN THE TLD, AND PROCEDURES THAT WILL EFFECTIVELY MINIMIZE POTENTIAL FOR ABUSE IN THE TLD

Please note; all figures, tables and diagrams referenced in the following response can be found in the attachment titled "Attachment dot web Q28."

Web.com Group, Inc ("Web.com") has been in the business of helping our near 3 million customers establish their online presences for over 15 years. As such, we have a rich history of understanding the importance of abuse prevention and mitigation as a core objective. We are active participants in a variety of industry and government efforts to prevent domain name abuse and are constantly updating our operating procedures to ensure our customers are as protected from this type of activity as they can be.

The .web gTLD will help customers launch and leverage their presence on the World Wide Web. As a leading global provider of online marketing services to small businesses, Web.com recognizes that finding a relevant and memorable domain name can be challenging. Since many keywords and descriptive phrases associated with existing gTLDs have already been registered, it is difficult to pinpoint a domain name which contains a limited number of characters. Consequently, prospective registrants are often unable to secure a unique name. Regularly, in the .com space amongst others, this is because of exploitative or abusive registrations. In the forthcoming .web namespace, we will endeavor to the utmost of our ability to prevent this pattern from repeating.

One of the most important reasons our customers choose Web.com is because of our reputation for great products and exceptional customer service. The .web gTLD is a natural extension of our business. It is a place where we can help customers be successful on the web. At Web.com, we believe that a website is only as good as the services and support behind it. With the .web gTLD, we have the chance to bring this same commitment to service and support to a gTLD. For companies and consumers who stake their reputation on a .web domain name, having a gTLD that is trusted and secure is critical.

Unfortunately, some of the current gTLDs are not operated in a manner that instills this level of confidence. Web.com hopes to make the .web gTLD different. In launching the .web gTLD we have put together a tapestry of efforts that seek to prevent and successfully mitigate domain name abuse, making the web a more accessible and friendly place for small and medium sized businesses as well as consumers. These efforts include:

- An acceptable use policy that clearly defines what is considered abuse and what registrants may and may not do with their domain names
- A seasoned abuse mitigation team that has years of experience in dealing with these issues
- Technological Measures for Removal of Orphan Glue Records

- Efforts and measures to promote accurate and complete Whois
- Requirements for .web accredited registrars to enact measures in support of these efforts

The fight against abusive behavior is not static and Web.com is committed to ensuring that our efforts are constantly evolving to meet the ever changing landscape of threats.

1.1 .web Abuse Prevention and Mitigation Implementation Plan

Preventing domain name abuse in the .web gTLD is of critical importance to registrants, consumers and Web.com. To demonstrate our commitment to make the .web gTLD more resistant to abusive behavior than just about any other gTLD that currently exists, Web.com has explored various mechanisms to help prevent abusive registrations. We were particularly impressed with the set of 31 Proposed Security, Stability and Resiliency Requirements for Financial TLDs that were developed by the Security Standards Working Group (SSWG) under the guidance of the financial services industry. Following their recommendation that all potential applicants look at these standards for their own TLDs, Web.com has completed a thorough review to determine which might enhance the .web gTLD experience. While not all of the proposed standards are applicable to the .web gTLD, we will endeavor to implement several of them to aid in our efforts to prevent and mitigate abusive registrations.

Web.com has developed and will look to deploy a customized approach that seeks to minimize the potential for abusive registrations and mitigate them as soon as possible should they occur. Registrants, Registrars and the Registry will all play a role in this endeavor. Having all three levels of the .web gTLD ecosystem participate in these measures will help ensure a comprehensive approach to these critical objectives. Web.com has designed the following procedure to prevent and mitigate abusive registrations:

Acceptable Use Policy - Web.com has developed a draft Acceptable Use Policy (AUP) which can be found in "Attachment dot web Q28." This AUP clearly defines what is considered abuse and what type of behavior is expressly prohibited in conjunction with the use of a .web domain name. Web.com will require, through the Registry Registrar Agreement (RRA), that this AUP be included in the registration agreement used by all .web gTLD accredited registrars. This registration agreement must be accepted by a registrant prior to them being able to register a name in the .web gTLD.

Annual Certification of Registrar compliance with Registry-Registrar Agreement. The self-certification program consists, in part, of evaluations applied equally to all operational .web gTLD accredited registrars and conducted from time to time throughout the year. Process steps are as follows:

- Web.com sends an email notification to the ICANN primary registrar contact, requesting that the contact go to a designated URL, log in with his⁄her Web ID and password, and complete and submit the online form. The contact must submit the form within 15 business days of receipt of the notification.
- When the form is submitted, Web.com sends the registrar an automated email confirming that the form was successfully submitted.
- Web.com reviews the submitted form to ensure the certifications are compliant.
- Web.com sends the registrar an email notification if the registrar is found to be compliant in all areas.
- If a review of the response indicates that the registrar is out of compliance or if Web.com has follow-up questions, the registrar has 10 days to

respond to the inquiry.
• If the registrar does not respond within 15 business days of receiving the original notification, or if it does not respond to the request for additional information, Web.com sends the registrar a Breach Notice and gives the registrar 30 days to cure the breach.
• If the registrar does not cure the breach, Web.com terminates the Registry-Registrar Agreement (RRA).

The .web gTLD registry will provide and maintain a primary point of contact for abuse complaints. We will display the contact information for the Abuse Mitigation Team, which serves as the primary point of contact for reporting abuse within the .web gTLD, on the .web gTLD website.

Each .web gTLD accredited registrar will provide and maintain a primary point of contact for abuse complaints. The registrar must provide and maintain valid primary contact information for reporting abuse in the .web gTLD on their website. This will be required as part of the .web gTLD RRA.

Web.com will explicitly define for Registrars what constitutes abusive behavior including but not limited to, malicious, negligent, and reckless behavior. The definition of abusive behavior will be contained in the AUP that Registrars will be required to include as part of the Registration Agreement. This will be required as part of the .web gTLD RRA.

Registrar must notify Registry Operator immediately regarding any investigation or compliance action including the nature of the investigation or compliance action by ICANN or any outside party (e.g., law enforcement, etc.), along with the TLD impacted. This will be required as part of the .web gTLD RRA.

Development of an Abuse Prevention and Mitigation Working Group. To give the Web.com team alternate perspectives about handling incidents of abuse and ways to mitigate them, we will form an Abuse Prevention and Mitigation Working Group. This team will not only be comprised of a cross functional group of Web.com professionals but also look to involve representatives from law enforcement, our customer base and outside experts. The group would meet regularly to discuss the latest trends in domain name abuse and the most effective way to prevent and remedy them.

1.2 Policies for Handling Complaints Regarding Abuse

Web.com will staff a Single Point of Contact (SPoC) Abuse team to address abuse and malicious use requests. The role of the abuse team is to monitor registry services and review complaints entered online by end users, customers, and/or Law Enforcement. The complaints will be managed in accordance with the applicable Acceptable Use Policy (AUP) and Terms of Service (TOS) which shall allow the Abuse team discretion to suspend a domain instantly or send the complaint through the appropriate escalation channel for complaint resolution.

Complaints shall be received via email at Contact Information Redacted as will be prominently provided on the .web website (http://registry.web). Registrar access to .web's Abuse Team will be provided via a hotline number, email address and additional personnel for filing direct requests. Complaints may be submitted 24x7 and each request path requires the submitter to provide personal contact information. .web will acknowledge the complaint within one (1) business day and will provide the requestor acceptance and/or resolution within three (3) business days depending on severity and complexity of the complaint.

Web.com views domain name abuse as a serious matter that produces direct harm to

Internet users and .web customers. As such, .web will handle each abuse complaint as a direct threat and intends to resolve each validated complaint with a sense of urgency. Our Abuse Policies recognize many forms of abuse related to the registrations and use of domain names. Abuses and their respective mitigation strategy listed here is not an exhaustive list, but is meant to highlight general process and procedure by which .web will manage the most common forms of abuse. The .web Abuse Team collaborates and participates with industry experts and forums to understand the latest forms of abuse in an attempt to protect customers of our services and Internet users where possible.

DRAFT ABUSE REMEDY PROCESS

Listed here is the proposed process for dealing with the major forms of domain abuse:

1. Customer or end user submits abuse complaint to Contact Information Redacted
2. Abuse Coordinator receives request and acknowledges receipt of complaint;
3. Abuse Coordinator analyzes request to determine the abuse type to be addressed and references the .web knowledgebase for detailed procedures;
4. Abuse Coordinator assigns a severity rating based on complaint type;
5. Abuse Coordinator resolves the complaint based on the following decision tree:
   a. Is the request a court ordered seizure and transfer?
      i. Yes – See section 28.1.1
      ii. No - next step
   b. Does the request reflect a potential DDOS Attack?
      i. Yes – See section 28.1.2
      ii. No - next step
   c. Is the request a phishing complaint?
      i. Yes – See section 28.1.3
      ii. No - next step
   d. Is the complaint a notice of a trademark infringement?
      i. Yes – See section 28.1.4
      ii. No - next step
   e. Is the request a possible hijacking case or a transfer dispute?
      i. Yes – See section 28.1.5
      ii. No - next step
   f. Is the request an email service abuse?
      i. Yes – See section 28.1.6
      ii. No - next step
   g. Does the complaint refer to abusive or offensive content hosted on a .web domain?
      i. Yes – See section 28.1.7
      ii. No - next step
   h. For all other abuses not defined:
      i. Escalate request to Abuse Manager for guidance and resolution

28.1.1 Court Ordered Seizure and Transfer

Definition: Law enforcement via a court of legal jurisdiction orders that domain be seized due to illegal activity of applicable law.

Service Level: One (1) business day

Procedure:

• Abuse Coordinator contacts the legal jurisdiction to request signed copies of the court order;

- Upon receipt of court order, Abuse Coordinator confirms request with the Abuse Situation Manager;
- If the request is determined to be valid, Abuse Coordinator will submit a request to the Registry Support team to have the domain pushed to the requested registrar as directed by the applicable judicial entity;
- If the request is determined to be invalid or documents submitted are in question, the Abuse Coordinator will contact the legal jurisdiction requesting the appropriate documentation or to provide reasoning as to why the request cannot be fulfilled.

28.1.2 DOS or DDOS Attack

Definition: A denial-of-service attack (DoS attack) or distributed denial-of-service attack (DDoS attack) is an attempt to make a computer or network resource unavailable to its intended users.

Service Level: One (1) business day

Procedure:
- Abuse Coordinator will confirm the DDOS attack with the Abuse Manager;
- If the complaint is confirmed as a DDOS attack:
  - Abuse Coordinator will escalate the request to the respective Registrar Support Team;
  - If not , Abuse Coordinator will respond to the complainant as unable to confirm and request additional information or close the complaint;
- Registrar Support team will suspend the domain registration until further notice.

28.1.3 Phishing

Definition: Phishing is a website fraudulently presenting itself as a trusted site (often a bank) in order to deceive Internet users into divulging sensitive information (e.g. online banking credentials, email passwords).

Service Level: One (1) business day

Procedure:
- Abuse Coordinator will confirm the phishing scam with the Abuse Manager;
- If the complaint is confirmed as a legitimate phishing event;
  - Abuse Coordinator will escalate the request to the Registry Support Team;
  - If not , Abuse Coordinator will respond to the complainant as unable to confirm and request additional information or close the complaint;
- Registry Support Team will immediately suspend the domain;
- Abuse Manager will investigate the Phish event and determine the intent of the domain registrant, the Registry Support team seize and⁄or delete the domain from the zone.

28.1.4 Cybersquatting ⁄ Trademark Infringement

Definition: Cybersquatting is the deliberate and bad-faith registration and use of a name that is a registered brand or mark of an unrelated entity, often for the purpose of profiting (typically, though not exclusively, through pay-per-click advertisements).

Service Level: Three (3) business days

Procedure:
- If request appears to be an initial complaint on a possible infringement,

Abuse Coordinator will direct complainant to the UDRP/WIPO process;
• If not , if the request of transfer is from a .web registrar, Abuse Coordinator will work with the Registrar to ensure the domain in question is transferred appropriately.

28.1.5 Transfer Disputes / Hijacking

Definition: Domain hijacking or domain theft is the act of changing the registration of a domain name without the permission of its original registrant.

Service Level: Three (3) business days

Procedure:
• Abuse Coordinator will confirm the OFAC request with the Abuse Manager;
• Abuse Coordinator will escalate request to and Registrar shall internal policies and procedures to investigate the transfer.

28.1.6 Email Service Abuse

Definition: An illegitimate use of email systems to distribute abusive content or in a manner that violates the Acceptable Use Policy. Examples of this abuse are Un-Solicited Commercial Email (UCE/SPAM).

Service Level: Three (3) business days

Procedure:
• Abuse Coordinator will validate the complaint for UCE/SPAM elements and collaborate with the Complainant to acquire the examples of the offensive material;
• If Abuse Coordinator deems the offensive material to violate Acceptable Use Policy and is deemed to be offensive material, Abuse Coordinator will escalate the request to the Registry Support team for suspension;
• Registry Support team will immediately suspend the domain;
• If a .web customer is found to be unknowingly sending UCE, Customer shall be allotted the opportunity to correct the situation and assurances must be received by offender to ensure against future occurrences.

28.1.7 Web Hosting Abuse

Definition: Content or material hosted on a website that that is deemed to be offensive or against the .web Acceptable Use Policy. Material that is deemed offensive by registrar/host shall result in a Warning, then Suspension if material is not removed and possible seizure or termination of services.

Service Level: Three (3) business days

Procedure:
• Abuse Coordinator will validate the information in the complaint to confirm that the hosting package is being used in a way that is not compliant with the .web Acceptable Use Policy. Some examples may include the following:
  o Documents, videos, pictures, music files, software etc. is not associated with the function or serving up of website;
  o Content being stored is not accessible from the Website;
  o An open FTP server;
  o Storage being used as a hard drive/backup; or
  o Space Manager usage exceeds 2GB of storage on the UNIX hosting platform only.
• If one or more of the above is confirmed and validated, the Abuse

Coordinator or Technical Services will notify the Customer that they are in violation of the .web AUP and/or Terms of Service;
- An email will be sent immediately to the Registrant, Admin and Technical contact on file to advise of the violation. The email should instruct the Customer to take the appropriate action within 24 hours to remove the offending content or they may be subjected to a suspension of services;
- During Business Hours, the Abuse Coordinator will contact the Customer via phone in addition to sending the email to inform the Registrant, Admin or Technical contacts of the offending violation. The Technical Services agents will follow the same process for After Hours handling;
- If no response is received within 24 hours, a second phone and email attempt will be made to reach the Registrant, Admin and Technical contact;
- If the offending party does not respond by the end of the second business day, action will be taken to remove the offending content that is causing server degradation;
- Technical Support team will suspend the Hosting services;
- The Registry Support team will place the domain on Registrar hold to de-resolve the name;
- If the offending party responds and agrees to remove the offending content within the 24 hour time frame, the Abuse Coordinator or Technical Services agent must confirm the material has been removed, and note the appropriate remediation within the CRM system;
- If the offending party responds and agrees to remove the offending content after the service suspension, the Registry Support team may remove the suspension and allow customer to remove the content. Support will confirm the offending material has been removed, and note the appropriate CRM systems;
- If the offending party requests that .web remove the offending material, the Abuse Coordinator agent must call the Customer and obtain confirmation to remove the content on behalf of the Customer. The Abuse Coordinator will also obtain written confirmation from the Customer via the Registrant, Administrative or Technical Contacts that are listed. The confirmation should be noted in the appropriate CRM system;
- If there is no response from the offending party after 7 Days, the Abuse Coordinator will submit a request to delete the offending content from the servers to the Abuse Manager for approval to delete the content;
- Prior to deleting the content, an email will be sent to the appropriate internal Legal point of contact to advise of the issue and obtain approval to delete the content.

1.3 Proposed Measures for Removal of Orphan Glue Records

Although orphan glue records often support correct and ordinary operation of the Domain Name System (DNS), registry operators will be required to remove orphan glue records (as defined at http://www.icann.org/en/committees/security/sac048.pdf) when provided with evidence in written form that such records are present in connection with malicious conduct. Web.com's selected backend registry services provider's registration system is specifically designed to not allow orphan glue records. Registrars are required to delete/move all dependent DNS records before they are allowed to delete the parent domain.

To prevent orphan glue records, Verisign, Web.com's chosen backend registry services provider, performs the following checks before removing a domain or name server:

Checks during domain delete:
- Parent domain delete is not allowed if any other domain in the zone refers to the child name server.
- If the parent domain is the only domain using the child name server, then

both the domain and the glue record are removed from the zone.

Check during explicit name server delete:
• Verisign confirms that the current name server is not referenced by any domain name (in-zone) before deleting the name server.

Zone-file impact:
• If the parent domain references the child name server AND if other domains in the zone also reference it AND if the parent domain name is assigned a serverHold status, then the parent domain goes out of the zone but the name server glue record does not.
• If no domains reference a name server, then the zone file removes the glue record.

1.4 Resourcing Plans

Details related to resourcing plans for the initial implementation and ongoing maintenance of Web.com's abuse plan are provided in Section 2 of this response.

1.5 Measures to Promote Whois Accuracy

Web.com supports efforts to improve the accuracy and completeness of Whois records. To that end, we will seek to implement a series of measures that require registrars and registrants to help us in this pursuit. This includes a Whois reminder process at the registry level, regular scans of the Whois data to search for blank or incomplete data and economic incentives for registrars who achieve 100% complete and accurate Whois data for those names they have registered.

Regular Monitoring of Registration Data for Accuracy and Completeness

Whois data reminder process. Verisign regularly reminds registrars of their obligation to comply with ICANN's Whois Data Reminder Policy, which was adopted by ICANN as a consensus policy on 27 March 2003 (http://www.icann.org/en/registrars/wdrp.htm). Verisign sends a notice to all registrars once a year reminding them of their obligation to be diligent in validating the Whois information provided during the registration process, to investigate claims of fraudulent Whois information, and to cancel domain name registrations for which Whois information is determined to be invalid.

Bi-Annual Whois Verification by Registrars. As will be required in the Registry-Registrar Agreement, all .web accredited registrars will be required to verify Whois data for each record they have registered in the TLD twice a year. Verification can take place via email, phone or any other methods as long as there is a proactive action by the registrant to confirm the accuracy of the Whois data associated with the domain name. Web.com will randomly audit Whois records to ensure compliance and accuracy. As part of the .web gTLD Abuse reporting system, users can report missing or incomplete Whois data via the registry website.

Quarterly Scan of the Zone file for incomplete Registrant Data. On a quarterly basis, Web.com will do a scan of all Whois records in the .web gTLD to find any blank fields or missing registration data. Upon completion of the scan, registrars will be sent a report detailing which domain names are missing data. As part of their responsibilities in the RAA to work towards 100% accuracy of Whois data, registrars must then alert registrants that there is data missing in their Whois record and remind them of their responsibility contained in the registration agreement that they must comply with ICANN requirements for complete and accurate Whois data.

Economic incentives for Registrars to achieve 100% Whois Accuracy

Web.com will offer Market Development Funds (MDF) to those registrars who can demonstrate via a third party audit that the .web gTLD names registered with them have 100% complete and accurate Whois data.

1.6 Malicious or Abusive Behavior Definitions, Metrics, and Service Level Requirements for Resolution

Web.com defines Malicious and Abusive behavior based on the following but not limited definitions:

Phishing is a criminal activity employing tactics to defraud and defame Internet users via sensitive information with the intent to steal or expose credentials, money or identities. A phishing attack begins with a spoofed email posing as a trustworthy electronic correspondence that contains hijacked brand names i.e. (financial institutions, credit card companies, e-commerce sites). The language of a phishing email is misleading and persuasive by generating either fear and/or excitement to ultimately lure the recipient to a fraudulent website. It is paramount for both the phishing email and website to appear credible in order for the attack to influence the recipient. As with the spoofed email, phishers aim to make the associated phishing website appear credible. The legitimate target website is mirrored to make the fraudulent site look professionally designed. Fake third-party security endorsements, spoofed address bars, and spoofed padlock icons falsely lend credibility to fraudulent sites as well. The persuasive inflammatory language of the email combined with a legitimate looking website is used to convince recipients to disclose sensitive information such as passwords, usernames, credit card numbers, social security numbers, account numbers, and mother's maiden name.

Malware is malicious software that was intentionally developed to infiltrate or damage a computer, mobile device, software and/or operating infrastructure or website without the consent of the owner or authorized party. This includes, amongst others, Viruses, Trojan horses, and worms.

Domain Name or Domain Theft is the act of changing the registration of a domain name without the permission of its original registrant.
Section 1.2 outlines the Web.com Policies and Procedures for Handling Complaints Regarding Abuse as defined above.

As pertains to Web.com performance metrics and service level requirements for resolution, we adhere to a 12 hour timeframe to address and potentially rectify the issue as it pertains to all forms of abuse and fraud. Once a notification is received via email, call center or fax, the Web.com Customer Service centers immediately create a support ticket in order to monitor and track the issue through resolution. If notifications are received during normal business hours (8am – 11pm EST. (Monday – Friday) and 8am – 6pm EST (Saturday & Sunday) the majority of issues are resolved in less than a 4 hour period.

1.7 Controls to Ensure Proper Access to Domain Functions

To ensure proper access to domain functions, Web.com incorporates Verisign's Registry-Registrar Two-Factor Authentication Service into its full-service registry operations. The service is designed to improve domain name security and assist registrars in protecting the accounts they manage by providing another level of assurance that only authorized personnel can communicate with the registry. As part of the service, dynamic one-time passwords (OTPs) augment the user names and

passwords currently used to process update, transfer, and/or deletion requests. These one-time passwords enable transaction processing to be based on requests that are validated both by "what users know" (i.e., their user name and password) and "what users have" (i.e., a two-factor authentication credential with a one-time-password).

Registrars can use the one-time-password when communicating directly with Verisign's Customer Service department as well as when using the registrar portal to make manual updates, transfers, and/or deletion transactions. The Two-Factor Authentication Service is an optional service offered to registrars that execute the Registry-Registrar Two-Factor Authentication Service Agreement. As shown in Figure 28-1, the registrars' authorized contacts use the OTP to enable strong authentication when they contact the registry. There is no charge for the Registry-Registrar Two-Factor Authentication Service. It is only enabled for registrars that wish to take advantage of the added security provided by the service.

2. TECHNICAL PLAN THAT IS ADEQUATELY RESOURCED IN THE PLANNED COSTS DETAILED IN THE FINANCIAL SECTION

Resource Planning

Web.com is a leading provider of Internet services for small to medium-sized businesses (SMBs). Web.com is the parent company of two global domain name registrars and further meets the Internet needs of SMBs throughout their lifecycle with affordable value added services that including domain name registration, website design, search engine optimization, search engine marketing, social media and mobile products, local sales leads, eCommerce solutions and call center services. Headquartered in Jacksonville, FL, USA, Web.com is NASDAQ traded company serving nearly three million customers with more than 1,700 global employees in fourteen locations in North America, South America and the United Kingdom.

Our business is helping people establish, maintain, promote, and optimize their web presence. Web.com intentionally chose Verisign as our registry services provider because of their unsurpassed track record in operating some of the world's most complex and critical top level domains. Verisign's support for the .web gTLD will help ensure its success

The .web gTLD will be fully supported by a cross function team of Web.com professionals. Numbers and types of employees will vary for each function but Web.com projects it will use the following personnel to support the resource planning requirements:

- Quality Assurance Engineer: 0.5 FTE
- System Administrator: 1 FTE
- Database Administrator: 0.5 FTE
- Technical Project Manager: 0.5 FTE
- Marketing Director: 1 FTE
- Sales Manager: 1 FTE
- Legal Counsel: 1 FTE
- Finance/Accounting: 1 FTE
- Customer Service: 2 FTEs

Resource Planning Specific to Backend Registry Activities

Verisign, Web.com's selected backend registry services provider, is an experienced backend registry provider that has developed a set of proprietary resourcing models to project the number and type of personnel resources necessary to operate a TLD. Verisign routinely adjusts these staffing models to account for new tools and

process innovations. These models enable Verisign to continually right-size its staff to accommodate projected demand and meet service level agreements as well as Internet security and stability requirements. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its staffing models, Verisign derived the necessary personnel levels required for this gTLD's initial implementation and ongoing maintenance. Verisign's pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as "Total Critical Registry Function Cash Outflows" (Template 1, Line IIb.G) within the Question 46 financial projections response.

Verisign employs more than 1,040 individuals of which more than 775 comprise its technical work force. (Current statistics are publicly available in Verisign's quarterly filings.) Drawing from this pool of on-hand and fully committed technical resources, Verisign has maintained DNS operational accuracy and stability 100 percent of the time for more than 13 years for .com, proving Verisign's ability to align personnel resource growth to the scale increases of Verisign's TLD service offerings.

Verisign projects it will use the following personnel roles, which are described in Section 5 of the response to Question 31, Technical Overview of Proposed Registry, to support abuse prevention and mitigation:

- Application Engineers: 19
- Business Continuity Personnel: 3
- Customer Affairs Organization: 9
- Customer Support Personnel: 36
- Information Security Engineers: 11
- Network Administrators: 11
- Network Architects: 4
- Network Operations Center (NOC) Engineers: 33
- Project Managers: 25
- Quality Assurance Engineers: 11
- Systems Architects: 9

To implement and manage the Web.com .web gTLD as described in this application, Verisign, Web.com's selected backend registry services provider, scales, as needed, the size of each technical area now supporting its portfolio of TLDs. Consistent with its resource modeling, Verisign periodically reviews the level of work to be performed and adjusts staff levels for each technical area.

When usage projections indicate a need for additional staff, Verisign's internal staffing group uses an in-place staffing process to identify qualified candidates. These candidates are then interviewed by the lead of the relevant technical area. By scaling one common team across all its TLDs instead of creating a new entity to manage only this proposed gTLD, Verisign realizes significant economies of scale and ensures its TLD best practices are followed consistently. This consistent application of best practices helps ensure the security and stability of both the Internet and this proposed gTLD, as Verisign holds all contributing staff members accountable to the same procedures that guide its execution of the Internet's largest TLDs (i.e., .com and .net). Moreover, by augmenting existing teams, Verisign affords new employees the opportunity to be mentored by existing senior staff. This mentoring minimizes start-up learning curves and helps ensure that new staff members properly execute their duties.

3. POLICIES AND PROCEDURES IDENTIFY AND ADDRESS THE ABUSIVE USE OF REGISTERED NAMES AT STARTUP AND ON AN ONGOING BASIS

3.1 Start-Up Anti-Abuse Policies and Procedures

Verisign, Web.com's selected backend registry services provider, provides the following domain name abuse prevention services, which Web.com incorporates into its full-service registry operations. These services are available at the time of domain name registration.

Registry Lock. The Registry Lock Service allows registrars to offer server-level protection for their registrants' domain names. A registry lock can be applied during the initial standup of the domain name or at any time that the registry is operational.

Specific Extensible Provisioning Protocol (EPP) status codes are set on the domain name to prevent malicious or inadvertent modifications, deletions, and transfers. Typically, these 'server' level status codes can only be updated by the registry. The registrar only has 'client' level codes and cannot alter 'server' level status codes. The registrant must provide a pass phrase to the registry before any updates are made to the domain name. However, with Registry Lock, provided via Verisign, Web.com's subcontractor, registrars can also take advantage of server status codes.

The following EPP server status codes are applicable for domain names: (i) serverUpdateProhibited, (ii) serverDeleteProhibited, and (iii) serverTransferProhibited. These statuses may be applied individually or in combination.

The EPP also enables setting host (i.e., name server) status codes to prevent deleting or renaming a host or modifying its IP addresses. Setting host status codes at the registry reduces the risk of inadvertent disruption of DNS resolution for domain names.

The Registry Lock Service is used in conjunction with a registrar's proprietary security measures to bring a greater level of security to registrants' domain names and help mitigate potential for unintended deletions, transfers, and/or updates.

Two components comprise the Registry Lock Service:

- Web.com and/or its registrars provides Verisign, the provider of backend registry services, with a list of the domain names to be placed on the server status codes. During the term of the service agreement, the registrar can add domain names to be placed on the server status codes and/or remove domain names currently placed on the server status codes. Verisign then manually authenticates that the registrar submitting the list of domain names is the registrar of record for such domain names.
- If Web.com and/or its registrars requires changes (including updates, deletes, and transfers) to a domain name placed on a server status code, Verisign follows a secure, authenticated process to perform the change. This process includes a request from a Web.com-authorized representative for Verisign to remove the specific registry status code, validation of the authorized individual by Verisign, removal of the specified server status code, registrar completion of the desired change, and a request from the Web.com-authorized individual to reinstate the server status code on the domain name. This process is designed to complement automated transaction processing through the Shared Registration System (SRS) by using independent authentication by trusted registry experts.

Web.com intends to charge registrars based on the market value of the Registry Lock Service. A tiered pricing model is expected, with each tier having an annual fee based on per domain name/host and the number of domain names and hosts to be placed on Registry Lock server status code(s).

3.2 Ongoing Anti-Abuse Policies and Procedures

3.2.1 Policies and Procedures That Identify Malicious or Abusive Behavior

Verisign, Web.com's selected backend registry services provider, provides the following service to Web.com for incorporation into its full-service registry operations.

Malware scanning service. Registrants are often unknowing victims of malware exploits. Verisign has developed proprietary code to help identify malware in the zones it manages, which in turn helps registrars by identifying malicious code hidden in their domain names.

Verisign's malware scanning service helps prevent websites from infecting other websites by scanning web pages for embedded malicious content that will infect visitors' websites. Verisign's malware scanning technology uses a combination of in-depth malware behavioral analysis, anti-virus results, detailed malware patterns, and network analysis to discover known exploits for the particular scanned zone. If malware is detected, the service sends the registrar a report that contains the number of malicious domains found and details about malicious content within its TLD zones. Reports with remediation instructions are provided to help registrars and registrants eliminate the identified malware from the registrant's website.

3.2.2 Policies and Procedures That Address the Abusive Use of Registered Names

Suspension processes.

In the case of domain name abuse, Web.com will determine whether to take down the subject domain name. Verisign, Web.com's selected backend registry services provider, will follow the following auditable processes to comply with the suspension request.

Verisign Suspension Notification. Web.com submits the suspension request to Verisign for processing, documented by:

- Threat domain name
- Registry incident number
- Incident narrative, threat analytics, screen shots to depict abuse, and/or other evidence
- Threat classification
- Threat urgency description
- Recommended timeframe for suspension/takedown
- Technical details (e.g., Whois records, IP addresses, hash values, anti-virus detection results/nomenclature, name servers, domain name statuses that are relevant to the suspension)
- Incident response, including surge capacity

Verisign Notification Verification. When Verisign receives a suspension request from Web.com, it performs the following verification procedures:

- Validate that all the required data appears in the notification.
- Validate that the request for suspension is for a registered domain name.
- Return a case number for tracking purposes.

Suspension Rejection. If required data is missing from the suspension request, or the domain name is not registered, the request will be rejected and returned to Web.com with the following information:

- Threat domain name
- Registry incident number
- Verisign case number
- Error reason

Registrar Notification. Once Verisign has performed the domain name suspension, and upon Web.com request, Verisign notifies the registrar of the suspension. Registrar notification includes the following information:

- Threat domain name
- Registry incident number
- Verisign case number
- Classification of type of domain name abuse
- Evidence of abuse
- Anti-abuse contact name and number
- Suspension status
- Date/time of domain name suspension

Registrant Notification. Once Verisign has performed the domain name suspension, and upon Web.com request, Verisign notifies the registrant of the suspension. Registrant notification includes the following information:

- Threat domain name
- Registry incident number
- Verisign case number
- Classification of type of domain name abuse
- Evidence of abuse
- Registrar anti-abuse contact name and number

Upon Web.com request, Verisign can provide a process for registrants to protest the suspension.
Domain Suspension. Verisign places the domain to be suspended on the following statuses:

- serverUpdateProhibited
- serverDeleteProhibited
- serverTransferProhibited
- serverHold

Suspension Acknowledgement. Verisign notifies Web.com that the suspension has been completed. Acknowledgement of the suspension includes the following information:

- Threat domain name
- Registry incident number
- Verisign case number
- Case number
- Domain name
- Web.com abuse contact name and number, or registrar abuse contact name and number
- Suspension status

4. WHEN EXECUTED IN ACCORDANCE WITH THE REGISTRY AGREEMENT, PLANS WILL RESULT IN COMPLIANCE WITH CONTRACTUAL REQUIREMENTS

Web.com is fully committed to improving the completeness and accuracy of Whois data and to preventing and mitigating domain name abuse in the .web gTLD. We strongly believe the efforts that we have outlined will go a long way in this critical area and most certainly meet the requirements as outlined by ICANN.

The fight against domain names abuse is not a static fight. The tactics used by malicious parties are constantly evolving and web.com is committed to evolving our systems to address these ongoing threats not because ICANN says we have to but simply because it is what our customers have come to expect from Web.com.

The .web gTLD is an extension of our current business. At Web.com, we believe that a website is only as good as the services and support behind it. With the .web gTLD, we have the chance to bring this same commitment to service and support to a gTLD. For companies and consumers who stake their reputation on a .web domain name, having a gTLD that is trusted and secure is critical.

5. TECHNICAL PLAN SCOPE/SCALE THAT IS CONSISTENT WITH THE OVERALL BUSINESS APPROACH AND PLANNED SIZE OF THE REGISTRY

Scope/Scale Consistency

As one of the first domain registrars, Web.com and its subsidiaries have seen the Internet grow exponentially across three decades. Web.com has grown to a point where it now serves approximately 3 million customers, comprising over 8 million domain names under management. As our customer base grew and the number of domains we managed with it, we expanded our operations to meet customer needs. We anticipate doing exactly the same as .web proliferates. Our systems are highly developed and continually tested and audited, and will scale as we scale. The commitments we will seek to make to prevent domain name abuse will expand to meet the anticipated growth of the .web gTLD. We invest tens of millions each year in upgrading infrastructure and developing new business processes to meet the growth and needs of our customer base, and consider doing so of paramount importance.

After 15 years of developing in this way, Web.com is a leading provider of Internet services for small- to medium-sized businesses (SMBs). Web.com is the parent company of two global domain name registrars, and further meets the Internet needs of consumers and businesses throughout their lifecycle with affordable value-added services. Those services include domain name registration; website design; search engine optimization; search engine marketing; social media and mobile products; local sales leads; eCommerce solutions; and call center services.

Headquartered in Jacksonville, FL, USA, Web.com is a publicly traded company (Nasdaq: WWWW), with more than 1,700 global employees in fourteen locations in North America, South America and the United Kingdom. Web.com brings a wealth of experience in providing a seamless process for customers from the first point of registration through the growth of their Internet properties.

Indeed, following our acquisition of Register.com in July 2010 and the subsequent acquisition of Network Solutions, LLC, in October 2011, we have become one of the largest domain name registrars in the world. Web.com offers a variety of gTLDs and a full suite of domain name services, including registration, management, renewal, expiration protection and privacy services.

It is clear, therefore, that managing the potentially enormous growth of the .web namespace will be a challenge, but a challenge to which we are more than equal.

Scope/Scale Consistency Specific to Backend Registry Activities

Verisign, Web.com’s selected backend registry services provider, is an experienced backend registry provider that has developed and uses proprietary system scaling models to guide the growth of its TLD supporting infrastructure. These models direct Verisign’s infrastructure scaling to include, but not be limited to, server

capacity, data storage volume, and network throughput that are aligned to projected demand and usage patterns. Verisign periodically updates these models to account for the adoption of more capable and cost-effective technologies.

Verisign’s scaling models are proven predictors of needed capacity and related cost. As such, they provide the means to link the projected infrastructure needs of the .web gTLD with necessary implementation and sustainment cost. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its scaling models, Verisign derived the necessary infrastructure required to implement and sustain this gTLD. Verisign’s pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as “Other Operating Cost” (Template 1, Line I.L) within the Question 46 financial projections response.

29. Rights Protection Mechanisms

1 MECHANISMS DESIGNED TO PREVENT ABUSIVE REGISTRATIONS

Web.com Group, Inc (“Web.com”) has been in the business of helping our nearly 3 million customers establish their online presence for over 15 years. Through our recent acquisition of Network Solutions, the oldest ICANN accredited registrar, with over 25 years of experience, we have a long history of understanding the importance of rights protection. This is a core objective not only from our own personal perspective as the holder of various trademarks including web.com®, but also on behalf of our customers who have their own trademarks.

Web.com will implement and adhere to any rights protection mechanisms (RPMs) that may be mandated by ICANN, including each mandatory RPM set forth in the Registry Agreement, specifically Specification 7. Web.com acknowledges that, at a minimum, ICANN requires a Sunrise period, a Trademark Claims period, and interaction with the Trademark Clearinghouse with respect to the registration of domain names for the .web gTLD. It should be noted that because ICANN, as of the time of this application submission, has not issued final guidance with respect to the Trademark Clearinghouse, Web.com cannot fully detail the specific implementation of the Trademark Clearinghouse within this application. Web.com will adhere to all processes and procedures to comply with ICANN guidance once this guidance is finalized.

We understand the importance of Trademark holders to manage and protect their brands. In order to demonstrate our commitment to ensure the .web gTLD will accommodate the Intellectual Property community, Web.com has analyzed various additional mechanisms to help prevent abusive registrations. We were particularly impressed with the set of 31 Proposed Security, Stability and Resiliency Requirements for Financial gTLDs that were developed by the Security Standards Working Group (SSWG) under the guidance of the financial services industry. Following their recommendation that all potential applicants look at these standards for their own gTLDs, Web.com completed a thorough review to determine which standards may enhance the .web gTLD experience. While not all of the proposed standards are applicable to the .web gTLD, we will strive to implement several of these standards to ensure trademark owners will be able to take advantage of the additional protection beyond the minimums set forth by ICANN.

Web.com has developed and will deploy a customized approach that seeks to minimize the potential for abusive registrations and incorporate a proactive mitigation

process if a situation were to arise. Registrants, Registrars and the Registry will be contributing participants in this endeavor. Having all three participating entities of the .web gTLD ecosystem take part in these measures will ensure a comprehensive approach to these critical objectives.
Web.com has designed the following procedures to help protect the rights of trademark owners:

- Extended Sunrise Services
- Extended Trademark Claims Service
- Name Selection Policy
- Acceptable Use Policy
- Name Allocation Policy
- URS and UDRP
- PDDRP and RRDRP
- Rapid Takedown or Suspension
- Anti-Abuse Process
- Malware Code Identification
- DNSSEC Signing Service
- Biannual WHOIS Verification
- Participation in Anti-abuse Community Activities

As described in this response, Web.com will implement a Sunrise period and Trademark Claims service with respect to the registration of domain names within the .web gTLD. Certain aspects of the Sunrise period and/or Trademark Claims service may be administered on behalf of Web.com by Web.com approved registrars or by authorized subcontractors of Web.com, such as its selected backend registry services provider, Verisign.

Sunrise Periods. As it pertains to the launch of the .web gTLD, Web.com is currently planning on holding two different sunrise periods. Sunrise A will enable those participants that wish to register trademarks in the .web gTLD. A second sunrise period, Sunrise B, will be held for those who wish to reserve a domain name already registered in another gTLD. A more detailed explanation of each Sunrise Period follows.

Sunrise A

As set forth in the ICANN Applicant Guidebook, the Sunrise service pre-registration procedure for domain names must last for at least 30 days prior to the launch of the general registration of domain names in the gTLD.

To ensure that trademark owners have ample time to participate in the midst of the possible launch of several other gTLDs, Web.com is planning on extending the sunrise to 60 days, 30 days longer than the ICANN mandated minimum.

During the Sunrise period, holders of marks that have been previously validated by the Trademark Clearinghouse receive notice of domain names that are an identical match (as defined in the ICANN Applicant Guidebook) to their mark(s). Such notice is in accordance with ICANN’s requirements and is provided by Web.com either directly or through Web.com-approved registrars.

Web.com requires all registrants, either directly or through Web.com-approved registrars, who are in good-standing with ICANN, to i) affirm that said registrants meet the Sunrise Eligibility Requirements (SER) and ii) submit to the Sunrise Dispute Resolution Policy (SDRP) consistent with Section 6 of the Trademark Clearinghouse model. At a minimum Web.com recognizes and honors all word marks for which a proof of use was submitted and validated by the Trademark Clearinghouse.

During the Sunrise period, Web.com and/or Web.com-approved registrars, as applicable, are responsible for determining whether each domain name is eligible to be registered (including in accordance with the SERs).

Sunrise B

During a potential Sunrise B, registrants of domain names in other gTLDs may be able to file an application through a .web gTLD accredited registrar to register their existing domain name in the .web gTLD. Proof of registration of the domain name will be verified at the time of application. This sunrise period will last 30 days and at the end of the registration period, if there are no identical matches to any other applied for strings, the domain name will be registered to the appropriate applicant. If there are competing applications for the same domain name, qualified applicants will proceed to a closed auction to resolve the conflict.

Trademark Claims Service. As provided by the Trademark Clearinghouse model set forth in the January 11, 2012 version of the ICANN Applicant Guidebook, all new gTLDs will be required to provide a Trademark Claims service for a minimum of 60 days after the launch of the general registration of domain names in the gTLD (Trademark Claims period).

Similar to our voluntarily extending the sunrise period to accommodate the needs of trademark owners, Web.com is planning on extending the trademark claims services to 120 days, double the ICANN mandated minimum. As the processes for how the trademark clearinghouse, including technical and financial specifics of how the program will work, are not finalized as of the filing of this application, Web.com reserves the right to revisit the length of the Trademark Claims Service.

During the Trademark Claims period, in accordance with ICANN's requirements, Web.com or the Web.com-approved registrar will send a Trademark Claims Notice to any prospective registrant of a domain name that is an identical match (as defined in the ICANN Applicant Guidebook) to any mark that is validated in the Trademark Clearinghouse. The Trademark Claims Notice will include links to the Trademark Claims as listed in the Trademark Clearinghouse and will be provided at no cost.

Prior to registration of said domain name, Web.com or the Web.com-approved registrar will require each prospective registrant to provide the warranties dictated in the Trademark Clearinghouse model set forth in the ICANN Applicant Guidebook. Those warranties will include receipt and understanding of the Trademark Claims Notice and confirmation that registration and use of said domain name will not infringe on the trademark rights of the mark holders listed. Without receipt of said warranties, Web.com or the Web.com-approved registrar will not have the ability to process the domain name registration.

Following the registration of a domain name, the Web.com-approved registrar will provide a notice of domain name registration to the holders of marks that have been previously validated by the Trademark Clearinghouse and are an identical match. This notice will be as dictated by ICANN. At a minimum Web.com will recognize, honor and adhere to all word marks validated by the Trademark Clearinghouse.

Adoption of Certain SSWG Elevated Security Standards

As referenced earlier in this question, Web.com will work to implement the following elevated security standards in the .web gTLD:

Name Selection Policy

The .web gTLD will enforce a name selection policy that ensures that all names registered in the gTLD will be in compliance with ICANN mandated technical standards. These include restrictions on 2 character names, tagged names, and reserved names for Registry Operations. All names must also be in compliance with all applicable RFCs governing the composition of domain names. In addition, registrations of Country, Geographical and Territory Names will only be allowed in compliance with the restrictions as outlined in the answer to Question 22.

Name Allocation Policy

As described above, Web.com plans on implementing an extended Sunrise A period for Trademark Holders and a Sunrise B Period for domain name holders. In addition, our current plans call for incorporating a Landrush Period during which applicants can secure preferred .web domains, followed by a General Availability. With the exception of the Sunrise B Period, all registrations will occur on a first come first served basis. Web.com reserves the right to adjust this allocation Policy as it works through implementation details.

Acceptable Use Policy

Web.com has developed a draft the Registry Operator Acceptable Use Policy (AUP) which is further described in our response to Question 28. This AUP clearly defines what type of behavior is expressly prohibited in conjunction with the use of a .web domain name. Web.com will require, through the Registry Registrar Agreement (RRA), that this AUP be included in the registration agreement used by all .web gTLD accredited registrars. This registration agreement must be agreed upon by a registrant prior to them being able to register a name in the .web gTLD.

2 MECHANISMS DESIGNED TO IDENTIFY AND ADDRESS THE ABUSIVE USE OF REGISTERED NAMES ON AN ONGOING BASIS

In addition to the Sunrise and Trademark Claims services described in Section 1 of this response, Web.com will implement and adhere to RPMs post-launch as mandated by ICANN, and confirm that registrars accredited for the .web gTLD are in compliance with these mechanisms. Certain aspects of these post-launch RPMs may be administered on behalf of Web.com by Web.com-approved registrars or by approved subcontractors of Web.com, such as its selected backend registry services provider, Verisign.

These post-launch RPMs include the established Uniform Domain Name Dispute Resolution Policy (UDRP), as well as the newer Uniform Rapid Suspension System (URS) and Trademark Post-Delegation Dispute Resolution Procedure (PDDRP). Where applicable, Web.com will implement all determinations and decisions issued under the corresponding RPM.

After a domain name is registered, trademark holders may object to the registration through the UDRP or URS. Objections to the operation of the gTLD can be made through the PDDRP.

The following descriptions provide implementation details of each post-launch RPM for the .web gTLD:

• UDRP: The UDRP provides a mechanism for complainants to object to domain name registrations. The complainant files its objection with a UDRP provider and the domain name registrant has an opportunity to respond. The UDRP provider makes a decision based on the papers filed. If the complainant is successful, ownership of the domain name registration is transferred to the complainant. If the complainant is not successful, ownership of the domain name remains with the domain name

registrant. Web.com and entities operating on its behalf adhere to all decisions rendered by UDRP providers.

• URS: As provided in the Applicant Guidebook, all registries are required to implement the URS. Similar to the UDRP, a complainant files its objection with a URS provider. The URS provider conducts an administrative review for compliance with filing requirements. If the complaint passes review, the URS provider notifies the registry operator and locks the domain. A domain lock means that the registry restricts all changes to the registration data, but the name will continue to resolve. After the domain is locked, the complaint is served to the domain name registrant, who has an opportunity to respond accordingly. If the complainant is successful, the registry operator is informed and the domain name is suspended for the balance of the registration period; the domain name will not resolve to the original source, but to an informational approved web page provided by the URS provider. If the complainant is not successful, the URS is terminated and full control of the domain name registration is returned to the domain name registrant. Similar to the existing UDRP, Web.com and entities operating on its behalf adhere to decisions rendered by the URS providers.

• PDDRP: As provided in the Applicant Guidebook, all registries are required to implement the PDDRP. The PDDRP provides a mechanism for a complainant to object to the registry operator's manner of operation or use of the gTLD. The complainant files its objection with a PDDRP provider, who performs a threshold review. The registry operator has the opportunity to respond and the provider issues its determination based on the papers filed, although there may be opportunity for further discovery and a hearing. Web.com participates in the PDDRP process as specified in the Applicant Guidebook.

Additional Measures Specific to Rights Protection. Web.com provides additional measures against abusive registrations. These measures will assist with mitigation of, but are not limited to, the following activities: phishing, pharming, and other Internet security threats. The measures exceed the minimum requirements for RPMs defined by Specification 7 of the Registry Agreement and are available at the time of registration.

These measures include:

• Rapid Takedown or Suspension Based on Court Orders: Web.com complies promptly with any order from a court of competent jurisdiction that directs it to take any action on a domain name that is within its technical capabilities as a gTLD registry. These orders may be issued when abusive content, such as but not limited to child pornography, counterfeit goods or illegal pharmaceuticals, is associated with the domain name.
• Anti-Abuse Process: Web.com implements an anti-abuse process that is executed based on the type of domain name takedown requested. The anti-abuse process is for malicious exploitation of the DNS infrastructure, such as phishing, botnets, and malware.
• Authentication Procedures: Verisign, Web.com's selected backend registry services provider, uses two-factor authentication to enhance security protocols for telephone, email, and chat communications.
• Registry Lock: Verisign's Registry Lock service allows registrants to lock a domain name at the authoritative registry level to protect against both unintended and malicious changes, deletions, and transfers. Only Verisign, as Web.com's backend registry services provider, can release the lock; thus all other entities that normally are permitted to update Shared Registration System (SRS) records are prevented from doing so. This lock is released only after the authorized registrar makes the request to unlock.
• Malware Code Identification: This safeguard reduces opportunities for

abusive behaviors that use registered domain names in the gTLD. Registrants are often unknowing victims of malware exploits. As Web.com's backend registry services provider, Verisign has developed proprietary code to help identify malware in the zones it manages, which in turn helps registrars by identifying malicious code hidden in their domain names.

- DNSSEC Signing Service: Domain Name System Security Extensions (DNSSEC) helps mitigate pharming and phishing attacks that use cache poisoning to redirect unsuspecting users to fraudulent websites or addresses. It uses public key cryptography to digitally sign DNS data when it comes into the system and then validate it at its destination. The .web gTLD is DNSSEC-enabled as part of Verisign's core backend registry services.
- Biannual Whois Verification As detailed in our response to Question 28, all .web gTLD accredited registrars will be required as part of their RRA with Web.com to perform a Whois confirmation process twice a year. By asking registrants to confirm this information every 6 months, the .web gTLD should have a higher level of accurate Whois information for registered names in the event there is a case of trademark infringement by a non authorized registrant. Having accurate Whois information is critical to solving these issues in a timely manner.
- Participation in Anti-abuse Community Activities. Since our founding in 1997, Web.com has been an active participant and leader in multiple organizations, symposia, forums and other efforts that focus on the prevention of domain name abuse, including trademark infringement. Specifically, we are an active member of the Certificate Authentication Board, ICANN, the Internet standards development community, and we participate in SSAC. We find this participation extremely helpful in staying abreast of the latest changes and challenges in this field. Participation in these efforts also allows us to not only share our best practices with the rest of the anti-abuse community, but to learn from what others have been doing and incorporate it into how we operate our business. As mentioned earlier in this question, Web.com will be incorporating some of the SSWG enhanced security standards which is proof that community led efforts can produce significant results.

3. RESOURCING PLANS

Resource Planning

Web.com is a leading provider of Internet services for small to medium-sized businesses (SMBs). Web.com is the parent company of two global domain name registrars and further meets the Internet needs of consumers and businesses throughout their lifecycle with affordable value added services that including domain name registration, website design, search engine optimization, search engine marketing, social media and mobile products, local sales leads, eCommerce solutions and call center services. Headquartered in Jacksonville, FL, USA, Web.com is NASDAQ traded company serving nearly three million customers with more than 1,700 global employees in fourteen locations in North America, South America and the United Kingdom.

Our business is helping people establish, maintain, promote, and optimize their web presence. Web.com intentionally chose Verisign as our registry services provider because of their unsurpassed track record in operating some of the world's most complex and critical top level domains. Verisign's support for the .web gTLD will help ensure its success

The .web gTLD will be fully supported by a cross function team of Web.com professionals. Numbers and types of employees will vary for each function but Web.com projects it will use the following personnel to support the resource planning requirements;

- Quality Assurance Engineer: 0.5 FTE
- System Administrator: 1 FTE
- Database Administrator: 0.5 FTE
- Technical Project Manager: 0.5 FTE
- Marketing Director: 1 FTE
- Sales Manager: 1 FTE
- Legal Counsel: 1 FTE
- Finance/Accounting: 1 FTE
- Customer Service: 2 FTEs

Resource Planning Specific to Backend Registry Activities

Verisign, Web.com's selected backend registry services provider, is the most experienced backend registry provider that has developed a set of proprietary resourcing models to project the number and type of personnel resources necessary to operate a TLD. Verisign routinely modifies these staffing models to account for new tools, standards and policy implementations and process innovations. These models enable Verisign to continually allocate the appropriate staff to accommodate projected demand and meet service level agreements as well as Internet security and stability requirements. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its staffing models, Verisign derived the necessary personnel levels required for this gTLD's initial implementation and ongoing maintenance. Verisign's pricing for the backend registry services it will extend to Web.com fully accounts for cost related to this infrastructure, which is provided as Line IIb.G, Total Critical Registry Function Cash Outflows, within the Question 46 financial projections response.

Verisign employs more than 1,040 individuals of which more than 775 comprise its technical work force. (Current statistics are publicly available in Verisign's quarterly filings.) Drawing from this pool of on-hand and fully committed technical resources, Verisign has maintained DNS operational accuracy and stability at 100 percent of the time for more than 13 years for .com, which exceeds the current several level agreements, proving Verisign's ability to align personnel resource growth to the scale increases of Verisign's gTLD service offerings.

Verisign projects it will use the following personnel roles, which are described in Section 5 of the response to Question 31, Technical Overview of Proposed Registry, to support the implementation of RPMs:

- Customer Affairs Organization: 9
- Customer Support Personnel: 36
- Information Security Engineers: 11

To implement and manage the .web gTLD as described in this application, Verisign, Web.com's selected backend registry services provider, scales, as needed, the size of each technical area now supporting its portfolio of gTLDs. Consistent with its resource modeling, Verisign frequently reviews the level of work to be performed and adjusts staff levels for each technical area.

When usage projections indicate a need for additional staff, Verisign's internal staffing group uses an in-place staffing process to identify qualified and skilled candidates. These candidates are then interviewed by the lead of the relevant technical area. By scaling one common team across all its gTLDs instead of creating a new entity to manage only this proposed gTLD, Verisign realizes significant economies of scale and ensures its gTLD best practices are followed consistently. This consistent demonstration of best practices helps ensure the security and stability of both the Internet and this proposed gTLD, as Verisign holds all

contributing staff members accountable to the same procedures that guide its execution of the Internet's largest gTLDs (i.e., .com). Moreover, by augmenting existing teams, Verisign ensures new employees are provided the opportunity to be trained and mentored by existing senior staff. This coaching and mentoring minimizes start-up learning curves and helps ensure that new staff members properly execute their duties.

30(a). Security Policy: Summary of the security policy for the proposed registry

1 DETAILED DESCRIPTION OF PROCESSES AND SOLUTIONS DEPLOYED TO MANAGE LOGICAL SECURITY ACROSS INFRASTRUCTURE AND SYSTEMS, MONITORING AND DETECTING THREATS AND SECURITY VULNERABILITIES AND TAKING APPROPRIATE STEPS TO RESOLVE THEM

Please note; all figures, tables and diagrams referenced in the following response can be found in attachment titled "Attachment dot web Q30A."

Web.com Group, Inc. ("Web.com") selected backend registry services provider's (Verisign's) comprehensive security policy has evolved over the years as part of managing some of the world's most critical TLDs. Verisign's Information Security Policy is the primary guideline that sets the baseline for all other policies, procedures, and standards that Verisign follows. This security policy addresses all of the critical components for the management of backend registry services, including architecture, engineering, and operations.

Verisign's general security policies and standards with respect to these areas are provided as follows:

- Architecture
- Information Security Architecture Standard: This standard establishes the Verisign standard for application and network architecture. The document explains the methods for segmenting application tiers, using authentication mechanisms, and implementing application functions.
- Information Security Secure Linux Standard: This standard establishes the information security requirements for all systems that run Linux throughout the Verisign organization.
- Information Security Secure Oracle Standard: This standard establishes the information security requirements for all systems that run Oracle throughout the Verisign organization.
- Information Security Remote Access Standard: This standard establishes the information security requirements for remote access to terminal services throughout the Verisign organization.
- Information Security SSH Standard: This standard establishes the information security requirements for the application of Secure Shell (SSH) on all systems throughout the Verisign organization.

- Engineering
- Secure SSL/TLS Configuration Standard: This standard establishes the information security requirements for the configuration of Secure Sockets Layer/Transport Layer Security (SSL/TLS) for all systems throughout the Verisign organization.
- Information Security C++ Standards: These standards explain how to use and implement the functions and application programming interfaces (APIs) within C++. The document also describes how to perform logging, authentication, and database

connectivity.

- Information Security Java Standards: These standards explain how to use and implement the functions and APIs within Java. The document also describes how to perform logging, authentication, and database connectivity.

- Operations
- Information Security DNS Standard: This standard establishes the information security requirements for all systems that run DNS systems throughout the Verisign organization.
- Information Security Cryptographic Key Management Standard: This standard provides detailed information on both technology and processes for the use of encryption on Verisign information security systems.
- Secure Apache Standard: Verisign has a multitude of Apache web servers, which are used in both production and development environments on the Verisign intranet and on the Internet. They provide a centralized, dynamic, and extensible interface to various other systems that deliver information to the end user. Because of their exposure and the confidential nature of the data that these systems host, adequate security measures must be in place. The Secure Apache Standard establishes the information security requirements for all systems that run Apache web servers throughout the Verisign organization.
- Secure Sendmail Standard: Verisign uses sendmail servers in both the production and development environments on the Verisign intranet and on the Internet. Sendmail allows users to communicate with one another via email. The Secure Sendmail Standard establishes the information security requirements for all systems that run sendmail servers throughout the Verisign organization.
- Secure Logging Standard: This standard establishes the information security logging requirements for all systems and applications throughout the Verisign organization. Where specific standards documents have been created for operating systems or applications, the logging standards have been detailed. This document covers all technologies.
- Patch Management Standard: This standard establishes the information security patch and upgrade management requirements for all systems and applications throughout Verisign.

- General
- Secure Password Standard: Because passwords are the most popular and, in many cases, the sole mechanism for authenticating a user to a system, great care must be taken to help ensure that passwords are “strong” and secure. The Secure Password Standard details requirements for the use and implementation of passwords.
- Secure Anti-Virus Standard: Verisign must be protected continuously from computer viruses and other forms of malicious code. These threats can cause significant damage to the overall operation and security of the Verisign network. The Secure Anti-Virus Standard describes the requirements for minimizing the occurrence and impact of these incidents.

Security processes and solutions for the .web gTLD are based on the standards defined above, each of which is derived from Verisign’s experience and industry best practice. These standards comprise the framework for the overall security solution and applicable processes implemented across all products under Verisign’s management. The security solution and applicable processes include, but are not limited to:

- System and network access control (e.g., monitoring, logging, and backup)
- Independent assessment and periodic independent assessment reports
- Denial of service (DoS) and distributed denial of service (DDoS) attack mitigation
- Computer and network incident response policies, plans, and processes
- Minimization of risk of unauthorized access to systems or tampering with registry data

- Intrusion detection mechanisms, threat analysis, defenses, and updates
- Auditing of network access
- Physical security

Further details of these processes and solutions are provided in Part B of this response.

1.1 Security Policy and Procedures for the Proposed Registry
Specific security policy related details, requested as the bulleted items of Question 30 – Part A, are provided here.

Independent Assessment and Periodic Independent Assessment Reports. To help ensure effective security controls are in place, Web.com, through its selected backend registry services provider, Verisign, conducts a yearly American Institute of Certified Public Accountants (AICPA) and Canadian Institute of Chartered Accountants (CICA) SAS 70 audit on all of its data centers, hosted systems, and applications. During these SAS 70 audits, security controls at the operational, technical, and human level are rigorously tested. These audits are conducted by a certified and accredited third party and help ensure that Verisign in-place environments meet the security criteria specified in Verisign's customer contractual agreements and are in accordance with commercially accepted security controls and practices. Verisign also performs numerous audits throughout the year to verify its security processes and activities. These audits cover many different environments and technologies and validate Verisign's capability to protect its registry and DNS resolution environments. Figure 30A-1 lists a subset of the audits that Verisign conducts. For each audit program or certification listed in Figure 30A-1, Verisign has included, as attachments to the Part B component of this response, copies of the assessment reports conducted by the listed third-party auditor. From Verisign's experience operating registries, it has determined that together these audit programs and certifications provide a reliable means to ensure effective security controls are in place and that these controls are sufficient to meet ICANN security requirements and therefore are commensurate with the guidelines defined by ISO 27001.

Augmented Security Levels or Capabilities. See Section 5 of this response.

Commitments Made to Registrants Concerning Security Levels. See Section 4 of this response.

2 SECURITY CAPABILITIES ARE CONSISTENT WITH THE OVERALL BUSINESS APPROACH AND PLANNED SIZE OF THE REGISTRY

Verisign, Web.com's selected backend registry services provider, is an experienced backend registry provider that has developed and uses proprietary system scaling models to guide the growth of its TLD supporting infrastructure. These models direct Verisign's infrastructure scaling to include, but not be limited to, server capacity, data storage volume, and network throughput that are aligned to projected demand and usage patterns. Verisign periodically updates these models to account for the adoption of more capable and cost-effective technologies.

Verisign's scaling models are proven predictors of needed capacity and related cost. As such, they provide the means to link the projected infrastructure needs of the .web gTLD with necessary implementation and sustainment cost. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its scaling models, Verisign derived the necessary infrastructure required to implement and sustain this gTLD. Verisign's pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided

as “Total Critical Registry Function Cash Outflows” (Template 1, Line IIb.G) within the Question 46 financial projections response.

3 TECHNICAL PLAN ADEQUATELY RESOURCED IN THE PLANNED COSTS DETAILED IN THE FINANCIAL SECTION

Resource Planning
Web.com is a leading provider of Internet services for small to medium-sized businesses (SMBs). Web.com is the parent company of two global domain name registrars and further meets the Internet needs of consumers and businesses throughout their lifecycle with affordable value added services that including domain name registration, website design, search engine optimization, search engine marketing, social media and mobile products, local sales leads, eCommerce solutions and call center services. Headquartered in Jacksonville, FL, USA, Web.com is NASDAQ traded company serving nearly three million customers with more than 1,700 global employees in fourteen locations in North America, South America and the United Kingdom.

Our business is helping people establish, maintain, promote, and optimize their web presence. Web.com intentionally chose Verisign as our registry services provider because of their unsurpassed track record in operating some of the world’s most complex and critical top level domains. Verisign’s support for the .web gTLD will help ensure its success.

The .web gTLD will be fully supported by a cross function team of Web.com professionals. Numbers and types of employees will vary for each function but Web.com projects it will use the following personnel to support the resource planning requirements:

- Quality Assurance Engineer: 0.5 FTE
- System Administrator: 1 FTE
- Database Administrator: 0.5 FTE
- Technical Project Manager: 0.5 FTE
- Marketing Director: 1 FTE
- Sales Manager: 1 FTE
- Legal Counsel: 1 FTE
- Finance/Accounting: 1 FTE
- Customer Service: 2 FTEs

Resource Planning Specific to Backend Registry Activities
Verisign, Web.com’s selected backend registry services provider, is an experienced backend registry provider that has developed a set of proprietary resourcing models to project the number and type of personnel resources necessary to operate a TLD. Verisign routinely adjusts these staffing models to account for new tools and process innovations. These models enable Verisign to continually right-size its staff to accommodate projected demand and meet service level agreements as well as Internet security and stability requirements. Using the projected usage volume for the most likely scenario (defined in Question 46, Template 1 – Financial Projections: Most Likely) as an input to its staffing models, Verisign derived the necessary personnel levels required for this gTLD’s initial implementation and ongoing maintenance. Verisign’s pricing for the backend registry services it provides to Web.com fully accounts for cost related to this infrastructure, which is provided as “Total Critical Registry Function Cash Outflows” (Template 1, Line IIb.G) within the Question 46 financial projections response.

Verisign employs more than 1,040 individuals of which more than 775 comprise its technical work force. (Current statistics are publicly available in Verisign’s quarterly filings.) Drawing from this pool of on-hand and fully committed technical

resources, Verisign has maintained DNS operational accuracy and stability 100 percent of the time for more than 13 years for .com, proving Verisign's ability to align personnel resource growth to the scale increases of Verisign's TLD service offerings.

Verisign projects it will use the following personnel role, which is described in Section 5 of the response to Question 31, Technical Overview of Proposed Registry, to support its security policy:

- Information Security Engineers: 11

To implement and manage the .web gTLD as described in this application, Verisign, Web.com's selected backend registry services provider, scales, as needed, the size of each technical area now supporting its portfolio of TLDs. Consistent with its resource modeling, Verisign periodically reviews the level of work to be performed and adjusts staff levels for each technical area.

When usage projections indicate a need for additional staff, Verisign's internal staffing group uses an in-place staffing process to identify qualified candidates. These candidates are then interviewed by the lead of the relevant technical area. By scaling one common team across all its TLDs instead of creating a new entity to manage only the .web gTLD, Verisign realizes significant economies of scale and ensures its TLD best practices are followed consistently. This consistent application of best practices helps ensure the security and stability of both the Internet and this the .web gTLD, as Verisign holds all contributing staff members accountable to the same procedures that guide its execution of the Internet's largest TLDs (i.e., .com and .net). Moreover, by augmenting existing teams, Verisign affords new employees the opportunity to be mentored by existing senior staff. This mentoring minimizes start-up learning curves and helps ensure that new staff members properly execute their duties.

4 SECURITY MEASURES ARE CONSISTENT WITH ANY COMMITMENTS MADE TO REGISTRANTS REGARDING SECURITY LEVELS

Verisign is Web.com's selected backend registry services provider. For the .web gTLD, no unique security measures or commitments must be made by Verisign or Web.com to any registrant.

5 SECURITY MEASURES ARE APPROPRIATE FOR THE APPLIED-FOR gTLD STRING (FOR EXAMPLE, APPLICATIONS FOR STRINGS WITH UNIQUE TRUST IMPLICATIONS, SUCH AS FINANCIAL SERVICES-ORIENTED STRINGS, WOULD BE EXPECTED TO PROVIDE A COMMENSURATE LEVEL OF SECURITY)

No unique security measures are necessary to implement the .web gTLD. As defined in Section 1 of this response, Verisign, Web.com's selected backend registry services provider, commits to providing backend registry services in accordance with the following international and relevant security standards:

- American Institute of Certified Public Accountants (AICPA) and Canadian Institute of Chartered Accountants (CICA) SAS 70
- WebTrust⁄SysTrust for Certification Authorities (CA)

EXHIBIT GS-24

New gTLD Application Submitted to ICANN by: DotWeb Inc.

Application Downloaded On: 27 Jun 2014

String: web

Application ID: 1-956-26846

Applicant Information

1. Full legal name
DotWeb Inc.

2. Address of the principal place of business
Contact Information Redacted

3. Phone number
Contact Information Redacted

4. Fax number
Contact Information Redacted

5. If applicable, website or URL
http://www.radixregistry.com

Primary Contact

6(a). Name
Brijesh Joshi

6(b). Title
Director & GM

6(c). Address

6(d). Phone Number

Contact Information Redacted

6(e). Fax Number

6(f). Email Address

Contact Information Redacted

Secondary Contact

7(a). Name

Namit Merchant

7(b). Title

General Manager

7(c). Address

7(d). Phone Number

Contact Information Redacted

7(e). Fax Number

7(f). Email Address

Contact Information Redacted

Proof of Legal Establishment

8(a). Legal form of the Applicant

International Business Company (Limited Liability Company)

8(b). State the specific national or other jurisdiction that defines the type of entity identified in 8(a).

Republic of Seychelles, International Business Companies Act, 1994 (Act 24 of 1994)

8(c). Attach evidence of the applicant's establishment.

Attachments are not displayed on this form.

9(a). If applying company is publicly traded, provide the exchange and symbol.

9(b). If the applying entity is a subsidiary, provide the parent company.

9(c). If the applying entity is a joint venture, list all joint venture partners.

Applicant Background

11(a). Name(s) and position(s) of all directors

Name	Position
Brijesh Joshi	Director & General Manager

11(b). Name(s) and position(s) of all officers and partners

Name	Position
Brijesh Joshi	Director & General Manager
Namit Merchant	General Manager
Vishal Manjalani	Vice President

11(c). Name(s) and position(s) of all shareholders holding at least 15% of shares

Name	Position
Directi FZC dba Radix	Not Applicable

11(d). For an applying entity that does not have directors, officers, partners, or shareholders: Name(s) and position(s) of all individuals having legal or executive responsibility

Applied-for gTLD string

13. Provide the applied-for gTLD string. If an IDN, provide the U-label.

web

14A. If applying for an IDN, provide the A-label (beginning with "xn--").

14B. If an IDN, provide the meaning, or restatement of the string in English, that is, a description of the literal meaning of the string in the opinion of the applicant.

14C1. If an IDN, provide the language of the label (in English).

14C2. If an IDN, provide the language of the label (as referenced by ISO-639-1).

14D1. If an IDN, provide the script of the label (in English).

14D2. If an IDN, provide the script of the label (as referenced by ISO 15924).

14E. If an IDN, list all code points contained in the U-label according to Unicode form.

15A. If an IDN, upload IDN tables for the proposed registry. An IDN table must include:

1. the applied-for gTLD string relevant to the tables,
2. the script or language designator (as defined in BCP 47),
3. table version number,
4. effective date (DD Month YYYY), and
5. contact name, email address, and phone number.
   Submission of IDN tables in a standards-based format is encouraged.

15B. Describe the process used for development of the IDN tables submitted, including consultations and sources used.

15C. List any variants to the applied-for gTLD string according to the relevant IDN tables.

16. Describe the applicant's efforts to ensure that there are no known operational or rendering problems concerning the applied-for gTLD string. If such issues are known, describe steps that will be taken to mitigate these issues in software and other applications.

The string ".web" consists of three ASCII characters, each one of which currently occurs as part of existing and operational gTLD strings. We are not aware of any possible rendering problems concerning the string ".web".

We are aware of the issue of universal acceptability and accept that some incorrectly configured third-party software may consider ".web" to be an invalid string, in the same way that other TLDs such as ".INFO" and ".MUSEUM" are also at times considered "invalid." The Registry will work to raise awareness of the issue of universal acceptance of .web and other new gTLDs. CentralNic has previously

contributed to these efforts, such as by publication of TLD Verification code for the PHP programming language.

We are aware that a significant fraction of queries sent to the DNS root servers are for invalid TLDs such as ".LOCAL" or ".LAN", and that the delegation of these TLDs could cause previously undiscovered configuration errors to result in operational problems for other operators. We have reviewed the research in this area, including the SAC 045 report from ICANN's Security and Stability Advisory Committee, data from the Day In The Life of the Internet project, and other sources, and are not aware of any significant volume of invalid root server queries related to .web. Therefore we feel confident that the delegation of this string will not result in any operation problems for Internet users.

This completes our response to Q16.

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17. OPTIONAL.
Provide a representation of the label according to the International Phonetic Alphabet (http://www.langsci.ucl.ac.uk/ipa/).

18A. Describe the mission/purpose of your proposed gTLD.

The mission/purpose of .web is first choice. Domain name first choice, once again - globally. Some registrants got their first choice of a .com name. Many did not. When the .com registry gained its momentum selling names early on, the North American market and particularly the United States were the first and primary purchasers of .com names. They got their first choice. And many global registrants who came after did not. Other generic top level domains have been introduced: .info, .biz, .net, .org - but none of those names have the true global generic appeal of the .com brand. Each of those four strings brings some characteristic that taints the string with some preconception.

* .info is short for information - but my site does much more than information

* .biz is short for business - but my site is not business related

* .net is short for network - but the term "the net" died several years ago

* .org is short for organization - but my site is not a non-profit

* .com is short for commercial or company, and is not truly a generic extension

Country code top-level domains (ccTLD) are an option, however a ccTLD

such as Germany (.DE) or Japan (.JP) brings the impression that the website is tied to the country or region, but not truly global. Hence the need for .web – a truly generic top level domain that means the same in Shanghai, Munich, Sao Paolo, Mumbai, Johannesburg, Tokyo and your city. The mission of .web is to give international registrants the same opportunity the North American market had - to get their unique name in a truly global name space – with nothing added – just trusted and secure access to the web. The mission of .web is first choice.

The goal of .web is to provide first choice name registration to individuals, entrepreneurs, communities, small and medium sized businesses, multi-national corporations, non-profits and anyone else seeking a truly global domain name. Based on our experience, when a potential registrant goes to a registrar's site to register a new gTLD domain name, the domain name is unavailable over 70% of the time (Source: Internal Research on com availability checks) and the registrant is presented with a long list of permutation options that are not their first choice – either for the name or the TLD.

The goal of .web is to register your first choice name. The Mission and purpose of our TLD is also to contribute to the Internet Namespace in the following ways:

1.1 ENHANCE REGISTRANT CHOICE

To create a namespace that provides registrants greater choice to represent themselves online in the manner they please. Due to the saturated nature of the existing gTLD space, many Internet users have to opt for a name that does not suit their needs best. Our Registry will provide Registrants a higher probability of obtaining their desired name.

1.2 CREATE A CLEANER INTERNET SPACE

To create a cleaner internet experience for end users by implementing pioneering registration policies, content and usage policies, and abuse mitigation processes.

1.3 CREATE A STABLE AND RESILIENT INTERNET SPACE

To deliver a stable and resilient internet experience to registrants and end-users by meeting the ICANN mandated SLAs and delivering 100% resolution uptime

This completes our response to Q18(a).

18B. How do you expect that your proposed gTLD will benefit registrants, Internet users, and others?

1. GOAL OF .WEB

1.1 SPECIALTY

* Our goal for .web in terms of area of specialty is to be the first choice generic TLD among new registrants. We will support the rapidly developing domain name markets, not just in traditional markets such as Western Europe and North America, but equally in the growing regions of South America, Asia, Eastern Europe, the entire Pacific Rim. The .web registry will provide registrants the opportunity for first choice of their preferred domain name on a generic global TLD.

1.2 SERVICE LEVELS

Our goal for .Web in terms of service levels is to go above and beyond the ICANN SLAs. ICANN provides for its expected SLA in Specification 10 in the Registry Agreement in the Applicant guidebook.

We have engaged CENTRALNIC to deliver services for this TLD. CENTRALNIC provides registry services for a number of TLDs including the .LA and .PW ccTLDs.

Our contract with CENTRALNIC is attached to our response to Q46. This contract details the SLA we intend on achieving with this TLD. As can be seen in the contract we meet or exceed the ICANN required SLA on every parameter.

Our response to Q34 and Q35 provides details on CentralNic's DNS system. This system has operated at 100% service availability since 1996 and has been developed into a secure and stable platform for domain resolution. Partnering with Community DNS, CentralNic’s DNS system includes nameservers in more than forty cities, on five continents. The DNS system fully complies with all relevant RFCs and all ICANN specifications, and has been engineered to ensure resilience and stability in the face of denial-of-service attacks, with substantial overhead and geographical dispersion.

It is our objective to provide 100% uptime, a resilient global DNS infrastructure, and very low latency in terms of DNS resolution for this TLD

1.3 REPUTATION

Reputation of our TLD is of paramount importance to us. The reputation of our TLD directly relates to how end-users on the internet perceive our Registrants. We will ensure the highest reputation of .Web by ensuring the following –

* Maintaining a high quality bar with respect to Registrants in the TLD
* Well defined Acceptable usage and content policies
* Well defined dispute resolution mechanisms
* Ensuring Whois accuracy to support abuse mitigation

* Well defined and implemented abuse mitigation processes
* Well defined and implemented rights protection mechanisms
* Exceptional service levels

To this effect we have created unprecedented Abuse mitigation policies and Rights protection mechanisms that go significantly above and beyond mandatory requirements and common practice described in considerable detail in our response to Q28 and Q29. We also commit to extremely high service levels that go beyond the stipulated service levels in the applicant guidebook.

2. CONTRIBUTION OF .WEB TO THE NAMESPACE

2.1 CONTRIBUTION IN TERMS OF COMPETITION, DIFFERENTIATION, OR INNOVATION

Per ICANN’s Bylaws as amended June 24, 2011, ICANN’s core value number six is “Introducing and promoting competition in the registration of domain names where practicable and beneficial in the public interest.”

The .web registry will be a new direct and formidable competitor to the current group of global generic TLDs. This will be especially true in the key growing international markets. Since Directi has been a registrar for over 10 years, managing over 4 million domain names across the globe, we understand the nuances of domain name buying behaviour. The .Web registry will leverage this unique market knowledge to design competitive offerings against other global gTLDs.

Directi will be offering the language and culture agnostic .web to international markets, with the goal of a truly global distribution of registrants. Most gTLDs have largely focused on developed markets with 70+% internet penetration, namely North America and European marketplaces. Domain Name and website growth is yet to occur in other developing markets like India, Brazil, Russia, China, Indonesia etc. However as the market for websites and domain names grows in these economies the existing gTLD space in TLDs like .com, .net, .org etc will already be saturated with all tier 1 names no longer available to markets like asia, africa. 70% of .com check availability checks return unavailable (data obtained from Internal Reserach). New companies have to resort to 2nd tier long multi-word names for their businesses in these markets. .Web will broaden the namespace by providing an alternative for Registrants in developing markets to register the domain name of their choice, creating competition.

Lastly .Web will provide registrants the option to register more desirable and shorter names as opposed to names they would have otherwise registered in existing gTLDs due to the high saturation of the existing namespaces.

Our intent is to operate .Web with a focus on integrity and quality for the .Web brand. This entails running robust abuse mitigation programs and pioneering Rights Protection Mechanisms from initiation,

which in our case not only meets ICANN’s requirements, but extends significantly beyond it as described in our response to Q28 and Q29.

3. USER EXPERIENCE GOALS

.Web considers both its Registrants and the end-users that access .Web websites as its users. Our goal is to create a highly reliable namespace and provide an outstanding user experience to both Registrants and end-users of .Web.

Registrants of .Web have an assurance of a scalable, resilient registry with 100% uptime, low latency, and exemplary security standards. Registrants will have the option to register the domain name of their choice, without much saturation of the namespace. Our registration policies and abuse mitigation policies ensure that Registrants will get advantages like higher recognition, better branding and more desirable, shorter names.

Our content and acceptable use policies and abuse mitigation processes ensure that end-users are benefited from a clean namespace. These are described in further detail in our response to Q28 and Q29.

4. REGISTRATION POLICIES IN SUPPORT OF GOALS

4.1 GENERAL NAMES

The purpose of .web is to allow registrants to register their first choice name. As such, the TLD will offer registrations at the second level, and will have an open registration policy so that registrants have the choice and the freedom to find the name that they like best. The TLD will be open to registrants in all areas of the world, without nexus or pre-qualification requirements. Registrations in .web can be used for any purpose, including for use by businesses, individuals, and not-for-profit entities. We anticipate that registrants will introduce many unique, new, dedicated Web sites to the Internet using their .web domain names.

The goals of .Web are outlined in the sections above. These goals are supported by the following artifacts –

* Registration policies and processes
* Acceptable usage policies and content guidelines
* Abuse mitigation processes
* Rights protection mechanisms
* Dispute resolution polices

To this effect we have created unprecedented Abuse mitigation policies and Rights protection mechanisms that go significantly above and beyond mandatory requirements and common practice. The salient aspects of all of the above are described below -

* DotWeb Inc. is a wholly owned subsidiary within the Directi Group. The Directi Group runs various businesses including several ICANN Accredited Domain Registrars (ResellerClub.com and BigRock.com) and

Web Hosting companies. With over four million active domain names registered through its registrars, Directi has significant experience (over 10 years) of managing domain name abuse mitigation and rights protection. Directi has been heralded as a white hat registrar and the undisputed leader with respect to abuse mitigation.
* Our Abuse and compliance processes will be run by the Directi Group
* We have an elaborate and detailed Accepted usage and content policy that covers over 11 macro forms of violations
* .Web will create a zero-tolerance reputation when it comes to abuse
* We have a defined SLA for responding to abuse complaints ensuring guaranteed turn-around time on any abuse complaint depending on its severity
* We will work closely with LEA and other security groups to mitigate abuse within the TLD by providing them with special interfaces and interacting with them regularly in terms of knowledge sharing.
* Other abuse mitigation steps we undertake include profiling, blacklisting, proactive quality reviews, industry collaboration and information sharing, regular sampling, contractual enforcements and sanctions
* The protection of trademark rights is a core goal of .Web. .Web will have a professional plan for rights protection. It will incorporate best practices of existing TLDs, going above and beyond the ICANN mandated RPMs to prevent abusive registrations and rapidly take-down abuse when it does occur.
* Standard RPMs such as Sunrise, Trademarks claims service, URS, UDRP, SDRP, PDDRP, SPOC etc are all provided for. Additional RPMs such as profiling and blacklisting, proactive quality reviews, APWG Review and others will also be provided.

The above salient points barely scratch the surface in detailing the steps that .Web will take in order to build a reputation of operating a clean, secure and trusted namespace. Significant details of all of the above and more are provided in our responses to Q26, Q27, Q28 and Q29

4.2. OTHER NAMES

* We will reserve the following classes of domain names, which will not be available to registrants via the Sunrise or subsequent periods:
** The reserved names required in Specification 5 of the new gTLD Registry Agreement.
** The geographic names required in Specification 5 of the new gTLD Registry Agreement. See our response to Question 22 (“Protection of Geographic Names”) for details.
** The registry operator will reserve its own name and variations thereof, and registry operations names (such as nic.Web, registry.Web, and www.Web), so that we can point them to our Web site. Reservation of the registry operator’s names was standard in ICANN’s past gTLD contracts.
** We will also reserve names related to ICANN and Internet standards bodies (iana.Web, ietf.Web, w3c.Web, etc.), for delegation of those names to the relevant organizations upon their request. Reservation

of this type of names was standard in ICANN's past gTLD contracts. The list of reserved names will be published publicly before the Sunrise period begins, so that registrars and potential registrants will know which names have been set aside.

* We will reserve generic names which will be set aside for distribution via special mechanisms.

5. PROTECTING PRIVACY OF REGISTRANTS' OR USERS' INFORMATION

.Web is committed to providing a secure and trusted namespace to its Registrants and end-users. To that extent we will have several measures for protecting the privacy or confidential information of registrants or users -

* Our Whois service (web-based whois, port 43 whois) all have built in abuse prevention mechanisms to prevent unauthorized access, data mining, data scraping and any other abusive behavior. Details of this are provided in our response to Q26

* .Web will allow Registrants to use privacy protection services provided by their Registrars in the form of a Proxy whois service as long as they follow the guidelines stipulated within our response to Q28 to prevent any abuse of the same

* As per the requirements of the new gTLD Registry Agreement (Article 2.17), we shall notify each of our registrars regarding the purposes for which data about any identified or identifiable natural person ("Personal Data") submitted to the Registry Operator by such registrar is collected and used, and the intended recipients (or categories of recipients) of such Personal Data. (This data is basically the registrant and contact data required to be published in the WHOIS.)

* We will also require each registrar to obtain the consent of each registrant in the TLD for such collection and use of Personal Data. As the registry operator, we shall not use or authorize the use of Personal Data in a way that is incompatible with the notice provided to registrars.

* As the registry operator we shall take significant steps to protect Personal Data collected from registrars from loss, misuse, unauthorized disclosure, alteration, or destruction. In our responses to Q24, Q30 and Q38 we detail the security policies and procedures we will use to protect the registry system and the data contained there from unauthorized access and loss.

* As registry operator we impose certain operational standards for our registrars. In order to gain and maintain accreditation for our TLD, we require them to adhere to certain information technology policies designed to help protect registrant data. These include standards for access to the registry system. Please see our response to Q24, Q25 and Q30 for details.

* We offer a “registry lock” service, designed to help protect participating registrants’ contact data from unauthorized modification, and against unauthorized domain transfers and deletions. Please see our response to Q27 for details.

* .Web implements DNSSEC at the zone which guarantees origin authentication of DNS data, authenticated denial of existence, and data integrity. This protects end-users from a man-in-the-middle attack protecting the privacy of data of end-users.

6. OUTREACH AND COMMUNICATIONS

* Our goal for .web is for it to be the first-choice generic TLD among new registrants. To achieve this, we will emphasize distribution channels internationally.

* We will also engage in relevant PR and outreach programs as well as ensure appropriate publication of information on our website.

* For many Internet users, the World Wide Web is the first thing they think of when they think of the Internet. For first-time registrants, a .web TLD will be easy to understand and easy to communicate about.

* Our outreach efforts will be directed towards our target market in coordination with Registrar partners, to ensure greater adoption of the .Web TLD. One important method of outreach will involve co-marketing programs with registrars. We will also leverage Directi’s existing channel of 65,000 Resellers, and its strategic relationships with other ICANN Accredited Registrars.

The communication and outreach will focus on -

* Educating audiences regarding this new namespace which has a high availability of names, and the immense possibilities and internet innovations that it could result in.

* Generating awareness of our Registration policies, Acceptable usage and content policies, Abuse mitigation processes and Rights protection mechanisms

This completes our response to Q18(b).

18C. What operating rules will you adopt to eliminate or minimize social costs (e.g., time or financial resource costs, as well as various types of consumer vulnerabilities)? What other steps will you take to minimize negative consequences/costs imposed upon consumers?

.Web considers both its Registrants and the end-users that access .Web websites as its users. Our goal is to create a highly reliable namespace and provide an outstanding user experience to both

Registrants and end-users of .Web. To that extent it is our goal to –

* Reduce ⁄ minimize any incremental costs ⁄ negative consequences imposed upon our users
* Increase ⁄ maximize the value added to our Registrants and end-users
* Ensure that the net effect of .Web on its users is that of positive value creation

In this response we explore how .Web achieves a net benefit for Registrants and End-users.

1. MINIMIZING COSTS

1.1 REGISTRANTS

It is our goal to provide Registrants of .Web incremental value and minimize any negative consequences and costs associated with .Web. We address this in the following manner

1.1.1 SUNRISE, TMCH, RPMs

Rights protection is a core goal of .Web. Our Rights Protection mechanisms go significantly above and beyond the mandatory RPMs ensuring protection of trademark and IP rights of domain registrants and reducing the costs associated with rights protection for Registrants. Our elaborate RPMs are described in significant detail in our response to Q29. Some salient aspects of these are as follows -

* We offer a sunrise period to provide an opportunity for legitimate Registrants to block domain names in .Web before general availability begins, preventing unnecessary post-facto litigation

* We will integrate with the Trademark Clearing House in the manner prescribed to provide the Trademarks claims service, so as to alert potential Registrants of any trademark violations prior to registration, as well as notify mark holders of potential mark violations

* We will provide SDRP, URS, UDRP and PDDRP reducing litigation costs by providing legitimate Registrants the opportunity to resolve disputes through standardized arbitration proceedings.

* Additionally we have pioneering RPMs like Profiling and Blacklisting, Proactive Quality assurance, APWG review etc – all intended to reduce rights violations and hence reduce costs for Registrants

The above salient points barely scratch the surface in detailing the steps that .Web will take in order to reduce costs of Registrants with respect to rights violations. Significant details of all of the above and more are provided in our responses to Q26, Q27, Q28 and Q29.

1.1.2 MULTIPLE APPLICATIONS FOR A DOMAIN

All of the RPMs described in section 1.1.1 above ensure that applicants for domain names in .Web are legitimate right holders for the applied string.

During general availability domain names will be allocated on a first come first serve basis amongst applicants. During the initial registry launch periods of Sunrise and Landrush if multiple applications for the same domain name are received from applicants then the same will be distributed in the following manner –

* Incase of multiple sunrise applications for the same domain name, all applications will be validated against the TMCH for a valid trademark. Applications that do not qualify will be dropped.

* All remaining applications will be distributed through a fair auction.

1.1.3 COST BENEFITS FOR REGISTRANTS

The ICANN new gTLD program marks a historical event in the timeline of the Internet. It is an unprecedented event and one that will yield tremendous benefits for consumers. At this preliminary stage it is impossible to determine the true value consumers will derive from increase in competition and choice. However there is historical data to go by. Upon the launch of Domain Registrars and creation of competition amongst registrars, the Registrants benefited from reduced pricing.

With .Web our goal is to provide fair pricing for domains within .Web that reflect the value proposition derived by the Registrants of .Web. While we do not have any committed pricing plans as yet and the same will be determined during the launch process, we do anticipate providing promotional offers through the life of .Web for the purpose of customer acquisition. This is not too dissimilar from other gTLD registries currently in existence who offer ongoing promotional offers to their customer base.

1.1.4 PRICE ESCALATIONS

The ICANN new gTLD program is an unprecedented event and the actual nature of pricing pressures will only be determinable once several TLDs have successfully launched. At this preliminary stage it is impossible to commit to any pricing strategy on our part. We strongly believe that ultimately, the open market will determine the viability of pricing models and dictate pricing strategy for everyone. We intend to maintain the freedom to set pricing to accommodate for the existence of 100s of TLDs and business models and create a sustainable long term business model. Our goal is to provide fair pricing for domains within .Web that reflect the value proposition derived by the Registrants of .Web.

1.2 END USERS

It is our goal to provide end users of .Web incremental value and minimize any negative consequences and costs associated with .Web. We address this in the following manner

End-users bear a considerable amount of cost as a result of various forms of Internet abuse such as spam, malware, phishing, pharming, hacking, identity theft etc. Any TLD that implements policies and processes to create a clean namespace will result in a considerable reduction of these forms of abuse and hence a significant saving in terms of cost to consumers

.Web intends to set an example when it comes to abuse mitigation and preventing abuse within .Web. To this effect we have created unprecedented Abuse mitigation policies and Rights protection mechanisms that go significantly above and beyond mandatory requirements and common practice. These are detailed in our response to Q28. We strongly believe these practices will result in a significant reduction in online abuse and considerable savings for end users of .Web. We similarly hope to set an example for other TLDs and cooperate with the industry in creating a clean internet experience for internet users.

2. COST BENEFIT ANALYSIS

There has been considerable debate within the community concerning the cost benefit analysis of launching new gTLDs. We strongly believe that the launch of new gTLDs and our implementation of .Web will add considerable value and result in a net positive effect on Registrants and end-users worldwide.

We recognize that there will be a post launch review of the New gTLD Program, from the perspective of assessing therelative costs and benefits achieved in the expanded gTLD space.

To this extent we would like to offer the following pointers concerning .Web as well as the general expansion of the new gTLD space in determining the net positive value generated for Registrants and end users –

* .Web will reduce overall cost for end-users in combating fraud and other forms of online abuse by implementing pioneering processes and anti-abuse policies as described in our response to Q28. Billions of dollars are spent worldwide combating various forms of fraud such as malware, phishing, spamming etc. Our abuse policies will result in overall reduction of these forms of abuses within .Web resulting in a considerable reduction in global costs spent towards combating these abuses. We also strongly believe that introduction of new gTLDs will result in increased competition which will drive significant innovation as well as competitive pressures for everyone in the industry to improve their abuse mitigation processes resulting in

overall cost reduction for end-users

* The value of a Registrant getting the name they want is immeasurably larger than any costs resulting from expansion of the namespace. DotWeb Inc. is a subsidiary within the Directi Group which owns and operates several ICANN Accredited Registrars. Our stats show that 70% of the users who check for a .com domain name do not get their desired name. Until this launch of the new gTLD program there were very limited alternatives and none very viable/desirable for Registrants to choose from. .Web will expand the namespace thus providing a higher probability for new Registrants to obtain names they desire

* In general increased competition always results in pricing benefits for Registrants. .Web will provide additional options to new Registrants resulting in overall benefits to Registrants

This completes our response to Q18(c).

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19. Is the application for a community-based TLD?

No

20A. Provide the name and full description of the community that the applicant is committing to serve. In the event that this application is included in a community priority evaluation, it will be scored based on the community identified in response to this question. The name of the community does not have to be formally adopted for the application to be designated as community-based.

20B. Explain the applicant's relationship to the community identified in 20(a).

20C. Provide a description of the community-based purpose of the applied-for gTLD.

20D. Explain the relationship between the applied- for gTLD string and the community identified in 20(a).

20E. Provide a complete description of the applicant's intended registration policies in support of the community-based purpose of the applied-for gTLD. Policies and enforcement mechanisms are expected to constitute a coherent set.

20F. Attach any written endorsements for the application from established institutions representative of the community identified in 20(a). An applicant may submit written endorsements by multiple institutions, if relevant to the community.

21A. Is the application for a geographic name?

No

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22. Describe proposed measures for protection of geographic names at the second and other levels in the applied-for gTLD. This should include any applicable rules and procedures for reservation and/or release of such names.

We have engaged CENTRALNIC to deliver services for this TLD. This response describes protection of geographic names as implemented by CENTRALNIC.

1. PROTECTION OF GEOGRAPHIC NAMES

In accordance with Specification 5 of the New gTLD Registry Agreement, we will initially reserve all geographic names at the second level, and at all other levels within the TLD at which the registry operator provides for registrations.
CENTRALNIC supports this requirement by using the following internationally recognised lists to develop a comprehensive master list of all geographic names that are initially reserved:

– The 2-letter alpha-2 code of all country and territory names contained on the ISO 3166-1 list, including all reserved and unassigned codes
[http://www.iso.org/iso/support/country_codes/iso_3166_code_lists/iso-3166-1_decoding_table.htm].

– The short form (in English) of all country and territory names contained on the ISO 3166-1 list, including the European Union, which is exceptionally reserved on the ISO 3166-1 List, and its scope extended in August 1999 to any application needing to represent the name European Union
[http://www.iso.org/iso/support/country_codes/iso_3166_code_lists/iso-3166-1_decoding_table.htm#EU].

– The United Nations Group of Experts on Geographical Names, Technical Reference Manual for the Standardisation of Geographical Names, Part III Names of Countries of the World. This lists the names of 193 independent States generally recognised by the international community in the language or languages used in an official capacity within each country and is current as of August 2006
[http://unstats.un.org/unsd/geoinfo/ungegn/docs/pubs/UNGEGN%20tech%20ref%20manual_m87_combined.pdf].

– The list of UN member states in sixofficial UN languages prepared by the Working Group on Country Names of the United Nations Conference on the standardisation of Geographical Names [http://unstats.un.org/unsd/geoinfo/UNGEGN/docs/9th-uncsgn-docs/econf/9th_UNCSGN_e-conf-98-89-add1.pdf].

Names on this reserved list in CENTRALNIC's registry system are prevented from registration.
A corresponding list of geographic names will also be available to the public via our website, to inform Registrars and potential registrants of reserved names. The lists noted above, are regularly monitored for revisions, therefore the reserved list (both within the registry and publicly facing) will be continually updated to reflect any changes.

In addition to these requirements, CENTRALNIC are able to support the wishes of the Governmental Advisory Council (GAC) or any individual Government in regard to the blocking of individual terms on a case by case basis. CENTRALNIC's registry system allows such additions to be made by appropriately authorised staff, with no further system development changes required.

The following applies to all Domain Names contained within the registry's reserved list:

– Attempts to register listed Domain Names will be rejected.
– WhoIs queries for listed Domain Names will receive responses indicating their reserved status.
– Reserved geographic names will not appear in the TLD zone file.
– DNS queries for reserved domain names will result in an NXDOMAIN response.

2. PROCEDURES FOR RELEASE

We understand that if we wish to release the reserved names at a later date, this will require agreement from the relevant government (s) or review by the GAC, and subsequent approval from ICANN.

This completes our response to Q22.

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23. Provide name and full description of all the Registry Services to be provided. Descriptions should include both technical and business components of each proposed service, and address any potential security or stability concerns.
The following registry services are customary services offered by a registry operator:

A. Receipt of data from registrars concerning registration of domain names and name servers.
B. Dissemination of TLD zone files.
C. Dissemination of contact or other information concerning domain name registrations (e.g., port-43 WHOIS, Web- based Whois, RESTful Whois service).
D. Internationalized Domain Names, where offered.

E. DNS Security Extensions (DNSSEC). The applicant must describe whether any of these registry services are intended to be offered in a manner unique to the TLD.

Additional proposed registry services that are unique to the registry must also be described.

DotWeb Inc has chosen CentralNic as the registry infrastructure provider for the TLD. Please see Appendix 23.1 for the acceptance letter from CentralNic. Any information regarding technical and operational capability of the proposed TLD registry (answers to questions 23 – 44) therefore refers to CentralNic's registry infrastructure systems.

DotWeb Inc and CentralNic hereby explicitly confirm that all registry services stated below are engineered and will be provided in a manner compliant with the new gTLD Registry Agreement, ICANN consensus policies (such as Inter-Registrar Transfer Policy and AGP Limits Policy) and applicable technical standards. Except for the registry services described above, no other services will be provided by the Registry that relate to (i) receipt of data from registrars concerning registrations of domain names and name servers; (ii) provision to registrars of status information relating to the zone servers for the TLD;(iii) dissemination of TLD zone files; (iv) operation of the Registry zone servers; or (v) dissemination of contact and other information concerning domain name server registrations in the TLD as required by the Registry Agreement.

There are no other products or services, except those described above that the Registry Operator will provide (i) because of the establishment of a Consensus Policy, or (ii) by reason of DotWeb Inc being designated as the Registry Operator.

Any changes to the registry services that may be required at a later time in the course of DotWeb Inc. operating the registry will be addressed using rules and procedures established by ICANN such as the Registry Services Evaluation Policy.

DotWeb Inc proposes to operate the following registry services, utilising CentralNic's registry system:

23.1. Receipt of Data From Registrars

CentralNic will operate a Shared Registry System (SRS) for the TLD. The SRS consists of a database of registered domain names, host objects and contact objects, accessed via an Extensible Provisioning Protocol (EPP) interface, and a web based Registrar Console. Registrars will uses these interfaces to provide registration data to the registry.

The SRS will be hosted at CentralNic's primary operations centre in London, UK. The primary operations centre comprises a resilient, fault-tolerant network infrastructure with multiple high quality redundant links to backbone Internet carriers. The primary operations centre is hosted in Level 3's flagship European data centre and boasts significant physical security capabilities, including 24x7 patrols, CCTV and card-based access controls.

CentralNic's existing SRS system currently supports more than 250,000 domain names managed by over 1,500 registrars. CentralNic has effective and efficient 24x7 customer support capabilities to support these domain names and registrars, and this capability will be expanded to meet the requirements of the TLD and provide additional capacity during periods of elevated activity (such as during Sunrise periods).

The SRS and EPP systems are described more fully in Q24 and Q25. The Registrar Console is described in Q31.

EPP is an extensible protocol by definition. Certain extensions have been put in place to comply with the new gTLD registry agreement, ICANN Consensus Policies and technical standards:

1. Registry Grace Period Mapping - compliant with RFC 3915 (http://tools.ietf.org/html/rfc3915)

2. DNSSEC Security Extensions - compliant with RFC 5910 (http://tools.ietf.org/html/rfc5910)

3. Launch Phase Extension - will be only active during the Sunrise phase, before the SRS opens for the general public. The extension is compliant with the current Internet Draft https://github.com/wil/EPP-Launch-Phase-Extension-Specification/blob/master/draft-tan-epp-launchphase.txt

More information on EPP extensions is provided in Q25.

The SRS will implement and support all ICANN Consensus Policies and Temporary Policies, including:

*Uniform Domain Name Dispute Resolution Policy

*Inter-Registrar Transfer Policy

*Whois Marketing Restriction Policy

*Restored Names Accuracy Policy

*Expired Domain Deletion Policy

*AGP Limits Policy

23.2. Provision to Registrars of Status Information Relating to the Zone Servers

CentralNic will operate a communications channel to notify registrars of all operational issues and activity relating to the DNS servers which are authoritative for the TLD. This includes notifications relating to:

1. Planned and unplanned maintenance;

2. Denial-of-service attacks;

3. unplanned network outages;

4. delays in publication of DNS zone updates;

5. security incidents such as attempted or successful breaches of access controls;

6. significant changes in DNS server behaviour or features;

7. DNSSEC key rollovers.

Notifications will be sent via email (to preregistered contact addresses), with additional notifications made via an off-site maintenance site and via social media channels.

23.3. Dissemination of TLD Zone Files

CentralNic will make TLD zone files available via the Centralized Zone Data Access Provider according to specification 4, section 2 of the Registry Agreement.

DotWeb Inc. will enter into an agreement with any Internet user that will allow such user to access an Internet host server or servers designated by DotWeb Inc. and download zone file data. The agreement will be standardized, facilitated and administered by a Centralized Zone Data Access Provider (the “CZDA Provider”). DotWeb Inc. will provide access to zone file data using the file format described in Section 2.1.4 of Specification 4 of the New gTLD Registry Agreement.

DotWeb Inc., through the facilitation of the CZDA Provider, will request each user to provide it with information sufficient to correctly identify and locate the user. Such user information will include, without limitation, company name, contact name, address, telephone number, facsimile number, email address, and the Internet host machine name and IP address.

DotWeb Inc. will provide the Zone File FTP (or other Registry supported) service for an ICANN-specified and managed URL for the user to access the Registry’s zone data archives. DotWeb Inc. will grant the user a non-exclusive, non-transferable, limited right to access DotWeb Inc.’s Zone File FTP server, and to transfer a copy of the top-level domain zone files, and any associated cryptographic checksum files no more than once per 24 hour period using FTP, or other data transport and access protocols that may be prescribed by ICANN.

DotWeb Inc. will provide zone files using a sub-format of the standard Master File format as originally defined in RFC 1035 (http://tools.ietf.org/html/rfc1035), Section 5, including all the records present in the actual zone used in the public DNS.

DotWeb Inc., through CZDA Provider, will provide each user with access to the zone file for a period of not less than three (3) months. DotWeb Inc. will allow users to renew their Grant of Access.

DotWeb Inc. will provide, and CZDA Provider will facilitate, access to the zone file to user at no cost.

23.4. Operation of the Registry Zone Servers

The TLD zone will be served from CentralNic's authoritative DNS system. This system has operated at 100% service availability since 1996 and has been developed into a secure and stable platform for domain resolution. Partnering with Community DNS, CentralNic's DNS system includes nameservers in more than forty cities, on five continents. The DNS system fully complies with all relevant RFCs and all ICANN specifications, and has been engineered to ensure resilience and stability in the face of denial-of-service attacks, with substantial overhead and geographical dispersion.

The DNS system is described further in Q35.

23.5. Dissemination of Contact and Other Information Concerning Domain Name Server Registrations

CentralNic will operate a Whois service for the TLD. The Whois service will provide information about domain names, contact objects, and name server objects stored in the Shared Registry System via a port-43 service compliant with RFC 3912 (http://tools.ietf.org/html/rfc3912). The Whois service will permit interested parties to obtain information about the Registered Name Holder, Administrative, Technical and Billing contacts for domain names. The Whois service will return records in a standardised format which complies with ICANN specifications.

CentralNic will provide access to the Whois service at no cost to the general public.

CentralNic's Whois service supports a number of features, including rate limiting to prevent abuse and privacy protections for natural persons. The Whois service is more fully described in Q26.

Should ICANN specify alternative formats and protocols for the dissemination of Domain Name Registration Data, CentralNic will implement such alternative specifications as soon as reasonably practicable.

23.6. DNSSEC

The TLD zone will be signed by DNSSEC. CentralNic uses the award-winning signer technology from Xelerance Corporation. Zone files will be signed using NSEC3 with opt-out, following a DNSSEC Practice Statement detailed in Q43.

CentralNic's DNSSEC implementation complies with RFCs 4033, 4034, 4035, 4509 and follows the best practices described in RFC 4641 (http://tools.ietf.org/html/rfc4641). Hashed Authenticated Denial of Existence (NSEC3) will be implemented, which complies with RFC 5155 (http://tools.ietf.org/html/rfc5155). The SRS will accept public-key material from child domain names in a secure manner according to industry best practices (specifically the secDNS EPP extension, described in RFC 5910(http://tools.ietf.org/html/rfc5910)). CentralNic will also publish in its website the DNSSEC Practice Statements (DPS) describing critical security controls and procedures for key material storage, access and usage for its own keys and secure acceptance of registrants' public-key material. CentralNic will publish its DPS following the format described in the "DPS-framework" Internet Draft within 180 days after that draft becomes an RFC.

23.7. Rights Protection Mechanisms

DotWeb Inc. will provide all mandatory Rights Protection Mechanisms that are specified in DotWeb Inc. Guidebook (version 11 January 2012), namely Trademark Claims Service (section 6.1) and Sunrise service (section 6.2). All the required RPM-related policies and procedures such as UDRP, URS, PDDRP and RRDRP will be adopted and used in the TLD. More information is available in Q29.

In addition to such RPMs, DotWeb Inc. may develop and implement additional RPMs that discourage or prevent registration of domain names that violate or abuse another party’s legal rights. DotWeb Inc. will include all ICANN mandated and independently developed RPMs in the registry-registrar agreement entered into by ICANN-accredited registrars authorised to register names in the TLD. DotWeb Inc. shall implement these mechanisms in accordance with requirements established by ICANN each of the mandatory RPMs set forth in the Trademark Clearinghouse.

The "LaunchPhase" EPP extension (described above) will be used to implement an SRS interface during the Sunrise period for the TLD. Depending on the final specification for the Trademark Claims Service (details of which have not yet been published), an additional EPP extension may be required in order to implement this service. If this is necessary, the extension will be designed to minimise its effect on the operation of the SRS and the requirements on registrars, and will only be in place for a limited period while the Trademark Claims Service is in effect for the TLD.

23.8. Registrar Support and Account Management

CentralNic will leverage its 16 years of experience of supporting over 1,500 registrars to provide high-quality 24x7 support and account management for the TLD registrars. CentralNic's experienced technical and customer support personnel will assist the TLD registrars during the on-boarding and OT&E process, and provide responsive personal support via email, phone and a web based support ticketing system.

23.9. Reporting to ICANN

DotWeb Inc. and CentralNic will compile and transmit a monthly report to ICANN relating to the TLD. This report will comply with Specification 3 of the New gTLD Registry Agreement.

23.10. Personnel Resources of CentralNic

The technical, operations and support functions of the registry will performed in-house by CentralNic's personnel. These personnel perform these functions on a full-time basis.

23.10.1. Technical Operations

Technical Operations refers to the deployment, maintenance, monitoring and security of the registry system, including the SRS and the other critical registry functions. Technical Operations staff design, build, deploy and maintain the technical infrastructure that supports the registry system, including power distribution, network design, access control, monitoring and logging services, and server and database administration. Internal helpdesk and incident reporting is also performed by the Technical Operations team. The Technical Operations team performs 24x7 monitoring and support for the registry system and mans the Network Operations Centre (NOC) from which all technical activities are co-ordinated.

CentralNic intends to maintain a Technical Operations team consisting of the following positions. These persons will be

responsible for managing, developing and monitoring the registry system for the TLD on a 24x7 basis:

*Senior Operations Engineer(s)

*Operations Engineer(s)

*Security Engineer

23.10.2. Technical Development

The Technical Development team develops and maintains the software which implements the critical registry functions, including the EPP, Whois, Zone file generation, data escrow, reporting, back office and web-based management systems (intranet and extranet), and open-source registrar toolkit software. All critical registry software has been developed and maintained in-house by this team.

CentralNic intends to maintain a Technical Development team consisting of the following positions. These persons will be responsible for maintaining and developing the registry software which will support the TLD:

*Senior Technical Developer x 2

*Technical Developer x 3

23.10.3. Technical Support

Technical Support refers to 1st, 2nd and 3rd line support for registrars and end-users. Areas covered include technical support for systems and services, billing and account management. Support personnel also deal with compliance and legal issues such as UDRP and URS proceedings, abuse reports and enquiries from law enforcement.

1st line support issues are normally dealt with by these personnel. 2bd and 3rd line support issues (relating to functional or operational issues with the registry system) are escalated to Technical Operations or Technical Development as necessary.

The Technical Support team will consist of the following positions:

*Operations Manager

*Support Manager

*Support Agent(s)

Our overseas account managers also perform basic support functions, escalating to the support agents in London where necessary.

23.10.4. Key Personnel

23.10.4.1. Gavin Brown - Chief Technology Officer

Gavin has worked at CentralNic since 2001, becoming CTO in 2005. He has overall responsibility for all aspects of the SRS, Whois, DNS and DNSSEC systems. He is a respected figure in the domain industry and has been published in several professional technical journals, and co-authored a book on the Perl programming language. He also participates in a number of technical, public policy and advocacy groups and several open source projects. Gavin has a BSc (hons) in Physics from the University of Kent.

23.10.4.2. Jenny White - Operations Manager

Jenny has been with CentralNic for nine years. Throughout this time she has expertly managed customer relations with external partners, prepared new domain launch processes and documentation, managed daily support and maintenance for over 1,500 Registrars, carried out extensive troubleshooting within the registrar environment to ensure optimum usability for registrars across communication platforms, handled domain disputes (from mediation to WIPO filing), and liaised with WIPO to implement changes to the Dispute Resolution Procedure when necessary.

23.10.4.3. Adam Armstrong - Senior Operations Engineer

Adam has recently joined CentralNic as Senior Operations Engineer. In this role he is responsible for the operation and development of the system and network infrastructure for the registry system. Adam has previously worked at a number of large UK ISPs including Jersey Telecom and Packet Exchange. He is also the lead developer of Observium, a network management system used by ICANN (amongst others). Adam has brought his strong knowledge of network design, management and security to bear at CentralNic and will oversee the operation of the SRS for the TLD.

23.10.4.4. Milos Negovanovic - Senior Technical Developer

Milos has worked at CentralNic since 2009. He has a background in building rich web applications and protocol servers. His main areas of responsibility are the Registrar Console, EPP and backoffice functions.

23.10.4.5. Mary O'Flaherty - Senior Technical Developer

Mary has worked at CentralNic since 2008. She plays an

integral role in the ongoing design, development and maintenance of the registry as a whole and has specific experience with the EPP system, Registrar Console and Staff Console. Mary has a 1st class Honors degree in Computer Science from University College Cork and has previously worked for Intel and QAD Ireland.

23.10.5. Job Descriptions

CentralNic will recruit a number of new employees to perform technical duties in relation to the TLD and other gTLDs. The following job descriptions will be used to define these roles and select candidates with suitable skills and experience.

23.10.5.1. Operations Engineer

Operations Engineers assist in the maintenance and development of the network and server infrastructure of the registry system. Operations Engineers have a good knowledge of the TCP/IP protocol stack and related technologies, and are familiar with best practice in the areas of network design and management and system administration. They should be competent system administrators with a good knowledge of Unix system administration, and some knowledge of shell scripting, software development and databases. Operations Engineers have 1-2 year's relevant commercial experience. Operations Engineers report to and work with the Senior Operations Engineer, who provides advice and mentoring. Operations Engineers participate in manning the NOC on a 24x7 basis and participate in the on-call shift rota.

23.10.5.2. Security Engineer

Security Engineers enhance and assure the security of the registry system. Day-to-day responsibilities are: responding to security incidents, performing analysis and remediating vulnerabilities, conducting tests of access controls, refining system configuration to improve security, training other team members, reviewing source code, maintaining security policies and procedures, and gathering intelligence relating to threats to the registry. Security Engineers have 1-2 year's relevant commercial experience. This role reports to and works with the Senior Operations Engineer and CTO. Security Engineers participate in manning the NOC on a 24x7 basis and participate in the on-call shift rota.

23.10.5.3. Technical Developer

Technical Developers are maintain the software which supports the registry. Day-to-day responsibilities are developing new systems in response to requests from management and customers, correcting bugs in existing software, and improving its performance. Technical Developers have a good knowledge of general programming practices including use of revision control and code review systems. Developers have a good awareness of security issues, such as those described in advisories published by the oWASP Project. Developers have at least one years' commercial experience in developing applications in programming languages such as PHP, Perl, and Python, although knowledge of domain technologies such as EPP and DNS is not critical. Technical Developers work as part of a team, with advice and mentoring from the Senior Technical Developers, to whom they report.

23.10.6. Resource Matrix

To provide a means to accurately and objectively predict human resource requirements for the operation of the registry system, CentralNic has developed a Resourcing Matrix, which assigns a proportion of each employee's available time to each aspect of registry activities. These activities include technical work such as operations and development, as well as technical support, registrar account management, rights protection, abuse prevention, and financial activity such as payroll, cash collection, etc. This matrix then permits the calculation of the total HR resource assigned to each area.

A copy of the Resourcing Matrix is included as Appendix 23.2. It is important to note that the available resources cover the operation of CentralNic's entire registry operations: this includes CentralNic's own domain registry portfolio (uk.com, us.com, etc), the .LA and .PW ccTLDs, as well as the gTLDs which CentralNic will provides registry service for.

The actual proportion of human technical resources required specifically for the TLD is determined by the relative size of the TLD to the rest of CentralNic's operations. This calculation is based on the projected number of domains after three years of operation: the optimistic scenario is used to ensure that sufficient personnel is on hand to meet periods of enhanced demand. CentralNic has calculated that, if all its TLD clients are successful in their applications, and all meet their optimistic projections after three years, its registry system will be required to support up to 4.5 million domain names.

Since the optimistic projection for the number of domains registered in the TLD after three years is 471,500, the TLD will therefore require 10.48% of CentralNic's total available HR resources in order operate fully and correctly. In the event that registration volumes exceed this figure, CentralNic will proactively increase the size of the Technical Operations, Technical Development and support teams to ensure that the needs of the TLD are fully met. Revenues from the additional registration volumes will fund the

salaries of these new hires. Nevertheless, CentralNic is confident that the staffing outlined above is sufficient to meet the needs of the TLD for at least the first 18 months of operation.

This completes our response to Q23.

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24. Shared Registration System (SRS) Performance:
describe

- the plan for operation of a robust and reliable SRS. SRS is a critical registry function for enabling multiple registrars to provide domain name registration services in the TLD. SRS must include
  the EPP interface to the registry, as well as any other interfaces intended to be provided, if they are critical to the functioning of the registry. Please refer to the requirements in Specification 6 (section 1.2) and Specification 10 (SLA Matrix) attached to the Registry Agreement; and
  • resourcing plans for the initial implementation of, and ongoing maintenance for, this aspect of the criteria (number and description of personnel roles allocated to this area).
  A complete answer should include, but is not limited to:
- A high-level SRS system description;
- Representative network diagram(s);
- Number of servers;
- Description of interconnectivity with other registry systems;
- Frequency of synchronization between servers; and
- Synchronization scheme (e.g., hot standby, cold standby).

Except where specified, this answer refers to the operations of DotWeb Inc.'s outsource Registry Service Provider, CentralNic.

24.1. Registry Type

CentralNic operates a "thick" registry in which the registry maintains copies of all information associated with registered domains. Registrars maintain their own copies of registration information, thus registry-registrar synchronization is required to ensure that both registry and registrar have consistent views of the technical and contact information associated with registered

domains. The Extensible Provisioning Protocol (EPP) adopted supports the thick registry model. See Q25 for further details.

24.2. Architecture

Figure 24.1 provides a diagram of the overall configuration of the SRS. This diagram should be viewed in the context of the overall architecture of the registry system described in Q32.

The SRS is hosted at CentralNic's primary operations centre in London. It is connected to the public Internet via two upstream connections, one of which is provided by Qube. Figure 32.1 provides a diagram of the outbound network connectivity. Interconnection with upstream transit providers is via two BGP routers which connect to the firewalls which implement access controls over registry services.

Within the firewall boundary, connectivity is provided to servers by means of resilient gigabit ethernet switches implementing Spanning Tree Protocol.

The registry system implements two interfaces to the SRS: the standard EPP system (described in Q25) and the Registrar Console (described in Q31). These systems interact with the primary registry database (described in Q33). The database is the central repository of all registry data. Other registry services also interact with this database.

An internal "Staff Console" is used by CentralNic personnel to perform management of the registry system.

24.3. EPP System Architecture

A description of the characteristics of the EPP system is provided in Q25. This response describes the infrastructure which supports the EPP system.

A network diagram for the EPP system is provided in Figure 24.2. The EPP system is hosted at the primary operations centre in London. During failover conditions, the EPP system operates from the Isle of Man Disaster Recovery site (see Q34).

CentralNic's EPP system has a two-layer logical and physical architecture, consisting of load balancers and a cluster of application servers. Each layer can be scaled horizontally in order to meet demand.

Registrars establish TLS-secured TCP connections to the load balancers on TCP port 700. Load is balanced using DNS round-robin load balancing.

The load balancers pass sessions to the EPP application servers. Load is distributed using a weighted-least-connections algorithm. The protocol servers run the Apache web server with the mod_epp module. These servers implement the EPP state diagram and handle registrar commands using application code.

Each component of the system is resilient: multiple inbound connections, redundant power, high availability firewalls, load balancers and application server clusters enable seamless operation in the event of component failure. This architecture also allows for arbitrary horizontal scaling: commodity hardware is used throughout the system and can be rapidly added to the system, without disruption, to meet an unexpected growth in demand.

The EPP system will comprise of the following systems:

*3x load balancers (1U rack mount servers with quad-core Intel processors, 16GB RAM, 40GB solid-state disk drives, running the CentOS operating system using the Linux Virtual Server [see http://www.linuxvirtualserver.org/])

*12x EPP protocol servers (1U rack mount servers with dual-core Intel processors, 16GB RAM, solid-state disk drives, running the CentOS operating system using Apache and mod_epp)

24.3.1. mod_epp

mod_epp is an Apache server module which adds support for the EPP transport protocol to Apache. This permits implementation of an EPP server using the various features of Apache, including CGI scripts and other dynamic request handlers, reverse proxies, and even static files. mod_epp was originally developed by Nic.at, the Austrian ccTLD registry. Since its release, a large number of ccTLD and other registries have deployed it and continue to support its development and maintenance. Further information can be found at http://sourceforge.net/projects/aepps. CentralNic uses mod_epp to manage EPP sessions with registrar clients, and to convert EPP commands into HTTP requests which can then be handled by backend application code.

24.4. Performance

CentralNic performs continuous remote monitoring of its EPP system, and this monitoring includes measuring the performance of various parts of the system. As of writing, the average round-trip times (RTTs) for various functions of the EPP system were as follows:

*connect time: 40ms

*login time: 20ms

*hello time: 7ms

*check time: 15ms

*logout time: 6ms

These figures include an approximate latency of 3.2ms due to the distance between the monitoring site and the EPP system. They were recorded during normal weekday operations during the busiest time of the day (around 1300hrs UTC) and compare very favourably to the requirement of 4,000ms for session commands and 2,000ms for query commands defined in the new gTLD Service Level Agreement. RTTs for overseas registrars will be higher than this due to the greater distances involved, but will remain well within requirements.

24.5. Scaling

Horizontal scaling is preferred over vertical scaling. Horizontal scaling refers to the introduction of additional nodes into a cluster, while vertical scaling involves using more powerful equipment (more CPU cores, RAM etc) in a single system. Horizontal scaling also encourages effective mechanisms to ensure high-availability, and eliminate single points of failure in the system.

Vertical scaling leverages Moore's Law: when units are

depreciated and replaced, the new equipment is likely to be significantly more powerful. If the average lifespan of a server in the system is three years, then its replacement is likely to be around four times as powerful as the old server.

For further information about Capacity Management and Scaling, please see Q32.

24.6. Registrar Console

The Registrar Console is a web-based registrar account management tool. It provides a secure and easy-to-use graphical interface to the SRS. It is hosted on a virtual platform at the primary operations centre in London. As with the rest of the registry system, during a failover condition it is operated from the Isle of Man. The virtual platform is described in Figure 24.3.

The features of the Registrar Console are described in Q31.

The virtual platform is a utility platform which supports systems and services which do not operate at significant levels of load, and which therefore do not require multiple servers or the additional performance that running on "bare metal" would provide. The platform functions as a private cloud, with redundant storage and failover between hosts.

The Registrar Console currently sustains an average of 6 page requests per minute during normal operations, with peak volumes of around 8 requests per minute. Volumes during weekends are significantly lower (fewer than 1 requests per minute). Additional load resulting from this and other new gTLDs is expected to result in a trivial increase in Registrar Console request volumes, and CentralNic does not expect additional hardware resources to be required to support it.

24.7. Quality Assurance

CentralNic employs the following quality assurance (QA) methods:

1. 24x7x365 monitoring provides reports of incidents to NOC

2. Quarterly review of capacity, performance and reliability

3. Monthly reviews of uptime, latency and bandwidth consumption

4. Hardware depreciation schedules

5. Unit testing framework

6. Frequent reviews by QA working group

7. Schema validation and similar technologies to monitor compliance on a real-time, ongoing basis

8. Revision control software with online annotation and change logs

9. Bug Tracking system to which all employees have access

10. Code Review Policy in place to enforce peer review of all changes to core code prior to deployment

11. Software incorporates built-in error reporting mechanisms to detect flaws and report to Operations team

12. Four stage deployment strategy: development environment, staging for internal testing, OT&E deployment for registrar testing, then finally production deployment

13. Evidence-based project scheduling

14. Specification development and revision

15. Weekly milestones for developers

16. Gantt charts and critical path analysis for project planning

Registry system updates are performed on an ongoing basis, with any user-facing updates (ie changes to the behaviour of the EPP interface) being scheduled at specific times. Disruptive maintenance is scheduled for periods during which activity is lowest.

24.8. Billing

CentralNic operates a complex billing system for domain name registry services to ensure registry billing and collection services are feature rich, accurate, secure, and accessible to all registrars. The goal of the system is to maintain the integrity of data and create reports which are accurate, accessible, secured, and scalable. The foundation of the process is debit accounts established for each registrar. CentralNic will withdraw all domain fees from the registrar’s account on a per-transaction basis. CentralNic will provide fee-incurring services (e.g., domain registrations, registrar transfers, domain renewals) to a registrar for as long as that registrar’s account shows a positive balance.

Once ICANN notifies DotWeb Inc. that a registrar has been issued accreditation, CentralNic will begin the registrar on-boarding process, including setting up the registrar's financial account within the SRS.

24.9. Registrar Support

CentralNic provides a multi-tier support system on a 24x7 basis with the following support levels:

*1st Level: initial support level responsible for basic customer issues. The first job of 1st Level personnel is to gather the customer’s information and to determine the customer’s issue by analyzing the symptoms and figuring out the underlying problem.

*2nd Level: more in-depth technical support level than 1st Level support containing experienced and more knowledgeable personnel on a particular product or service. Technicians at this level are responsible for assisting 1st Level personnel solve basic

technical problems and for investigating elevated issues by confirming the validity of the problem and seeking for known solutions related to these more complex issues.

*3rd Level: the highest level of support in a three-tiered technical support model responsible for handling the most difficult or advanced problems. Level 3 personnel are experts in their fields and are responsible for not only assisting both 1st and 2nd level personnel, but with the research and development of solutions to new or unknown issues.

CentralNic provides a support ticketing system for tracking routine support issues. This is a web based system (available via the Registrar Console) allowing registrars to report new issues, follow up on previously raised tickets, and read responses from CentralNic support personnel.

When a new trouble ticket is submitted, it is assigned a unique ID and priority. The following priority levels are used: n

1. Normal: general enquiry, usage question, or feature enhancement request. Handled by 1st level support.

2. Elevated: issue with a non-critical feature for which a work-around may or may not exist. Handled by 1st level support.

3. Severe: serious issue with a primary feature necessary for daily operations for which no work-around has been discovered and which completely prevents the feature from being used. Handled by 2nd level support.

4. Critical: A major production system is down or severely impacted. These issues are catastrophic outages that affect the overall Registry System operations. Handled by 3rd level support.

Depending on priority, different personnel will be alerted to the existence of the ticket. For example, a Priority 1 ticket will cause a notification to be emailed to the registrar customer support team, but a Priority 4 ticket will result in a broadcast message sent to the pagers of senior operations staff including the CTO. The system permits escalation of issues that are not resolved within target resolution times.

24.10. Enforcement of Eligibility Requirements

The SRS supports enforcement of eligibility requirements, as required by specific TLD policies.

Figure 24.4 describes the process by which registration requests are validated. Prior to registration, the registrant's eligibility is validated by a Validation Agent. The registrant then instructs their registrar to register the domain. The SRS returns an "Object Pending" result code (1001) to the registrar.

The request is sent to the Validation Agent by the registry. The Validation Agent either approves or rejects the request, having reconciled the registration information with that recorded during the eligibility validation. If the request has been approved, the domain is fully registered. If it is rejected, the domain is immediately removed from the database. A message is sent to the registrar via the EPP message queue in either case. The registrar then notifies the registrant of the result.

24.11. Interconnectivity With Other Registry Systems

The registry system is based on multiple resilient stateless modules. The SRS, Whois, DNS and other systems do not directly

interact with each other. Interactions are mediated by the database which is the single authoritative source of data for the registry as a whole. Individuals modules perform "CRUD" (create, read, update, delete) actions upon the database. These actions then affect the behaviour of other registry systems: for example, when a registrar adds the "clientHold" status to a domain object, this is recorded in the database. When a query is received for this domain via the Whois service, the presence of this status code in the database results in the "Status: CLIENT HOLD" appearing in the whois record. It will also be noted by the zone generation system, resulting in the temporary removal of the delegation of the domain name from the DNS.

24.12. Resilience

The SRS has a stateless architecture designed to be fully resilient in order to provide an uninterrupted service in the face of failure or one or more parts of the system. This is achieved by use of redundant hardware and network connections, and by use of continuous "heartbeat" monitoring allowing dynamic and high-speed failover from active to standby components, or between nodes in an active-active cluster. These technologies also permit rapid scaling of the system to meet short-term increases in demand during "surge" periods, such as during the initial launch of a new TLD.

24.12.1. Synchronisation Between Servers and Sites

CentralNic's system is implemented as multiple stateless systems which interact via a central registry database. As a result, there are only a few situations where synchronisation of data between servers is necessary:

1. replication of data between active and standby servers (see Q33). CentralNic implements redundancy in its database system by means of an active/standby database cluster. The database system used by CentralNic supports native real-time replication of data allowing operation of a reliable hot standby server. Automated heartbeat monitoring and failover is implemented to ensure continued

access to the database following a failure of the primary database system.

2. replication is used to synchronise the primary operations centre with the Disaster Recovery site hosted in the Isle of Man (see Q34). Database updates are replicated to the DR site in real-time via a secured VPN, providing a "hot" backup site which can be used to provide registry services in the event of a failure at the primary site.

24.13. Operational Testing and Evaluation (OT&E)

An Operational Testing and Evaluation (OT&E) environment is provided for registrars to develop and test their systems. The OT&E system replicates the SRS in a clean-room environment. Access to the OT&E system is unrestricted and unlimited: registrars can freely create multiple OT&E accounts via the Registrar Console.

24.14. Resourcing

As can be seen in the Resourcing Matrix found in Appendix 23.2, CentralNic will maintain a team of full-time developers and engineers which will contribute to the development and maintenance of this aspect of the registry system. These developers and engineers will not work on specific subsystems full-time, but a certain percentage of their time will be dedicated to each area. The total HR resource dedicated to this area is equivalent to more than one full-time post.

CentralNic operates a shared registry environment where multiple registry zones (such as CentralNic's domains, the .LA and .PW ccTLDs, this TLD and other gTLDs) share a common infrastructure and resources. Since the TLD will be operated in an identical manner to these other registries, and on the same

infrastructure, then the TLD will benefit from an economy of scale with regards to access to CentralNic's resources.

CentralNic's resourcing model assumes that the "dedicated" resourcing required for the TLD (ie, that required to deal with issues related specifically to the TLD and not to general issues with the system as a whole) will be equal to the proportion of the overall registry system that the TLD will use. After three years of operation, the optimistic projection for the TLD states that there will be 471,500 domains in the zone. CentralNic has calculated that, if all its TLD clients are successful in their applications, and all meet their optimistic projections after three years, its registry system will be required to support up to 4.5 million domain names. Therefore the TLD will require 10.48% of the total resources available for this area of the registry system.

In the event that registration volumes exceed this figure, CentralNic will proactively increase the size of the Technical Operations, Technical Development and support teams to ensure that the needs of the TLD are fully met. Revenues from the additional registration volumes will fund the salaries of these new hires. Nevertheless, CentralNic is confident that the staffing outlined above is sufficient to meet the needs of the TLD for at least the first 18 months of operation.

This completes our response to Q24.

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25. Extensible Provisioning Protocol (EPP): provide a detailed description of the interface with registrars, including how the applicant will comply with EPP in RFCs 3735 (if applicable), and 5730-5734.
If intending to provide proprietary EPP extensions, provide documentation consistent with RFC 3735, including the EPP templates and schemas that will be used.
Describe resourcing plans (number and description of personnel roles allocated to this area).
A complete answer is expected to be no more than 5 pages. If there are proprietary EPP extensions, a complete answer is also expected to be no more than 5 pages per EPP extension.

Except where specified this answer refers to the operations of DotWeb Inc.'s outsource Registry Service Provider, CentralNic.

The Extensible Provisioning Protocol (EPP) is an application layer client-server protocol for the provisioning and management of objects stored in a shared central repository. EPP defines generic object management operations and an extensible framework that maps protocol operations to objects. EPP has become established as the common protocol by which domain registrars can manage domains, nameservers and contact details held by domain registries. It is widely deployed in the gTLD and ccTLD registry space.

CentralNic has operated its EPP system since 2005, and it currently operates at significant load in terms of registrars, sessions and transaction volumes. CentralNic's EPP system is fully compliant with the following RFC specifications:

*5730 - Base Protocol

*5731 - Domains

*5732 - Host Objects

*5733 - Contact Objects

*5734 - TCP Transport

*3735 - Extension Guidelines

*3915 - RGP Extension

*5910 - DNSSEC Extension

25.1. Description of Interface

EPP is a stateful XML protocol layered over TCP (see RFC 3734 (http://tools.ietf.org/html/rfc3734)). Protected using lower-layer security protocols, clients exchange identification, authentication, and option information, and engage in a series of client-initiated command-response exchanges. All EPP commands are atomic (there is no partial success or partial failure) and designed so that they can be made idempotent (executing a command more than once has the same net effect on system state as successfully executing the command once).

EPP provides four basic service elements: service discovery, commands, responses, and an extension framework that supports definition of managed objects and the relationship of protocol requests and responses to those objects.

EPP servers respond to client-initiated communication (which can be either a lower-layer connection request or an EPP service discovery message) by returning a greeting to a client. The server then responds to each EPP command with a coordinated response that describes the results of processing the command.

EPP commands fall into three categories: session management, queries, and transform commands. Session management commands are used to establish and end persistent sessions with an EPP server. Query commands perform read-only object information retrieval operations. Transform commands perform read-write object management operations.

Commands are processed by a server in the order they are received from a client. The protocol includes features that allow for offline review of transform commands before the requested action is completed. In such situations, the response clearly notes that the command has been received but that the requested action is pending. The corresponding object then reflects processing of the pending action. The server will

also notify the client when offline processing of the action has been completed. Object mappings describe standard formats for notices that describe completion of offline processing.

EPP uses XML namespaces to provide an extensible object management framework and to identify schemas required for XML instance parsing and validation. These namespaces and schema definitions are used to identify both the base protocol schema and the schemas for managed objects.

25.1.1. Objects supported

Registrars may create and manage the following object types in the CentralNic EPP system:

*domains (RFC 5731 (http://tools.ietf.org/html/rfc5731))

*host objects (RFC 5732 (http://tools.ietf.org/html/rfc5732))

*contact objects (RFC 5733 (http://tools.ietf.org/html/rfc5733))

25.1.2. Commands supported

CentralNic supports the following EPP commands:

*<hello> - retrieve the <greeting> from the server

*<login> and <logout> - session management

*<poll> - message queue management

*<check> - availability check

*<info> - object information

*<create> - create object

*<update> - update object

*<renew> - renew object

*<delete> - delete object

*<transfer> - manage object transfer

25.2. EPP state diagram

Figure 25.1 describes the state machine for the EPP system. Clients establish a connection with the server, which sends a greeting. Clients then authenticate, and once a login session is established, submits commands and receive responses until the server closes the connection, the client sends a logout command, or a timeout is reached.

25.3. EPP Object Policies

The following policies apply to objects provisioned via the EPP system:

25.3.1. domains

1. domains must comply with the syntax described in RFC 1035 (http://tools.ietf.org/html/rfc1035) §2.3.1. Additionally, the first label of the name must be between 3 and 63 characters in length.

2. domains must have a registrant attribute which is associated with a contact object in the database.

3. domains must have an administrative contact attribute which is associated with a contact object in the database.

4. domains must have a technical contact which attribute is associated with a contact object in the database.

5. domains may have an billing contact attribute which is associated with a contact object in the database.

6. domains may have between 0 (zero) and 13 DNS servers. A domain with no name servers will not resolve and no records will be published in the DNS

7. the host object model for domains is used rather than the host attribute model.

8. domains may have a number of status codes. The presence of certain status codes indicates the domain's position in the lifecycle, described further in §27.

9. where policy requires, the server may respond to a <domain:create> command with an "Object Pending" (1001) response. When this occurs, the domain is placed onto the pendingCreate status while an out-of-band validation process takes place.

10. when registered, the expiry date of a domain may be set up to ten years from the initial date of registration. Registrars can specify registration periods in one-year increments from one to ten.

11. when renewed, the expiry date of a domain may be set up to ten years from the current expiry date. Registrars can specify renewal periods in one-year increments from one to ten. domains which auto-renew are renewed for one year at a time.

12. domains must have an authInfo code which is used to authenticate inter-registrar transfer requests. This authInfo code may contain up to 48 bytes of UTF-8 character data.

13. domains may have one or more DS records associated with

them. DS records are managed via the secDNS EPP extension, as specified in RFC 5910 (http://tools.ietf.org/html/rfc5910).

14. only the sponsoring registrar of the domain may submit <update>, <renew> or <delete> commands for the domain.

25.3.2. Host objects

1. host names must comply with RFC 1035 (http://tools.ietf.org/html/rfc1035). The maximum length of the host name may not exceed 255 characters.

2. in-bailiwick hosts must have at least one address of either type (IPv4 or IPv6). Any number of additional addresses of either type may be provided

3. sponsorship of hosts is determined as follows: if an object is in-bailwick (ie child of a domain in the database, and therefore also child to a TLD in the system), then the sponsor is the sponsor of the parent domain. If the object is out-of-bailiwick, the sponsor is the registrar which created the contact.

4. if a registrar submits a change to the name of a host object, if the new host name is subordinate to an in-bailiwick domain, then that registrar must be the sponsor of the new parent domain.

5. registrars are not permitted to create hosts that are subordinate to a non-existent in-bailiwick domain, or to change the name of a host object so that it us subordinate to a non-existent in-bailiwick domain.

6. a host cannot be deleted if one or more domains are delegated to it (the registry deletes hosts to remove orphan glue, see §28).

7. inter-registrar transfers are not permitted.

8. only the sponsoring registrar of the host may submit <update> or <delete> commands for the object.

25.3.3. Contact objects

1. contact IDs may only contain characters from the set [A-Z, 0-9, . (period), - (hyphen) and - (underscore)] and are case-insensitive.

2. phone numbers and email addresses must be valid as described in RFC 5733 (http://tools.ietf.org/html/rfc5733) §2.5 and §2.6.

3. contact information is accepted and stored in "internationalized" format only: that is, contact objects only have a single <contact:postalInfo> element and the type attribute is always "int".

4. the <contact:org>, <contact:sp>, <contact:pc>, <contact:phone> and <contact:fax> elements are optional.

5. contacts must have an authInfo code which is used in

inter-registrar transfers. This code may contain up to 48 bytes of UTF-8 character data.

6. a contact cannot be deleted if one or more domains are associated with it.

7. only the sponsoring registrar of the contact may submit <update> or <delete> commands for the object.

25.4. EPP Extensions

CentralNic supports the following EPP extensions. CentralNic's implementations fully comply with the required specifications.

25.4.1. Registry Grace Period Mapping

Various grace periods and hold periods are supported by the Registry Grace Period mapping, as defined in RFC 3915 (http://tools.ietf.org/html/rfc3915). This is described further in §27.

25.4.2. DNSSEC Security Extensions Mapping

Registrars may submit Delegation Signer (DS) record information for domains under their sponsorship. This permits the establishment of a secure chain-of-trust for DNSSEC validation.

CentralNic supports the specification defined in RFC 5910 (http://tools.ietf.org/html/rfc5910). This supports two interfaces: the DS Data Interface and Key Data Interface. CentralNic supports the former interface (DS Data), where registrars submit the keytag, algorithm, digest type and digest for DS records as XML elements, rather than as key data. Key data is stored if provided as a child element of the <secDNS:dsData> element. The maxSigLife element is optional in the specification and is not currently supported.

25.4.3. Launch Phase Extension

CentralNic has assisted development of a standard EPP extension for registry "launch phases" (ie Sunrise and Landrush periods), during which the steady-state mode of "first-come, first-served" operation does not apply. This extension permits registrars to submit requests for domains with claimed rights such as a registered trademark. The extension is currently described in an Internet-Draft (see http://tools.ietf.org/html/draft-tan-epp-launchphase-00). It is hoped that this draft will eventually be published as an RFC which can be implemented by other registries and registrars.

CentralNic's system implements this extension and will support the most recent version of the draft during the initial launch of the TLD. Once the TLD enters General Availability, this extension will no longer be available for use by registrars. Example frames describing the use of this extension are included in Appendix 25.2.

If and when this extension is published as an RFC, CentralNic will update the implementation so that it is compliant with the final specification

25.4.4. IDN Extension

The IDN extension allows registrars to specify the IDN table associated with an IDN domain at the point of registration. It also extends the <domain:info> response to return the IDN table associated with

an IDN domain. This extension is specified at http://tools.ietf.org/html/draft-obispo-epp-idn.

If and when this extension is published as an RFC, CentralNic will update the implementation so that it is compliant with the final specification.

25.4.5. Fee Extension

This extension allows registrars to query for the fees charged by the registry for certain transactions. The server response provides a hint as to the fees charged to the registrar for the requested action. The extension extends the “check” command frame to include a currency, action (ie create, renew, transfer, restore) and period for a given transaction (in addition to the object specified in the main request). The response frame is extended to include the fee associated with the requested transaction.

This extension is specified at the following URL, which includes example request and response frames, and an EPP schema: http://tools.ietf.org/html/draft-brown-epp-fees

CentralNic’s implementation will be updated as the specification develops and will be finalized upon publication of the RFC.

25.5. Registrar Credentials and Access Control

Registrars are issued with a username (their registrar ID) and a password. This password cannot be used to access any other service and only this password can be used to access the EPP system. Registrar officers with the "Management" access level can change their EPP password via the Registrar Console.

RFC 5730 (http://tools.ietf.org/html/rfc5730) requires "mutual, strong client-server authentication". CentralNic requires that all registrars connect using an SSL certificate. This certificate may be obtained from a recognised certificate authority, or it may be a self-signed certificate registered with CentralNic via the Registrar Console. Registrar officers with the "Management" access level can upload SSL certificates for their account.

25.6. Session Limits and Transaction Volumes

There are no limits on the number of active sessions a registrar can maintain with the server. Similarly, there are no limits on the volume of transactions a registrar may send. However the system is fully capable of imposing connection limits and this measure may be used in future to ensure equal access amongst registrars.

25.7. Transaction Logging and Reporting

All "transform" commands are logged. Transform commands are: <create>, <renew>, <update>, <delete> and <transfer>. The system logs the time and date when the command was received, the registrar which submitted it, the request and response frames, the result code and message. All commands, whether successful or not, are logged.

The transaction log is stored in the primary registry database. Registrars have access to the log for their account via the Registrar Console. The log viewer permits filtering by command, object type, object ID (domain, host name, contact ID), result code and timestamp.

Query commands (<check>, <info>, <poll op="req">) and session commands (<login>, <logout> and <hello>) are not logged due to the large volume of such queries (particularly <check> queries). The EPP system uses counters for these commands to facilitate generation of monthly reports.

25.8. EPP Message Queue

The EPP protocol provides a message queue to provide registrars with notifications for out-of-band events. CentralNic currently supports the following EPP message notifications:

*approved inbound transfer

*rejected inbound transfer

*new outbound transfer

*cancelled outbound transfer

*approved or rejected domain registration request (where TLD policy requires out-of-band approval of <domain:create> requests)

25.9. Registrar Support, Software Toolkit

CentralNic has supported EPP for many years. CentralNic has released a number of open source client libraries for several popular programming languages. These are used by registrars and registries around the world. CentralNic maintains the following open source EPP libraries:

*Net::EPP, a general purpose EPP library for Perl. See http://code.google.com/p/perl-net-epp/

*Preppi, a graphical EPP client written in Perl. See https://www.centralnic.com/company/labs/preppi

*Net_EPP, a PHP client class for EPP. See https://github.com/centralnic/php-epp

*Simpleepp, a Python client class for EPP. See https://bitbucket.org/milosn/simpleepp

*tx-epp-proxy, a EPP reverse proxy for shared-nothing client architectures written in Python. See https://bitbucket.org/milosn/tx-epp-proxy

These libraries are available for anyone to use, at no cost. CentralNic develops these libraries, and accepts submissions and bug reports from users around the world.

25.10. Quality Assurance, RFC Compliance

To ensure that its EPP system fully complies with the relevant specifications documents, CentralNic has implemented the following:

25.10.1. Schema Validation

The EPP system automatically validates all response frames against the XSD schema definitions provided in the RFCs. Should a non-

validating response be sent to a registrar, an alert is raised with the NOC to be investigated and corrected. By default, this feature is disabled in the production environment but it is enabled in all other environments (as described below).

25.10.2. Multi-stage Deployment and Testing

EPP system code is developed, tested and deployed in a multi-stage environment:

1. Developers maintain their own development environment in which new code is written and changes are prepared. Development environments are configured with the highest level of debugging and strictness to provide early detection of faults.

2. All changes to the EPP system are subjected to peer review: other developers in the team must review, test and sign off the changes before being committed (or, if developed on a branch, being merged into the stable branch).

3. Changes to EPP system code are then deployed in the OT&E environment. Registrars continually test this system as part of their own QA processes, and this additional phase provides an additional level of quality assurance.

25.10.3. Registrar Feedback

Registrars are provided with an easy way to report issues with the EPP system, and many perform schema validation on the responses they receive. When issues are detected by registrars, they are encouraged to submit bug reports so that developers can rectify the issues.

25.11. EPP System Resourcing

As can be seen in the Resourcing Matrix found in Appendix 23.2, CentralNic will maintain a team of full-time developers and engineers which will contribute to the development and maintenance of this aspect of the registry system. These developers and engineers will not work on specific subsystems full-time, but a certain percentage of their time will be dedicated to each area. The total HR resource dedicated to this area is equivalent to more than one full-time person.

CentralNic operates a shared registry environment where multiple registry zones (such as CentralNic's domains, the .LA and .PW ccTLDs, this TLD and other gTLDs) share a common infrastructure and resources. Since the TLD will be operated in an identical manner to these other registries, and on the same infrastructure, then the TLD will benefit from an economy of scale with regards to access to CentralNic's resources.

CentralNic's resourcing model assumes that the "dedicated" resourcing required for the TLD (ie, that required to deal with issues related specifically to the TLD and not to general issues with the system as a whole) will be equal to the proportion of the overall registry system that the TLD will use. After three years of operation, the optimistic projection for the TLD states that there will be 471,500 domains in the zone. CentralNic has calculated that, if all its TLD clients are successful in their applications, and all meet their optimistic projections after three years, its registry system will be required to support up to 4.5 million domain names. Therefore the TLD will require 10.48% of the total resources available for this area of the registry system.

In the event that registration volumes exceed this figure, CentralNic will proactively increase the size of the Technical Operations, Technical Development and support teams to ensure that the needs of the TLD are fully met. Revenues from the additional registration volumes will fund the salaries of these new hires. Nevertheless, CentralNic is confident that the staffing outlined above is sufficient to meet the needs of the TLD for at least the first 18 months of operation.

This completes our response to Q25.

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26. Whois: describe

- how the applicant will comply with Whois specifications for data objects, bulk access, and lookups as defined in Specifications 4 and 10 to the Registry Agreement;
- how the Applicant's Whois service will comply with RFC 3912; and
- resourcing plans for the initial implementation of, and ongoing maintenance for, this aspect of the criteria (number and description of personnel roles allocated to this area).

A complete answer should include, but is not limited to:

- A high-level Whois system description;
- Relevant network diagram(s);
- IT and infrastructure resources (e.g., servers, switches, routers and other components);
- Description of interconnectivity with other registry systems; and

Frequency of synchronization between servers.
To be eligible for a score of 2, answers must also include:

- Provision for Searchable Whois capabilities; and
- A description of potential forms of abuse of this feature, how these risks will be mitigated, and the basis for these descriptions

A complete answer is expected to be no more than 5 pages.

Except where specified this answer refers to the operations of DotWeb Inc.'s outsource Registry Service Provider, CentralNic.

Whois is one of the oldest Internet protocols still in use. It allows interested persons to retrieve information relating to Internet resources (domain names and IP addresses). Whois services are operated by the registries of these resources, namely TLD registries and RIRs.

Whois is described by RFC 3912 (http://tools.ietf.org/html/rfc3912), which serves as a description of

existing systems rather than requiring specific behaviours from clients and servers. The protocol is a query-response protocol, in which both the query and the response are opaque to the protocol, and their meanings are known only the server and to the human user who submits a query. Whois has a number of limitations, but remains ubiquitous as a means for obtaining information about name and number resources.

26.1. Compliance

The Whois service for the TLD will comply with RFC3912 and Specifications 4 and 10 of the New gTLD Registry Agreement. The service will be provided to the general public at no cost. If ICANN specify alternative formats and protocols (such as RDAP) then CentralNic will implement these as soon as reasonably practicable.

CentralNic will monitor its Whois system to confirm compliance. Monitoring stations will check the behaviour and response of the Whois service to ensure the correctness of Whois records. CentralNic will maintain a public Whois contact to which bug reports and other questions about the Whois service can be directed.

26.2. Domain Name

By default, any query is assumed to be a domain name unless a keyword is prepended to the query. If the domain exists, then registration is returned, including the following fields:

*Domain ROID

*Domain Name

*Domain U-label (if IDN)

*Creation Date

*Last Updated

*Expiration Date

*EPP status codes

*Registrant Contact Information

*Administrative Contact Information

*Technical Contact Information

*Billing Contact Information (if any)

*Sponsoring Registrar ID

*Sponsoring Registrar Contact Information

*DNS servers (if any)

*DNSSEC records (if any)

An example of a domain whois response is included in Appendix 26.1. The Domain ROID is the Repository Object Identifier as described in RFC 5730 (http://tools.ietf.org/html/rfc5730), Q2.8. The ROID field corresponds to the <domain:roid> element of EPP <info> responses.

A domain may be associated with one or more status codes. These are represented in Whois responses as phrases rather than EPP mnemonics. A domain may have any of the following status codes:

*PENDING CREATE - a <domain:create> command has been received through the SRS, but the registration has not yet been finalised as an out-of-band review process has not yet been completed.

*ADD PERIOD - the domain is in the Add Grace Period

*CLIENT HOLD - the registrar has added the clientHold status

*DELETE PROHIBITED - this may be present if the domain has either clientDeleteProhibited or serverDeleteProhibited (or both)

*INACTIVE - the domain has no DNS servers

*PENDING DELETE - the domain has left the Redemption Grace Period and is scheduled for deletion

*PENDING DELETE RESTORABLE - the domain is in the Redemption Grace Period

*PENDING RESTORE - a restore request has been received, but the Restore Report has not been received

*PENDING TRANSFER - there is an active inter-registrar transfer for the domain

*RENEW PERIOD - the domain is either in the Renew Grace Period or the Auto-Renew Grace Period

*RENEW PROHIBITED - this may be present if the domain has either clientRenewProhibited or serverRenewProhibited (or both)

*SERVER HOLD - the registry has added the serverHold status

*TRANSFER PERIOD - the domain is in the Transfer Grace Period

*TRANSFER PROHIBITED - this may be present if the domain has either clientTransferProhibited or serverTransferProhibited (or both)

*UPDATE PROHIBITED - this may be present if the domain has either clientUpdateProhibited or serverUpdateProhibited (or both)

*OK - present if none of the above apply.

The Registrant, Administrative, Technical and Billing Contact sections of the Whois record display the contact information for the contact objects that are associated with the domain. The information displayed replicates the information showed for a contact query (see below). The server shows similar information for the sponsoring registrar.

Domains may have 0-13 DNS servers. If a domain name has no DNS servers, then the "INACTIVE" status code appears in the Status section. If the registrant provided DS records for their DNSSEC-signed domain, then these are included. For each DS record, then the key tag, algorithm, digest type and digest are displayed.

26.3. Contact

Users can query for information about a contact by submitting a query of the form "contact [ID]", where "[ID]" is the contact ID equivalent to the <contact:id> element in EPP <info> responses. This is also the ID used when referring to contacts in domain responses.

The following information is included in Dontact records:

*Contact ID

*Sponsoring Registrar

*Creation Date

*Last Updated Date

*EPP Status Codes

*Contact Name

*Organisation

*Street Address (1-3 fields)

*City

*State/Province

*Postcode

*Country Code (2 character ISO-3166 code)

*Phone number (e164a format)

*Fax number (e164a format)

*Email address

An example of a contact object whois response is included in Appendix 26.2. A contact object may be associated with one or more status codes. These are represented in Whois responses as phrases rather than EPP code mnemonics. A contact object may have any of the following status codes:

*DELETE PROHIBITED - present if the contact object has either clientDeleteProhibited or serverDeleteProhibited (or both)

*TRANSFER PROHIBITED - present if the contact object has either clientTransferProhibited or serverTransferProhibited (or both)

*UPDATE PROHIBITED - present if the contact object has either clientUpdateProhibited or serverUpdateProhibited (or both)

*PENDING TRANSFER - there is an active inter-registrar transfer for the contact object

*LINKED - the contact object is associated with one or more domain names. A LINKED contact object automatically has the DELETE PROHIBITED status

26.4. Host Objects

Users can query for information about a host object by submitting a query of the form "nameserver [HOST]". The following information is included in host records:

*Server Name

*IPv4 address (if any)

*IPv6 address (if any)

*EPP status codes

*Sponsoring Registrar

*Creation Date

*Referral URL (if any)

*An example of a host whois response is included in Appendix 26.3. A host object may have an IPv4 or IPv6 address if the host is "in-bailiwick", ie subordinate to a domain name within a TLD operated by the registry. IP address information is not shown for "out-of-bailiwick" hosts.

Host objects may only have two status codes:

*INACTIVE - the host is not associated with any domain names

*LINKED - the host is associated with one or more domain names

The Referral URL is the website of the Sponsoring Registrar for this host. If the host is subordinate to a domain name in the TLD, this will be the sponsoring registrar of the parent name. If the host is out-of-bailiwick, then the sponsoring registrar is the registrar who issued the original <create> request.

26.5. Character Encoding

Responses are encoded as UTF-8. Queries are assumed to be encoded in UTF-8.

26.6. IDN Support

The Whois service supports Internationalised Domain Names. Users may submit queries for IDN domains using either the U-label or the A-label.

26.7. Bulk Access

CentralNic will provide up-to-date registration data to ICANN on a weekly basis (the day to be designated by ICANN). CentralNic will

provide the following data for all registered domain names: domain name, repository object id (roid), registrar id (IANA ID), statuses, last updated date, creation date, expiration date, and name server names. For sponsoring registrars it will provide: registrar name, registrar repository object id (roid), hostname of registrar Whois server, and URL of registrar. Data will be provided in the format specified in Specification 2 for Data Escrow (including encryption, signing, etc.) but including only the fields mentioned in the above.

At ICANN's request, CentralNic will provide ICANN with up-to-date data for the domain names of de-accredited registrar to facilitate a bulk transfer. The data will be provided in the format specified in Specification 2 for Data Escrow. The file will only contain data related to the domain names of the losing registrar. CentralNic will provide the data within 2 business days.

26.8. Load Projections

As described in Q31, CentralNic's existing Whois system receives an average of 0.36 queries per day for each domain name in the registry, including misses for non-existent objects as well as hits.

The number of daily queries per domain for each existing gTLD was calculated using figures for the month of November 2011 published by ICANN. This analysis may be found in Appendix 26.6. It shows little correlation between the number of domains in the TLD and the number of queries that each domain receives. Smaller gTLDs such as .aero and .museum receive more queries per domain than larger gTLDs, but .jobs (which is much larger than either .aero or .museum) received more queries per domain than either. It should be noted that the high volumes observed for .XXX are very likely due to activities surrounding the Landrush and initial launch of that TLD.

CentralNic believes that the query rate observed for its own registry system is mainly affected by its efforts to deter abuse, and outreach to registrars, who often use whois to perform availability checks, to encourage them to EPP instead. CentralNic believes this query rate will also apply for the TLD. A projection of query load for the Whois system for the first 24 months of operation can be found in Appendix 26.4. This model also includes data transit rates and bandwidth projections for the same period. As can be seen, the data and bandwidth requirements are

relatively small compared to those for the Shared Registry System and authoritative DNS.

26.9. Technical Implementation

A diagram describing the infrastructure supporting the Whois service may be found in Figure 26.1. During normal operations, the Whois service is operated at the primary operations centre in London. During failover conditions, it is operated at the Disaster Recovery site in the Isle of Man (see Q34).

Queries pass through the firewalls to one of two front-end load balancers. Round-robin DNS distributes queries between the devices. Load balancers are configured in High Availability mode so that if one a server fails, the other will resume service on its IP address until the server can be restored. Queries are distributed to backend application servers via weighted least connections algorithm.

26.9.1. Application Server Architecture

Application servers are built on commodity hardware running CentOS. The service is provided using the mod_whoisng Apache module (see https://www.centralnic.com/registry/labs/mod-whois) which causes Apache to listen on port 43 and accept queries, which are then handled using a PHP script, which generates and returns the response.

26.9.2. Caching

Application servers use caching to reduce database load. Subsequent identical queries are returned a cached record until the cache expires, after which a new record is generated. Records are currently cached for 600 seconds (ten minutes), so if a domain is updated

immediately after its Whois record has been cached, the updated record will be visible after ten minutes. This compares favourably to the 60 minute requirement in the gTLD Service Level Agreement. Records are cached in a shared Memached server. Memcached is a high-performance caching server used by some of the largest sites in the world, including Wikipedia, Flickr, Wordpress.com and Craigslist.

26.9.2. Database

The Whois service draws data directly from the primary database. The query volume required to sustain the Whois service is comparable to that of a modest web application such as a small e-commerce site, and as a result a dedicated database for the Whois system is not required. As can be seen in Figure 26.1, a separate logging database is used to aggregate log data for use with the rate limiting system.

26.10. Web based Whois Service

CentralNic provides a web interface to the Whois service on its website. In addition, DotWeb Inc. will provide a similar service on the TLD registry website. The web Whois acts as a proxy to the port 43 Whois service: users enter a query into a form, and a server-side process submits the query to the Whois server, and displays the response. This service will not be subjected to the rate limiting described above, but users will be required to complete a CAPTCHA to prevent high-volume automated access.

26.11. Anti-Abuse Mechanisms

CentralNic has implemented measures to mitigate the threat of abuse of the Whois service. The primary threat to the Whois service are so-called "dictionary" attacks, where an attacker attempts to enumerate the database by flooding the server with queries for domains taken from a precompiled list: as zone files are easy to obtain, this presents a threat to the privacy of contact information in the registry database. The information harvested can be used to compile email databases for spamming, or to send domain renewal scam letters, for example.

The Whois service implements rate-limiting to impede dictionary attacks. For each query, a counter associated with the client IP address is incremented. For subsequent queries, this counter determines the number of queries received within the previous hour. If the number of queries exceeds a pre-set maximum (currently 240 queries per hour), then the server returns an error, warning the user that they have exceeded the permitted query rate. If the user stops sending queries, then eventually the query rate will drop below the limit, and subsequent queries will be permitted. If the user continues to send queries, and the query rate exceeds the limit by a further 25% (300 queries per hour), then the IP address is permanently blocked. For queries over IPv6 (where an attacker might have access to billions of IP addresses), the enclosing /48 will be blocked.

Experience indicates that is an effective mechanism for preventing abuse of the Whois. The rate limit has been tuned to ensure that legitimate uses of the Whois are allowed, but abusive use of the whois is restricted to levels which are unappealing for attackers.

CentralNic keeps a "white list" of IP addresses used by legitimate users of the Whois service, including law enforcement agencies and other research and anti-abuse entities. Registrar access lists are also incorporated into the white list, and IP addresses registered on ICANN's RADAR system will also be included. Queries from IP addresses that appear on the white list are not rate-limited. Interested parties can request addition to the white list by contacting CentralNic's public customer service team.

The web-based Whois does not implement rate-limiting, but users of this service must complete a CAPTCHA to access Whois records.

26.11.1. Denial-of-Service attacks

The rate-limiting system in place provides protection against DoS and DDoS attacks, as any host that attempts to flood the Whois service with queries will be quickly blocked. However, a DDoS attack could still saturate upstream links requiring filtering at the edges of CentralNic's network, as well as their upstream providers. Continuous surveillance and monitoring of the Whois system (see Q42) proactively detects these threats. As the Whois service directly queries the primary SRS database, CentralNic rate-limits on the database backend to prevent an attack against the Whois service from disrupting the SRS.

26.12. Monitoring and Logging

Remote monitoring is used to verify the availability of the service and to record the round-trip times for different queries (warm hit, warm miss). Local monitoring records query volumes.

26.13. Resourcing

As can be seen in the Resourcing Matrix found in Appendix 23.2, CentralNic will maintain a team of full-time developers and engineers which will contribute to the development and maintenance of this aspect of the registry system. These developers and engineers will not work on specific subsystems full-time, but a certain percentage of their time will be dedicated to each area. The total HR resource dedicated to this area is equivalent to almost one full-time person (83%.

CentralNic operates a shared registry environment where multiple registry zones (such as CentralNic's domains, the .LA and .PW ccTLDs, this TLD and other gTLDs) share a common infrastructure and resources. Since the TLD will be operated in an identical manner to these other registries, and on the same infrastructure, then the TLD will benefit from an economy of scale with regards to access to CentralNic's resources.

CentralNic's resourcing model assumes that the "dedicated" resourcing required for the TLD (ie, that required to deal with issues related specifically to the TLD and not to general issues with the system as a whole) will be equal to the proportion of the overall registry system that the TLD will use. After three years of operation, the optimistic projection for the TLD states that there will be 471,500 domains in the zone. CentralNic has calculated that, if all its TLD clients are successful in their applications, and all meet their optimistic projections after three years, its registry system will be required to support up to 4.5 million domain names. Therefore the TLD will require 10.48 % of the total resources available for this area of the registry system.

In the event that registration volumes exceed this figure, CentralNic will proactively increase the size of the Technical Operations, Technical Development and support teams to ensure that the needs of the TLD are fully met. Revenues from the additional registration volumes will fund the salaries of these new hires. Nevertheless, CentralNic is confident that the staffing outlined above is sufficient to meet the needs of the TLD for at least the first 18 months of operation.

The Abuse and Compliance functions will be outsourced to the Abuse and Compliance team (20 staff) of the Directi Group.

The Directi Group and CentralNic teams provide abuse monitoring detection mechanisms to block data mining. Additionally the support team in conjunction with both the Compliance teams administer requests for listing on the Whitelist.

A detailed list of the Abuse and Compliance desk of Directi is provided in Q28. The Directi Group is protected against loss of staff due to its scale of operations. This is described in further detail in Q39

This completes our response to Q26.

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27. Registration Life Cycle: provide a detailed description of the proposed registration lifecycle for domain names in the proposed gTLD. The description must:

- explain the various registration states as well as the criteria and procedures that are used to change state;
- describe the typical registration lifecycle of create/update/delete and all intervening steps such as pending, locked, expired, and transferred that may apply;
- clearly explain any time elements that are involved - for instance details of add-grace or redemption grace periods, or notice periods for renewals or transfers; and
- describe resourcing plans for this aspect of the criteria (number and description of personnel roles allocated to this area).

The description of the registration lifecycle should be supplemented by the inclusion of a state diagram, which captures definitions, explanations of trigger points, and transitions from state to state.
If applicable, provide definitions for aspects of the registration lifecycle that are not covered by standard EPP RFCs.
A complete answer is expected to be no more than 5 pages.

Except where specified this answer refers to the operations of DotWeb Inc.'s outsource Registry Service Provider, CentralNic.

The lifecycle of a domain in the registry is described in Figure 27.1, and closely follows that of domain names in existing gTLD registries. The lifecycle is described below.

27.1. Available

The domain is not registered. No delegation (or any other records) exist in the DNS, and the whois system will return a "NOT FOUND" response to queries. An EPP <check> command will return an "avail" status of 1.

27.2. Registered

A registar submits an EPP <create> command or registers the domain name via the Registrar Console. The registration fee is deducted from the registrar's balance. The initial registration period may be any whole number of years between one (1) and ten (10).

For five (5) calendar days after the registration of the domain, the registrar can delete the domain and receive a credit for the registration fee (subject to the Add Grace Period Limits Policy).

While the domain is registered, it is delegated to the specified name servers and will resolve normally. During this time, the registrar may update the domain name's DNS settings, lock statuses and contact associations, and may extend the registration period (subject to a maximum of ten (10) years) by submitting a <renew> EPP command or using the Registrar Console.

The domain may also be transferred to a different sponsoring registrar. Upon such transfer the domain name is automatically renewed for one year.

27.3. Expired

When the expiry date is reached, the domain name is automatically renewed for a period of one year, and the renewal fee is deducted from the registrar's account.

For forty-five (45) days after the auto-renewal (Auto-Renew Grace Period), the registrar can delete the domain and receive a credit for the renewal fee.

27.4. Redemption Grace Period

Should the registrar delete the domain, the domain enters the Redemption Grace Period. During this period, the domain name will no longer resolve as all delegation information is removed from the TLD zone.

For the first thirty (30) days after receipt of the delete request, the domain is in the "Pending Delete Restorable" state. During this time, the registrar may submit an RGP restore request via EPP or the Registrar Console. The domain is then placed into the "Pending Restore" state.

The registrar must then submit an RGP Restore Report detailing the reason why the restore request has been submitted. If the Restore Report is received within five (5) calendar days of the original restore request, then the domain is restored. However, if the Restore Report is not received within this period, then the domain falls back into the "Pending Delete Restorable" state.

27.5. Redemption Period State Diagram

Figure 27.2 describes the state diagram for domain names in the Redemption Grace Period. This diagram is taken from RFC 3915 (http://tools.ietf.org/html/rfc3915).

27.6. Pending Delete

Forty (40) days after the receipt of the delete request, the domain leaves the "Pending Delete Restorable" and enters the "Pending Delete" status. The registrar cannot submit a Restore Request during this period.

27.7. Released

Five (5) days after the domain enters the "Pending Delete" status

the domain name is purged from the database and is once again available for registration.

27.8. Other Grace Periods

The registry also implements the following grace periods. In general, these grace periods allow registrars to delete domain names following billable transactions and receive a refund.

27.8.1. Add Grace Period

As described above, the Add Grace Period (AGP) is the five (5) calendar days following the initial registration of the domain.

27.8.2. Auto-renew Grace Period

As described above, the Auto-renew Grace Period is the forty five (45) calendar days following the auto-renewal of the domain.

27.8.3. Renew Grace Period

The Renew Grace Period is the five (5) calendar days following the renewal of the domain via an EPP <renew> command, or via the Registrar Console.

27.8.4. Transfer Grace Period

The Transfer Grace Period is the five (5) calendar days following the successful completion of an inter-registrar transfer.

27.9. Hold Periods

The registry implements the following hold periods:

27.9.1. Registration Hold Period

The Registration Hold Period forbids inter-registrar transfers of domain names within sixty (60) days of initial registration.

27.9.2. Transfer Hold Period

The Transfer Hold Period forbids transfers of domain names within sixty (60) days of a previous inter-registrar transfer. This Hold Period does not affect disputed transfers that are undone by the registry following the outcome of a Transfer Dispute Resolution process.

27.10. Lock Statuses

The registry system permits the following lock statuses for domain names:

27.10.1. clientHold

This status may be set by registrars using an EPP <update> command, or via the Registrar Console. Domains with this status are removed from the DNS and will not resolve.

27.10.2. clientDeleteProhibited

This status may be set by registrars using an EPP <update> command, or via the Registrar Console. When set, all attempts by the registrar to delete the domain using an EPP <delete> command will be refused with EPP response code 2304 (Status Prohibits Operation). Registrars must remove the code using an EPP <update> command before they can delete the domain.

27.10.3. clientRenewProhibited

This status may be set by registrars using an EPP <update> command, or via the Registrar Console. When set, all attempts by the registrar to renew the domain using an EPP <renew> command will be refused with EPP response code 2304 (Status Prohibits Operation). Registrars must remove the code using an EPP <update> command before they can renew the domain.

27.10.4. clientUpdateProhibited

This status may be set by registrars using an EPP <update> command, or via the Registrar Console. When set, all attempts by the registrar to update the domain using an EPP <update> command will be refused with EPP response code 2304 (Status Prohibits Operation), unless the <update> request frame includes a <rem> element to remove this status. Once the status has been removed, subsequent <update> commands will succeed.

27.10.5. clientTransferProhibited

This status may be set by registrars using an EPP <update> command, or via the Registrar Console. When set, all attempts by other registrars to submit a transfer request for the the domain using an EPP <transfer> command, or via the Registrar Console, will be refused with EPP response code 2304 (Status Prohibits Operation). The sponsoring registrar must remove this status before any other registrar can submit a transfer request.

27.10.6. serverHold

This status is set by the registry in accordance with policy. It cannot be removed by registrars. Domains with this status are removed from the DNS and will not resolve.

27.10.7. serverDeleteProhibited

This status is set by the registry in accordance with policy. It cannot be removed by registrars. When set, all attempts by the registrar to delete the domain using an EPP <delete> command will be refused with EPP response code 2304 (Status Prohibits Operation).

27.10.8. serverUpdateProhibited

This status is set by the registry in accordance with policy. It cannot be removed by registrars. When set, all attempts by the registrar to update the domain using an EPP <update> command will be refused with EPP response code 2304 (Status Prohibits Operation).

27.10.9. serverRenewProhibited

This status is set by the registry in accordance with policy. It cannot be removed by registrars. When set, all attempts by the registrar to renew the domain using an EPP <renew> command will be refused with EPP response code 2304 (Status Prohibits Operation).

27.10.10. serverTransferProhibited

This status is set by the registry in accordance with policy. It cannot be removed by registrars. When set, all attempts by the registrar to transfer the domain using an EPP <transfer> command will be refused with EPP response code 2304 (Status Prohibits Operation).

27.11. Lifecycle Processing

Domain names move through the lifecycle in one of two ways: in real-time as a result of registrar activity, or during daily billing runs.

Billing runs take place once per day. The billing run performs the following batch jobs:

*auto-renewal of expired domains

*processing of registration and renewal fees for domains that move outside their grace periods

*processing of domains in the RGP state (from restorable to not restorable, checking for missing restore reports, etc)

*purging of domains scheduled for deletion

The billing runs also perform registrar account management functions such as generation of invoices, sending balance warnings, and generation of internal reports.

27.12. Inter-Registrar Transfer Period

When a transfer request is received, the action date of the transfer is set to five (5) calendar days from the moment of the original request. Successful transfers are approved at the end of this period.

27.13. pendingCreate Status

The Registry system supports the "pendingCreate" status for

domain names, as described in RFC 5731 (http://tools.ietf.org/html/rfc5731), Q3.3. Domains in this state are fully registered in the database (subsequent <create> commands would fail with an Object Exists error) but are not present in the DNS.

This status is used when a particular TLD implements a policy whereby registration requests are verified by a third party such as a Sponsoring Organisation or Validation Agent. Following out-of-band review of the request, the registration may be approved or denied.

If a request is denied, then the domain is immediately purged from the registry system, and the registrar notified via email and the EPP message queue. The registrar also receives a credit for the registration fee. If approved, then the pendingCreate status is removed from the domain which begins to resolve.

27.14. Resourcing

The domain registration lifecycle is managed through automated backend processes that generally require no human intervention, and real-time business logic implemented in Shared Registry System application code. Operations personnel will be responsible for maintaining and developing the computing infrastructure which supports the lifecycle processing systems. Backend systems are hosted on a flexible virtual infrastructure hosted at the primary operations centre at the Goswell Road Data Centre in London.

The domain registration lifecycle does have customer and registrar support requirements, so a proportion of the time of the Operations Manager, Support Manager and Support Agent has been dedicated to this area. This time primarily relates to dealing with questions and comments from registrars and registrants about the status of their domain names.

As can be seen in the Resourcing Matrix found in Appendix 23.2, CentralNic will maintain a team of full-time developers and engineers which will contribute to the development and maintenance of this aspect of the registry system. These developers and engineers will not work on

specific subsystems full-time, but a certain percentage of their time will be dedicated to each area. The total HR resource dedicated to this area is equivalent to 30% of a full time person. Because of the maturity and stability of this system (which has been in use for more than 16 years), only 5% of time of a technical developer has been allocated to this area.

CentralNic operates a shared registry environment where multiple registry zones (such as CentralNic's domains, the .LA and .PW ccTLDs, this TLD and other gTLDs) share a common infrastructure and resources. Since the TLD will be operated in an identical manner to these other registries, and on the same infrastructure, then the TLD will benefit from an economy of scale with regards to access to CentralNic's resources.

CentralNic's resourcing model assumes that the "dedicated" resourcing required for the TLD (ie, that required to deal with issues related specifically to the TLD and not to general issues with the system as a whole) will be equal to the proportion of the overall registry system that the TLD will use. After three years of operation, the optimistic projection for the TLD states that there will be 471,500 domains in the zone. CentralNic has calculated that, if all its TLD clients are successful in their applications, and all meet their optimistic projections after three years, its registry system will be required to support up to 4.5 million domain names. Therefore the TLD will require 10.48% of the total resources available for this area of the registry system.

In the event that registration volumes exceed this figure, CentralNic will proactively increase the size of the Technical Operations, Technical Development and support teams to ensure that the needs of the TLD are fully met. Revenues from the additional registration volumes will fund the salaries of these new hires. Nevertheless, CentralNic is confident that the staffing outlined above is sufficient to meet the needs of the TLD for at least the first 18 months of operation.

The Abuse and Compliance functions will be outsourced to the Abuse and Compliance team (20 staff) of the Directi Group. The Compliance team outsourced to the Directi Group is responsible for any abuse of the registration policies within .web.

Most manual tasks fall to the Abuse and Compliance teams of the Directi Group, with staff experienced in development of policy for policy

rich TLD environments. They have the required legal and industry background to perform this function.

A detailed list of the Abuse and Compliance desk of Directi is provided in Q28. The Directi Group is protected against loss of staff due to its scale of operations. This is described in further detail in Q39.

This completes our response to Q27.

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28. Abuse Prevention and Mitigation: Applicants should describe the proposed policies and procedures to minimize abusive registrations and other activities that have a negative impact on Internet users. A complete answer should include, but is not limited to:

- An implementation plan to establish and publish on its website a single abuse point of contact responsible for addressing matters requiring expedited attention and providing a timely response to abuse complaints concerning all names registered in the TLD through all registrars of record, including those involving a reseller;
- Policies for handling complaints regarding abuse;
- Proposed measures for removal of orphan glue records for names removed from the zone when provided with evidence in written form that the glue is present in connection with malicious conduct (see Specification 6); and
- Resourcing plans for the initial implementation of, and ongoing maintenance for, this aspect of the criteria (number and description of personnel roles allocated to this area).

To be eligible for a score of 2, answers must include measures to promote Whois accuracy as well as measures from one other area as described below.

- Measures to promote Whois accuracy (can be undertaken by the registry directly or by registrars via requirements in the Registry-Registrar Agreement (RRA)) may include, but are not limited to:
  - Authentication of registrant information as complete and accurate at time of registration. Measures to accomplish this could include performing background checks, verifying all contact information of principals mentioned in registration data, reviewing proof of establishment documentation, and other means
  - Regular monitoring of registration data for accuracy and completeness, employing authentication methods, and establishing policies and procedures to address domain names with inaccurate or incomplete Whois data; and
  - If relying on registrars to enforce measures, establishing policies and procedures to ensure compliance, which may include audits, financial incentives, penalties, or other means. Note that the requirements of the RAA will continue to apply to all ICANN-accredited registrars.
- A description of policies and procedures that define malicious or abusive behavior, capture metrics, and establish Service Level Requirements for resolution, including service levels for responding to law enforcement requests. This may include rapid takedown or suspension systems and sharing information regarding malicious or abusive behavior with industry partners;

- Adequate controls to ensure proper access to domain functions (can be undertaken by the registry directly or by registrars via requirements in the Registry-Registrar Agreement (RRA)) may include, but are not limited to:
  - Requiring multi-factor authentication (i.e., strong passwords, tokens, one-time passwords) from registrants to process update, transfers, and deletion requests;
  - Requiring multiple, unique points of contact to request and/or approve update, transfer, and deletion requests; and
  - Requiring the notification of multiple, unique points of contact when a domain has been updated, transferred, or deleted.

A complete answer is expected to be no more than 20 pages.

DotWeb Inc. is a wholly owned subsidiary within the Directi Group. The Directi Group runs various businesses including several ICANN Accredited Domain Registrars (including ResellerClub.com and BigRock.com) and Web Hosting companies. The Directi Group manages centralized functions for all its businesses. We have outsourced our Abuse and Compliance functions to the Directi Group and our Abuse and Compliance desk will be staffed as a cost center by them.

This response aims to provide a 360 degree perspective on our policies and processes to prevent abusive activities, and ensure swift mitigation when abuse does occur. We have prepared this plan based on over a decade's experience of fighting abuse as a Registrar, learnings through active industry participation, best-practices from existing registry operators and expert inputs from our back-end technical partner CENTRALNIC.

1. ABUSE MITIGATION EXPERIENCE AND CAPABILITIES

With over four million active domain names registered through its registrars, Directi has significant experience (over 10 years) of managing domain names and is fully cognizant of the threat that stems from their abuse.

As one of the world's top ten registrars, we equally understand our ability to make a sizable contribution towards curbing internet abuse, and believe that mitigating this threat is one of our foremost responsibilities. By instituting policies, processes and services which go significantly above and beyond our obligation as a registrar, Directi has taken various initiatives to make the Internet a safer ground.

To drive this effort, Directi has a committed function working towards identifying abusive domain names and enforcing its policies. Our Abuse Desk functions 24⁄7 and takes prompt and effective action (both reactively and proactively) against domains reported or co-networked to be involved in any sort of online abuse. Complaints ranging from phishing, spam, malware perpetration, 419 scams, child pornography, copyright infringement and varied forms of abuse are subject to investigation at our Abuse Desk on a daily basis. The nature of abuse and the types of complaints received are varied in nature and intensity, and are documented in more detail

further.

On average we already address, 15000 reported or detected abuse cases per year. Abuse cases are addressed within pre-determined SLAs, and our team is committed to ensure that each incident is resolved satisfactorily. The Directi abuse team has been heralded on many occasions by various security groups, law enforcement organizations and the general anti-abuse community for the manner in which abuse mitigation has been handled by us. Additionally, we have always become highly involved, and continue to remain committed to industry-wide efforts to address organized abuse such as botnets (see below) and large scale phishing attacks, and any other malfeasances.

1.1 NOTABLE INSTANCES OF DIRECTI'S SUCCESSFUL ABUSE MITIGATION INITIATIVES

Our abuse mitigation team has developed strong relationships with many security groups and individuals in the abuse mitigation community, with the aim of sharing intelligence and facilitating quick action on abusive domain names. These sources provide us actionable intelligence on domains bought through our registrar. We have also participated in coordinated takedowns with such agencies in the past and are committed to doing so in the future. Please refer to Attachment 'Q28_Recommendations' which showcases letters from several global agencies including the IRS, commending our work and cooperation on several fronts. Following are some examples of cases where our efforts paid great results in abuse mitigation –

1.1.1 MARIPOSA WORKING GROUP

Directi was part of the Mariposa Working Group which was responsible for taking down the largest known botnet network at the time.

(Ref: http://defintel.com/docs/Mariposa_White_Paper.pdf)

"Directi is BY FAR THE BEST registrar we have ever worked with at taking down criminal domains in a timely, efficient and professional manner. Your team was absolutely key to the Mariposa Working Group taking down one of the largest Botnets in the history of the Internet. You and your team should be VERY proud of that :)"
-- Christopher Davis, Former CEO of Defence Intelligence

1.1.2 IM WORM BOTNET TAKEDOWN COORDINATED BY IID

Since 1996, IID (Internet Identity) has been providing technology and services that secure the Internet presence for an organization and its extended enterprise. It recently introduced a number of unique approaches to secure organizations' use of Internet infrastructure with ActiveTrust® BGP, ActiveTrust DNS, and ActiveTrust Resolver with TrapTrace. Directi worked with IID, acting against problematic domain names and sharing intelligence to take down a notorious botnet that was plaguing the internet for quite some time.

"Thank you for your exceptional coordination with our team and the other providers … during the simultaneous shutdown. We wanted to follow up with you and let you know that despite the last minute unanticipated scramble, the takedown was a success and the botnet has been shutdown." -- Lauren Lamp, Manager / Service Delivery - internetidentity.com

1.1.3 FAKE PHARMACY TAKEDOWNS COORDINATED BY LEGITSCRIPT

LegitScript is the leading source of information for patients, Internet users, physicians, businesses and other third parties who need to know if an Internet pharmacy is acting in accordance with the law and accepted standards of ethics and safety. LegitScript is identified by the National Association of Boards of Pharmacy as the only Internet pharmacy verification service that adheres to its standards. After affiliating with LegitScript, we have witnessed a steep downfall in fake pharma-related registrations. ResellerClub (referred below) is our wholesale registrar brand.

(Ref:http://legitscriptblog.com/2009/03/directi-no-safe-haven-for-rogue-internet-pharmacies/)

"Some registrars claim that they cannot shut down dangerous 'no-prescription-required' and fake online pharmacies. ResellerClub has proven that this is not true. By refusing to profit from dangerous, criminal activity at the expense of Internet users, ResellerClub has established itself as a responsible example for the rest of the
Internet community." John Horton, President, LegitScript.com

We have enclosed a commendation letter from LegitScript in Attachment 'Q28_Recommendations', which speaks of our leadership in fighting fake and rouge pharmacies.

1.1.4 419 FEEDBACK LOOP WITH ARTISTS AGAINST 419 (AA419.ORG)

An honorary member of the APWG (Anti-Phishing Working Group), Artists Against 419 is a premier organization with expertise in identifying, cataloging, and terminating fraud sites. Our tie-up with them has been greatly successful in eliminating fraudulent registrations within our portfolio. (Ref: http://blog.aa419.org/?p=134)

"Many registrars do respond to abuse reports and take action against them. However none do it as quickly and efficiently as Directi. If all registrars and hosters take this approach, it might then be possible to reduce internet fraud." -- aa419.org

We have enclosed a letter from Artists Against 419 in Attachment 'Q28_Recommendations' commending the speed and impact of our proactive abuse mitigation activities.

2. PROPOSED ABUSE POLICY FOR .WEB

We have fully adopted the definition of abuse developed by the Registration Abuse Policies Working Group (Registration Abuse Policies Working Group Final Report 2010).

Our abuse policies described in this section apply to initial and ongoing domain registrations, ie any domain name must comply with these policies during registration and throughout its tenure.

Abusive behaviour in a TLD may relate can be categorized into:

2.1 REGISTRATION POLICY VIOLATIONS

.Web adopts certain Registration policies and any violations of these policies would be treated as an Abuse.

2.1.1 SUNRISE POLICY VIOLATION

.Web will have a sunrise period as described in the response to Question 29. Our sunrise policy will have an overarching goal to protect interests of IP holders globally, and be based on best practices seen in previous TLD launches. We will implement the Trademark Claim Service and partner with experienced service providers to run the TM verification, Sunrise Challenge and Auction processes. All Sunrise domain names will be validated before they are activated. Hence the possibility of a Sunrise policy violation is low. However the Sunrise process provides for a Sunrise Dispute Resolution Policy, and any disputes that fall within its scope will be referred to the Sunrise Dispute Resolution provider. If the abuse desk receives any complaints concerning a sunrise domain which violates the Sunrise eligibility policy the abuse desk will direct the complainant to the Sunrise Dispute Resolution provider

2.1.2 WHOIS INACCURACY

.Web requires Whois accuracy as per its contracts. Any domain name with inaccurate whois information will be deemed to be in violation of its contract and hence will be deemed as an abuse and handled in the manner described ahead.

2.1.3 TRADEMARK INFRINGEMENT VIOLATION AND UDRP

.Web requires registrants to abide by UDRP. If the abuse desk receives any complaints concerning a domain name which infringes upon the trademark right of a 3rd party, the abuse desk will direct the complainant to the Uniform Dispute Resolution provider.

All names registered under .Web will be subject to the UDRP and URS processes. We believe that URS will deter cybersquatting, and some malicious activities that illegitimately use brand names. We will seek to expeditiously process all URS cases, and are already equipped with mature processes and tracking systems to manage and keep track of all cases.

The URS process will be run by our compliance team, who has significant experience in processing UDRP complaints for our Registrar businesses.

While Registrars will be responsible for processing all UDRP cases related to the .Web, we will reserve the right to act on their behalf when necessary, and process all court orders that are directed to us.

2.2 ACCEPTABLE USAGE RELATED VIOLATIONS

.Web adopts certain Content and Acceptable usage policies and any violations of these would be treated as an Abuse. The following are deemed as violations of our content and acceptable usage policy

2.2.1 INTELLECTUAL PROPERTY, TRADEMARK, COPYRIGHT, AND PATENT VIOLATIONS, INCLUDING PIRACY

Intellectual property (IP) is a term referring to a number of distinct types of creations of the mind for which a set of exclusive rights are recognized—and the corresponding fields of law. Under intellectual property law, owners are granted certain exclusive rights to a variety of intangible assets, such as musical, literary, and artistic works; discoveries and inventions; and words, phrases, symbols, and designs. Common types of intellectual property rights include copyrights, trademarks, patents, industrial design rights and trade secrets in recognized jurisdictions. Any act resulting in theft, misuse, misrepresentation or any other harmful act by any individual or a company is categorized as Intellectual Property violation.

2.2.2 SPAMMING

The use of electronic messaging systems to send unsolicited bulk messages. The term applies to e-mail spam and similar abuses such as instant messaging spam, mobile messaging spam, and the spamming of Web sites and Internet forums. Unsolicited emails advertising legitimate and illegitimate products, services, and/or charitable requests and requests for assistance are also considered as spam.

2.2.3 PHISHING (and various forms of identity theft)

Fraudulent web services and applications meant to represent/confuse or mislead internet users into believing they

represent services or products for nefarious purposes, such as illegally gaining login credentials to actual legitimate services.

2.2.4 PHARMING AND DNS HIJACKING

Redirection of DNS traffic from legitimate and intended destinations, by compromising the integrity of the relevant DNS systems. This leads unsuspecting Internet users to fraudulent web services and applications for nefarious purposes, such as illegally gaining login credentials to actual legitimate services.

2.2.5 DISTRIBUTION OF VIRUSES OR MALWARE

Most typically the result of a security compromised web service where the perpetrator has installed a virus or “malevolent” piece of software meant to infect computers attempting to use the web service in turn. Infected computers are then security compromised for various nefarious purposes such as gaining stored security credentials or personal identity information such as credit card data. Additionally compromised computers can sometimes be remotely controlled to inflict harm on other internet services (see botnet below).

2.2.6 CHILD PORNOGRAPHY

Child pornography refers to images or films (also known as child abuse images) and, in some cases, writings depicting sexually explicit activities involving a minor.

2.2.7 USING FAST FLUX TECHNIQUES

A methodology for hiding multiple source computers delivering malware, phishing or other harmful services behind a single domain hostname, by rapidly rotating associated IP addresses of the sources computers through related rapid DNS changes. This is typically done at DNS zones delegated below the level of a TLD DNS zone.

2.2.8 RUNNING BOTNET COMMAND AND CONTROL OPERATIONS

A Botnet is a significant coordinated net of compromised (sometimes tens of thousands) computers running software services to enact various forms of harm - ranging from unsanctioned spam to placing undue transaction traffic on valid computer services such as DNS or web services. Command and control refers to a smaller number of computers that issue/distribute subsequent commands to the Botnet. Compromised botnet computers will periodically check in with a command and control computer that hides behind a list of date triggered, rotating domain registrations, which are pre-loaded in the compromised computer during its last check-in.

Registries play a key role in breaking this cycle of pre-determined domain registrations by deactivating said registrations

prior to the compromised computers being able to use them to contact the command and control computer. Successful intervention results in the botnet losing contact with their command and control computers, leaving them inactive and reducing potential harms.

2.2.9 HACKING

Hacking constitutes illegally accessing computers, accounts, or networks belonging to another party, or attempting to penetrate security measures of other individuals. Also includes any activity that might be used as a precursor to an attempted system penetration.

2.2.10 FINANCIAL AND OTHER CONFIDENCE SCAMS

Financial scams, including but not limited to the cases defined below, are operated by fraudsters to lure investors into fraudulent money making schemes. Prominent examples that will be treated as abusive are –

1. Ponzi Schemes. A Ponzi scheme is essentially an investment fraud wherein the operator promises high financial returns or dividends that are not available through traditional investments. Instead of investing victims' funds, the operator pays "dividends" to initial investors using the principle amounts "invested" by subsequent investors. The scheme generally falls apart when the operator flees with all of the proceeds, or when a sufficient number of new investors cannot be found to allow the continued payment of "dividends."

2. Money Laundering. Money laundering, the metaphorical "cleaning of money" with regard to appearances in law, is the practice of engaging in specific financial transactions in order to conceal the identity, source, and/or destination of money, and is a main operation of the underground economy.

3. 419 Scams. "419" scam (aka "Nigeria scam" or "West African" scam) is a type of fraud named after an article of the Nigerian penal code under which it is prosecuted. It is also known as "Advance Fee Fraud". The scam format is to get the victim to send cash (or other items of value) upfront by promising them a large amount of money that they would receive later if they cooperate.

2.2.11 ILLEGAL PHARMACEUTICAL DISTRIBUTION

Distribution and promotion of drugs, locally within a nation or overseas, without prescription and appropriate licenses as required in the country of distribution are termed illegal.

2.2.12 OTHER VIOLATIONS

Other violations that will be expressly prohibited under the .Web include

* Network attacks
* Violation of applicable laws, government rules and other usage policies

3. PROCEDURES TO MINIMIZE ABUSIVE REGISTRATIONS

3.1 BUILDING A ZERO-TOLERANCE REPUTATION

Our Anti-Abuse Policy will put Registrants on notice of the ways in which we will identify and respond to abuse and serve as a deterrent to those seeking to register and use domain names for abusive purposes. The policy will be made easily accessible on the Abuse page of our Registry website which will be accessible and have clear links from the home page along with FAQs and contact information for reporting abuse.

Directi has vast experience in minimizing abusive registrations. Our zero tolerance procedures and aggressive proactive takedown measures as a Domain Registrar have resulted in a white-hat reputation discouraging abusive registrations to begin with. We intend on following the same approach with respect to Registry operations for .Web. Our proactive abuse procedures are geared towards building a reputation that discourages miscreants and malicious intent. Once it is known that abusive registrations and registrations in violation of our policies are suspended rapidly, both abusive registrations and abusive behavior will be discouraged.

Our Abuse policies described in section 2 above apply to new and ongoing registrations.

3.2 BUILDING AWARENESS OF OUR ANTI-ABUSE POLICY

The Abuse Policy will be published on the abuse page of our Registry website which will be accessible and have clear links from the home page. The abuse page of our Registry website will emphasise and evidence our commitment to combating abusive registrations by clearly identifying what our policy on abuse is and what effect our implementation of the policy may have on registrants. We anticipate that the clear message, which communicates our commitment to combating abusive registrations, will further serve to minimise abusive registrations in our TLD.

3.3 ICANN PRESCRIBED MEASURES

In accordance with our obligations as a Registry Operator we will comply with all requirements in the ‘gTLD Applicant Guidebook’. In particular, we will comply with the following measures prescribed by ICANN which serve to mitigate the potential for abuse in the TLD:

* DNSSEC deployment, which reduces the opportunity for pharming and other man-in-the-middle attacks. We will encourage registrars and Internet Service Providers to deploy DNSSEC capable resolvers in addition to encouraging DNS hosting providers to deploy DNSSEC in an easy to use manner in order to facilitate deployment by registrants. DNSSEC deployment is further discussed in the context of our response to Question 43;

* Prohibition on Wild Carding as required by section 2.2 of specification 6 of the Registry Agreement

* Removal of Orphan Glue records: ICANN requires a policy and procedure to take action to remove orphan glue records from the zone when provided with evidence that the glue is indeed present and aiding malicious conduct.

CentralNic's registry system includes effective measures to prevent the abuse of orphan glue records.

Firstly, the Shared Registry System will reject any request to create host object that is the child of a non-existent domain name. That is, if EXAMPLE.WEB does not exist, then NS0.EXAMPLE.WEB cannot be created.

If the parent domain name does exist, then only the sponsoring registrar of that domain is permitted to create child host objects.

CentralNic's registry system currently follows the third model described in the SAC 048 report: orphan glue records are deleted from the registry and removed from the DNS when the parent domain name is deleted. If other domains in the database are delegated to orphan hosts that are removed, then the delegation is also removed from these domains.

The removal of glue records upon removal of the delegation point NS record mitigates the potential for use of orphan glue records in an abusive manner

3.4 REGISTRANT DISQUALIFICATION

Abusive domain registration has historically attracted a small number of individuals and organisations that engage in high volume registrations, driven by the marginal profitability of individual abusive registrations. As specified in our Anti-Abuse Policy, we reserve the right to deny registration of a domain name to a Registrant who has repeatedly engaged in abusive behaviour in our TLD or any other TLD.

Registrants, their agents or affiliates found through the application of our Anti-Abuse Policy to have repeatedly engaged in abusive registration will be disqualified from maintaining any registrations or making future registrations. This will be triggered when our records indicate that a Registrant has had action taken against it an unusual number of times through the application of our Anti-Abuse Policy.

Registrant disqualification provides an additional disincentive for qualified registrants to maintain abusive registrations in that it puts at risk even otherwise non-abusive registrations through the possible loss of all registrations.

In addition, name servers that are found to be associated only with fraudulent registrations will be added to a local blacklist and any existing or new registration that uses such fraudulent NS record will be investigated.

The disqualification of ‘bad actors’ and the creation of blacklists mitigates the potential for abuse by preventing individuals known to partake in such behaviour from registering domain names.

3.5 PROACTIVE DETERMINATION OF POTENTIAL ABUSE

There are several tell-tale signs which are indicative of abusive intent. The following are examples of the data variables will serve as indicators that we will monitor with the help of our registry technical partner.

* Unusual Domain Name Registration Practices: practices such as registering hundreds of domains at a time, registering domains which are unusually long or complex or include an obvious series of numbers tied to a random word (abuse40, abuse50, abuse60) may when considered as a whole be indicative of abuse

* An Unusual Number of Changes to the NS record: the use of fast-flux techniques to disguise the location of web sites or other Internet services, to avoid detection and mitigation efforts, or to host illegal activities is considered abusive in the TLD. Fast flux techniques use DNS to frequently change the location on the Internet to which the domain name of an Internet host or name server resolves. As such an unusual number of changes to the NS record may be indicative of the use of fast-flux techniques given that there is little, if any, legitimate need to change the NS record for a domain name more than a few times a month.

* Results of Monthly Checks: The random monthly checks to promote Whois accuracy (described ahead) are not limited to serving that purpose but may also be used to identify abusive behaviour given the strong correlation between inaccurate Whois data and abuse.

* Analysis of Cross Validation of Registrant Whois data against Whois Data Known to be Fraudulent.

* Analysis of Domain Names belonging to Registrant subject to action under the Anti-Abuse policy: in cases where action is taken against a registrant through the application of our Anti-Abuse policy, we will also investigate other domain names by the same registrant (same name, nameserver IP address, email address, postal address etc).

4. PROCEDURES FOR HANDLING COMPLAINTS

4.1 MECHANISMS FOR REPORTING COMPLAINTS

In order to make it easy for security agencies, law enforcement bodies and vigilant users to report incidents of abusive behavior within .Web, we shall enable several channels of communication.

4.1.1 SINGLE POINT OF CONTACT

In accordance with section 4.1 of specification 6 of the Registry Agreement we will establish a single abuse point of contact (SAPOC) responsible for addressing and providing a timely response to abuse complaints concerning all names registered in the TLD through all registrars of record, including those involving a reseller. Complaints may be received from members of the general public, other registries, registrars, LEA (Law Enforcement Agencies), government and quasi governmental agencies and recognised members of the anti-abuse community.

The SAPOC’s accurate contact details (email, fax and mailing address) will be provided to ICANN and published on the abuse page of our Registry website. The SAPOC will in turn represent the entire compliance desk operated by the Directi group on behalf of .Web as an outsourced function.

The Registry website will additionally also include:

* All public facing policies in relation to the TLD including the Anti-Abuse Policy described in section 2
* A web based submission service for reporting inaccuracies in Whois information
* Registrant Best Practices
* Conditions that apply to proxy registration services and direction to the SAPOC to report domain names that violate the conditions

As such, the SAPOC may receive complaints regarding a range of matters concerning the abuse policy defined in section 2

The SAPOC will be the primary method by which we will receive notification of abusive behaviour from third parties. It must be emphasised that the SAPOC will be the initial point of contact following which other processes will be triggered depending on the identity of the reporting organization and the type of abuse. Accordingly, separate processes for identifying abuse will exist for reports by LEA/government and quasi governmental

agencies and members of the general public.

When any party makes a report via the Abuse POC e-mail address or the abuse web form, he or she will receive back a ticket number from a ticketing system. Our abuse team will then examine these reports, and use a ticketing system to track each issue. This process will leverage a dedicated software that we have used for handling abuse reports to our registrar businesses. It is our goal to provide a timely response to all abuse complaints concerning domains registered in the TLD, as per the SLAs defined by us.

4.1.2 LAW ENFORCEMENT AGENCIES

We recognise that LEA, governmental and quasi governmental agencies may be privy to information beyond the reach of others which may prove critical in the identification of abusive behaviour in our TLD. As such, we will provide an expedited process which serves as a channel of communication for law enforcement, government and quasi-governmental agencies to, amongst other things, report illegal conduct in connection with the use of the TLD.

The process will involve prioritization and prompt investigation of reports identifying abuse from those organizations. The steps in the expedited process are summarised as follows:

1. We will identify relevant LEA, government and quasi governmental agencies who may take part in the expedited process
2. We will establish back channel communication with each of the identified agencies in order to obtain information that may be used to verify the identity of the agency upon receipt of a report utilising the expedited process;
3. We will publish contact details on the abuse page of the Registry website for the SAPOC to be utilised by only those taking part in the expedited process;
4. All calls to this number will be responded to by a member of our 24⁄7 Compliance Team
5. We will verify the identity of the reporting agency employing methods specific to that agency established during back channel communication;
6. Upon verification of the reporting agency, we will obtain the details necessary to adequately investigate the report of abusive behaviour in the TLD;
7. Reports from verified agencies may be provided in the Incident Object Description Exchange Format (IODEF) as defined in RFC 5070. Provision of information in the IODEF will improve our ability to resolve complaints by simplifying collaboration and data sharing
8. The report identifying abuse will then be dealt with in accordance to our process defined in subsequent sections of this answer

4.2 EVALUATION OF COMPLAINTS

The next step is for our abuse desk staff to review each complaint. The abuse team looks at the facts of each complaint in order to verify the complaint. The goals are accuracy, good record-keeping, and a zero false-positive rate so as not to harm innocent registrants while at the same time, taking timely action to mitigate abusive behaviour and to minimize impact.

Evaluation of complaints thus forms a very important part of the process.

The following factors are considered for each case:

* Type, Severity and immediacy of the abuse: Upon initial review, all incoming complaints will face an initial evaluation on the basis of severity and harm cased due to the abuse. While we will adhere to the SLAs laid down for our abuse mitigation processes, regardless of the type of complaint, there will be some complaints that will be considered relatively more severe and of greater malicious impact than others. Complaints with a higher severity/malicious impact and immediacy will be processed with greater urgency than others.

* Determining the origin of the complaint: a credible complainant e.g. a law enforcement agency, a security group etc. automatically lends genuineness to a complaint while a complaint from a previously unknown source will require a background check to ensure that the complaint is not from a miscreant looking to create unnecessary trouble for a domain owner. Thus while we may take immediate action complaints from reliable sources, those from other sources, not backed by enough evidence, may require further due-diligence before action is taken.

* Evaluating proof submitted along with a complaint: A complaint is also evaluated based on the supporting evidence provided which further determines the validity of a complaint. At this stage we will also attempt to establish a clear link between the activity reported and the alleged type of abusive behaviour. This is done to ensure that addressing the reported activity will address the abusive behaviour. In some cases the abuse is evident, which will result in immediate processing of the complaint from our side without much further due-diligence. In some cases, where the abuse may not be evident upfront, our desk will rely on supplementary evidence provided by the complainant which may be further ratified. While not limited to this list, supporting evidence could range from links, screen-shots of websites, copy right / trademark details, emails, email headers, whois information, ID proof etc.

* Evaluating historical data: As mentioned before, we will maintain a log of all complaints received, including the contact details of complainants, the whois details of the abusers, the nameservers of abusive domain registrations, the type of domain names, the IPs of spamming domains etc. This will further help us in establishing trends for further action as required. A registration that re-sounds alarms from previously seen abusive trends will ascertain the necessary pre-emptive mitigation processes.

Assessing abuse reports requires good judgment, and we will rely upon our, specially trained abuse desk staff.

While we recognise that each incident of abuse represents a unique security threat and should be mitigated accordingly, we also recognise that prompt action justified by objective criteria are key to ensuring that mitigation efforts are effective. With this in mind, we have categorised the actions that we may take in response to various types of abuse by reference to the severity and immediacy of harm. This categorisation will be applied to each validated report of abuse and actions will be taken accordingly. It must be emphasised that the actions to mitigate the identified type of abuse in the section/s below are merely intended to provide a rough guideline and may vary upon further investigation.

4.3 CATEGORIZATION OF COMPLAINTS

Each confirmed case of abuse is bucketed into one of the following categories

4.3.1 CATEGORY 1

Probable Severity or Immediacy of Harm - Low
Examples of types of abusive behaviour – Small Scale Spam, Whois Inaccuracy

Mitigation steps:

1. Preliminary Investigation
2. Delegate to Registrar
3. Monitor response time-frame vis-à-vis SLA
4. Take direct action in case of Registrar non-conformance.

4.3.2 CATEGORY 2

Probable Severity or Immediacy of Harm - Medium
Examples of types of abusive behaviour – Medium scale spam, inactive botnets and other forms of abuse which have a higher degree of impact than the ones bucketed as category 1, but still relatively limited in terms of potential damage.

Mitigation steps:

1. Preliminary Investigation
2. Delegate to Registrar
3. Monitor response time-frame vis-à-vis SLA
4. Take direct action in case of Registrar non-conformance.

4.3.3 CATEGORY 3

Probable Severity or Immediacy of Harm - High
Examples of types of abusive behaviour – Fast Flux Hosting, Phishing, Large scale hacking, Pharming, Botnet command and control, Child Pornography and all other cases deemed to carry a very high risk of large scale impact

Mitigation steps for Abuse policy violation:

1. Suspend domain name
2. Investigate
3. Restore or terminate domain name

4.4 MITIGATION OF COMPLAINTS

The mitigation steps for each category will now be described:

4.4.1 CATEGORY 1

Types of abusive behaviour that fall into this category include those that represent a low severity or immediacy of harm to registrants and internet users. These generally include behaviours that result in the dissemination of unsolicited information or the publication of illegitimate information. While undesirable, these activities do not generally present such an

immediate threat as to justify suspension of the domain name in question. Each of these cases will be delegated down to the Registrar and the registrar's performance, in terms of response and resolution rate, will be monitored and recorded by us. In case of non-conformance by the Registrar, we will take-over the issue.

We will also continually monitor the issue to track possible increases in the severity of harm. In case the threat level is above what was originally anticipated, we will escalate the issue to category two or three and act in accordance.

4.4.2 CATEGORY 2

Types of abusive behaviour that fall into this category include those that represent a medium severity or immediacy of harm to registrants and internet users. These generally include medium scale spam, network intrusion, inactive botnets etc. Following the notification of the existence of such behaviours, our compliance team will delegate the issue to registrars and envoke the more aggressive SLAs that apply to this category of risk.

As was the case with category 1, we will continue to monitor the registrar's conformance with the SLAs and take direct action when necessary. We will also check for possible increases in risk levels and escalate the abuse category if required.

4.4.3 CATEGORY 3

Highly serious, sensitive and large scale issues like phishing, child pornography and large-scale botnet are considered to be a serious violation of the Anti-Abuse Policy owing to its fraudulent exploitation of consumer vulnerabilities, high level of risk and far-reaching consequences. Given the direct relationship between the uptime of these activities, and extent of harm caused, we recognise the urgency required to execute processes that handle these cases directly, without any delegation.
As soon as the abuse is substantiated, we will proceed to suspend the domain name pending further investigation to determine whether the domain name should be unsuspended or cancelled. Cancellation will result if upon further investigation, the behaviour is determined to be one of the types of abuse defined in the Anti Abuse Policy.

In some cases we may change the nameservers associated with the domain and/or use EPP prohibited statuses in appropriate combinations to restrict activity against the domain such as contact updates, deletes or transfers.

In the past we have modified Nameservers to sinkhole malicious domains, so research partners can measure botnets and monitor malware activity. We believe this to be an extremely effective mechanism which takes down large scale attacks from the source, and assists researchers to build processes and tools which prevent future attacks from the same source. Our team will follow the same process for domains belonging to our registry.

We have built special systems to suspend individual and bulk batches of domains. This will allow us to quickly take care of cases where criminals have obtained bulk batches of domain names. This will be of use if malware designers use generation algorithms to register domains.

Reactivation of the domain name will result where further investigation determines that abusive behaviour, as defined by the Anti Abuse Policy, does not exist and that the domain name is not causing any harm.

4.5 PROPOSED RESOLUTION METRICS AND SERVICE LEVEL AGREEMENTS

SLA RESPONSE CONSIDERATIONS FOR REPORTED ABUSE CASES

As described earlier, each abuse case and goes into one of three response categories depending on the severity and immediacy of the harm caused by the abuse. In the case of any failed SLA responses, the Registry reserves the right to act directly to suspend and/or lock the domains associated with a given abuse case. Additionally, highly serious, sensitive and large scale issues are ranked as category 3 and prioritized above all other cases.

Attachment 'Q28_Abuse Mitigation SLA', shows the flowchart and SLA response for each category of abuse complaint

4.5.1 CATEGORY 1

Some examples of abuses cases that will be categorized as 1 include:

* Low scale Spam
* Whois Inaccuracy
* Low scale Malware
* Any other abuse case deemed as low risk

RESPONSE SLA COMMITMENTS:

* Initial Registry Response to Complainant: 2 business days from the time of receipt of the complaint
* Registry Notification to Registrar: 2 business days from the time of receipt of the complaint
* Initial Response from Registrar: 3 business days from the time that the complaint notification is sent to the Registrar
* Update from Registrar as action taken or intended: 7 business days from the time that the complaint notification is sent to the Registrar
* Final Resolution: 15 business days from the time the issue was reported to us

4.5.2 CATEGORY 2

Some examples of abuses cases that will be categorized as 2 include:

* Medium scale Spam
* Confirmed but inactive botnet domains
* All other abuse cases deemed as medium scale

RESPONSE SLA COMMITMENTS:

* Initial Registry Response to Complainant: 2 business days from the time of receipt of the complaint
* Registry Notification to Registrar: 2 business days from the time of receipt of the complaint
* Initial Response from Registrar: 2 business days from the time that the complaint notification is sent to the Registrar by the Registry

* Update from Registrar as action taken or intended: 3 business days from the time that the complaint notification is sent to the Registrar by the Registry
* Final Resolution: 8 business days from the time of receipt of the complaint

4.5.3 CATEGORY 3

Some examples of abuses cases that will be categorized as 3 include:

* Confirmed Cases of child pornography
* Confirmed cases of Phishing
* Confirmed and active botnets domains
* Any other case deemed as large scale

RESPONSE SLA COMMITMENTS:

* Initial Registry Response to Complainant: 1 business day from the time of receipt of the complaint
* Registry time to direct takedown: 3 business days from the time of receipt of the complaint

4.6 FOLLOW-UP AND CAPTURE OF METRICS

The abuse staff will track each abuse complaint ticket to resolution. Our ticketing system allows us to capture many metrics. We will measure resolution times, and we can see what percentage of abuse reports could be confirmed. We will also capture how many domains were suspended, and we will break down statistics by registrar in the TLD. This will help us identify registrars that have regular problems, and we can work with them to systematically identify and act against bad actors.

4.7 CONTRACTUAL PROVISIONS

As the registry operator, we will use the Registry-Registrar Agreement (RRA) to establish the registry's right to act against abusive registrations as described in the preceding sections. We will also use the contract to impose certain obligations on the registrars, and make some obligations binding on the registrants by obligating specific terms in the registrar-registrant contract. The contract will be a mandatory part of the Registrar accreditation process with the Registry. Production access to the Registry will not be granted until the contract is duly signed AND the registrar has provided copy of their Registry Registrant Agreement to demonstrate the inclusion of any required pass-through provisions. The registrar is also fully obligated to their accreditation contracts with ICANN (via the RAA) which includes elements such as the UDRP.

In general, the contracts will establish that the registry operator may reject a registration request, or can delete, revoke, update, suspend, cancel, or transfer a registration for violations of our anti-abuse policies. The terms in our proposed agreement will empower us to take necessary action including, but not limited to:

* Discretionary action against domain names that are not accompanied by complete and accurate information as required by ICANN Requirements and⁄or Registry Policies or where required information is not updated and⁄or corrected as required by ICANN Requirements and⁄or Registry Policies;

* Action as may be required to protect the integrity and stability of the Registry, its operations, and the TLD system;

* Action as may be required to comply with any applicable law, regulation, holding, order, or decision issued by a court, administrative authority, or dispute resolution service provider with jurisdiction over the Registry;

* Action as may be required to establish, assert, or defend the legal rights of the Registry or a third party or to avoid any civil or criminal liability on the part of the Registry and/or its affiliates, subsidiaries, officers, directors, representatives, employees, contractors, and stockholders;

* Action as may be required to correct mistakes made by the Registry or any Accredited Registrar in connection with a registration; or

* Enforcement of Registry policies and ICANN requirements; each as amended from time to time;

* Actions as otherwise provided in the Registry-Registrar Agreement and/or the Registry-Registrant Agreement.

Below are some additional points that we will look to cover in the RRA. These clauses will enable us to enforce some additional, proactive measures to curb and deter abuse:

* We will reserve the right to deny registration of a domain name to a registrant who has repeatedly engaged in abusive behaviour in our TLD or any other TLD.

* We will reserve the right to place upon registry lock, hold or similar status a domain name during resolution of a dispute.

* We may amend or otherwise modify this policy to keep abreast of changes in consensus policy or new and emerging types of abusive behaviour in the Internet.

* Relevant language that enforces Registrars to conform with the SLAs provided for abuse cases delegated to them and provides the Registry with rights to take relevant actions in those cases.

* Relevant language for sanctions against a Registrar leading to termination with respect to repeated offences and violations of their obligations with respect to abuse mitigation.

* Relevant language that requires Registrars to provide for the following in their agreement with the Registrants
** Whois accuracy provisions
** Acceptable content and usage policy
** Sunrise policy and submission to SDRP
** UDRP
** Rights granted to the Registrar and Registry to take necessary action wrt abuse prevention including sharing information with regulatory bodies and LEA and domain takedowns where appropriate
** Indemnification

All of the contracts above will be regularly reviewed (atleast once a

year) based on the experience gained by the Registry during actual operation and any relevant changes required to mitigate abuse will be appropriately introduced in consultation with ICANN and the Registrars

4.8 ADDITIONAL MITIGATION MEASURES

Based on our experience of running a leading Registrar, we have also devised some powerful mechanisms which will prevent possible abuse, and quickly diffuse abusive domains. These mechanisms include:

4.8.1 PROFILING & BLACKLISTING

This process, currently in practice for our registrar businesses within the Directi Group, is used for gathering intelligence on known offenders. We maintain abuse ratios for each of the 1,000,000 plus registrants and 65,000 plus resellers who use Directi.

Experience has enabled us to use these ratios accurately to uncover registrants who are known and repeated offenders. Expert offenders rarely reuse the same registrant profile and often maintain a myriad number of profiles to mask their true identity. Through pattern mapping we try and group registrant profiles that we believe belong to the same operator.

The same process is followed at the reseller level too, to identify those resellers who are knowingly harboring offenders, or are themselves involved in abuse.
When a registrant profile is confirmed to be involved in organized abuse, including but not limited to cybersquatting, phishing, pharming etc., our immediate step is to suspend that customer’s control over his abusive domain portfolio. Our compliance team then carefully analyzes each domain name to identify those which are abusive and not already taken-down. The necessary action is undertaken to diffuse any ongoing abuse.

We plan to adopt the ‘Profiling and Blacklisting’ process within our registry operations. Since all of our compliance resources will be trained and experienced in running this process, its implementation into .Web will be simple. Specifics of this policy and process, as it applies to our registry business, will be drawn out.

4.8.2 PROACTIVE QUALITY REVIEW

As a preventive safeguard against abusive domain registration, we follow a consistent review process for domain registrations on our registrar, where a sample of newly registered domain names are analyzed for potential abusive activity. Coupled with our profiling process (described above), it enables us to take proactive measures against domain names that are registered solely to perpetrate malicious activities such as phishing, or otherwise infringe on the rights of others. This helps us curb abusive activity before it can affect too many Internet users. We shall seek to implement similar safeguards for .Web, and encourage registrars to incorporate this practice as part of their abuse mitigation processes.

4.9 INDUSTRY COLLABORATION AND INFORMATION SHARING

Upon obtaining Registry Accreditation, we will join the Registry Internet Safety Group (RISG), whose mission is to facilitate data exchange and promulgate best practices to address internet identity theft, especially phishing and malware distribution. In addition, Directi coordinates with

the Anti-Phishing Working Group (APWG), other DNS abuse prevention organizations and is subscribed to the NXdomain mailing list. Directi's strong participation in the industry facilitates collaboration with relevant organizations on abuse related issues and ensures that Directi is responsive to new and emerging domain name abuses.

The information shared as a result of this industry participation will be used to identify domain names registered or used for abusive purposes. Information shared may include a list of registrants known to partake in abusive behavior in other TLDs. While presence on such lists will not directly constitute grounds for registrant disqualification, we will investigate domain names registered to those listed registrants and take appropriate action. In addition, information shared regarding practices indicative of abuse will facilitate detection of abuse by our own monitoring activities.

5. PROMOTING AND ENSURING WHOIS ACCURACY

All registrants shall be required, via required language in every Registrar – Registrant Agreement, to provide accurate Registrar Data Directory Services, RDDS (WHOIS) contact details, and to keep those details current. Additionally, Registrars shall have direct responsibility to ensure Whois accuracy through their accreditation contracts with ICANN. Whois Data Reminder Policy or WDRP is an example of a direct Registrar/ICANN contractual obligation to monitor that RDDS (WHOIS) information is accurate and up to date – it includes requiring Registrars to notify their registrants at least once a year to ensure their RDDS (WHOIS) data is correct and up to date.

The threat of inaccurate Whois information significantly hampers the ability to enforce policies in relation to abuse in the TLD by allowing the registrant to remain anonymous. In addition, LEA's rely on the integrity and accuracy of Whois information in their investigative processes to identify and locate wrongdoers.

In recognition of this, we propose that .Web have the following measures to promote RDDS (WHOIS) accuracy.

5.1 WHOIS INACCURACY REPORTING SYSTEM

On the abuse page of our Registry website, we will provide a web based submission service for reporting Whois accuracy issues. Each of these issues will then be resolved as per the process detailed in the previous sections.

5.2 REGULAR MONITORING & SAMPLING

Registrants of randomly selected domain names will be contacted by telephone using the provided Whois information by a member of our team in order to verify the phone number and confirm other Whois information. Where the registrant is not contactable by telephone, alternative contact details (email, postal address) will be used to contact the registrant who must then provide a contact number that is verified by our team. In the event that the registrant is not able to be contacted by any of the methods provided in Whois, the domain name will be cancelled following five contact attempts or one month after the initial contact attempt (based on the premise that a failure to respond is indicative of inaccurate Whois information and is grounds for terminating the

registration agreement)

5.3 ANALYSIS OF REGISTRY DATA

We will adopt some processes to identify patterns and correlations indicative of inaccurate Whois (e.g. repetitive use of fraudulent details).

5.4 PROMOTING ACCURATE WHOIS DATA

WDRP (Whois Data Reminder Policy) implemented by ICANN at the Registrar level, mandates regular e-mail communication to registrants reminding them to keep their whois data accurate and updated. In addition, we will also identify effective mediums to remind registrants to update Whois information and inform them of the ramifications of a failure to respond to our random monthly checks. Ramifications include but are not limited to termination of the registration agreement.

5.5 ENFORCEMENT AT REGISTRAR LEVEL

Registrars will also be contractually required to promptly investigate reports of RDDS (WHOIS) accuracy submitted to them, and resolve each case within a predefined time-frame stipulated through our SLA.

For all cases where inaccuracy is confirmed, we will record the registrar from whom the domain was sourced. We will use this data to capture the ratio of inaccuracies as a percentage of total domains managed, and identify the registrars that seem to attract an abnormally high number of inaccuracy issues. We will then work with those registrars to find potential ways in which they can progressively reduce the number of whois inaccuracy incidents.

The measures to promote Whois accuracy described above strike a balance between the need to maintain the integrity of the Whois service, which facilitates the identification of those taking part in illegal or fraudulent behaviour, and the operating practices of the Registry Operator and Registrars which aim to offer domain names to registrants in an efficient and timely manner.

Awareness among registrants that we will actively take steps to maintain the accuracy of Whois information mitigates the potential for abuse in the TLD. It deters abusive behaviour given that registrants may be identified, located and held liable for all actions in relation to their domain name.

5.6 PROXY / PRIVACY PROTECTION

We have designed a policy that will maximize the legitimate use of proxy and privacy services, and will minimize use by criminals and abusers.

.Web will allow the use of proxy and privacy services, where permitted by ICANN policies and requirements. These services have legitimate uses. Millions of registrants use them to protect their privacy and personal data from spammers and other parties that mine zone files and RDDS (WHOIS) data.

It is undeniable that criminals also use whois proxy services, to hide their true identities. To deter that practice, our policy will require that:

* Registrants must use only a privacy/proxy service operated, contracted or owned by the domain's sponsoring registrar, and cannot use third-party proxy services unaffiliated with the domain's sponsoring registrar. This means that a domain's sponsoring registrar will always be in possession of the underlying contact data.

*. Registrars and resellers must provide the underlying registrant information to the registry operator upon request, and/or upon a legitimate law-enforcement request, within 24 hours. The registry operator will keep this data confidential, unless #3 below applies.

* Registrars and resellers must remove the proxy protection and publish the underlying registrant information in the RDDS (WHOIS) if it is determined by the registry operator and/or the registrar that the registrant has breached any terms of service, such as anti-abuse policies.

The registrar obligations outlined above shall apply with equal force to all registrations sponsored by a registrar, whether those registrations were placed directly with the registrar or through a reseller.

These conditions will be implemented contractually by inclusion of corresponding clauses in the RRA as well as being published on the abuse page of our Registry website. Individuals and organisations will be encouraged through our abuse page to report any domain names they believe violate the restriction on the availability of proxy registrations, following which appropriate action may be taken by us. Publication of these conditions on the abuse page of our Registry website ensures that registrants are aware that despite utilisation of a proxy registration service, actual Whois information will be provided to LEA upon request in order to hold registrants liable for all actions in relation to their domain name. The certainty of Whois disclosure of domain names which draw the attention of LEA, deters those seeking to register domain names for abusive purposes.

6. CONTROLS FOR PROPER ACCESS TO DOMAIN FUNCTIONS

We realize that registrants often do not willfully use their domain names for abusive purposes, but domain names end up being compromised because of a lapse in security. Though this cannot always be controlled or mitigated by the registry, we are nevertheless committed to ensure that adequate safeguards are implemented to prevent domain names from being compromised and thereby making them prone to abuse.

6.1 MULTI-FACTOR AUTHENTICATION AND SECURE CONNECTIVITY FOR REGISTRARS

Through the contractual agreement with the registry, registrars will be expected to develop and employ in their domain name registration business, all necessary technology and restrictions to ensure that their connection to the registry is secure. All data exchanged between the registrar's system and the registry shall be protected to avoid unintended disclosure of information. Each EPP session shall be authenticated and encrypted using two-way secure socket layer ("SSL") protocol. Registrars will also agree to authenticate every EPP client connection with the registry using both an X.509 server certificate issued by a commercial Certification Authority identified by the registry and their registrar password, disclosed only to their respective employees on a need-to-know basis. Registrars will also access the SRS Web interface by utilizing an additional two-factor authentication token. Further details on this is

provided in the response to Question 24 and 25

6.2 ENFORCEMENT OF STRONG AUTHCODES

Every domain name will have a strong authorization (authinfo) code, composed of alphabets, numerals, and special characters. An inter-registrar domain name transfer will not be permitted unless the registrant provides this authorization code at the time of executing the transfer process.

6.3 NOTIFICATION FOR EVERY UPDATE

We plan to notify the domain name holder upon any update made to a domain name. The notification will be committed through email to either or both of the registrant and technical contact of the domain name.

6.4 REGISTRY LOCK

Certain mission-critical domain names such as transactional sites, email systems and site supporting applications may warrant a higher level of security. ‘Registry locking’ is a feature which allows registrants to prohibit any updates at the Registry Operator level. This service will be available programmatically via EPP, so all registrars will be able to offer it in real-time to their registrants. The feature will prevent unintentional transfer, modification or deletion of the domain name, and mitigates the potential for abuse by prohibiting any unauthorised updates that may be associated with fraudulent behaviour. For example, an attacker may update name servers of a mission critical domain name, thereby redirecting customers to an illegitimate website without actually transferring control of the domain name. This is described in detail in our response to Question 27

6.5 AWARENESS PROGRAMS

In accordance with our commitment to operating a secure and reliable TLD, we will attempt to improve registrant awareness of the threats of domain name hijacking, registrant impersonation and fraud, and emphasize the need for registrants to keep registration information accurate and confidential. Awareness will be raised by:

* Publishing the necessary information on the Abuse page of our Registry website in the form of videos, presentations and FAQs;

* Developing and providing to registrants, resellers and Registrars Best Common Practices that describe appropriate use and assignment of domain auth info codes and risks of misuse when the uniqueness property of this domain name password is not preserved.

7. RESOURCING PLANS

7.1 PERSONNEL

Functions described herein will be performed by -
* Directi Group staff under contract with us -
** Abuse & Compliance Team
* Dispute Resolution Service Providers that are selected wrt UDRP and SDRP

Directi Group possesses an exemplary track record of diffusing abuse on 4

million plus domains under their Registrar. The abuse mitigation function of our Registry will be handled by the same team that currently manages this process for the registrar businesses.

The existing compliance team comprises of:
* 1 Compliance Manager
* 1 Team Supervisor
* 4 Cyber Security Analysts
* 9 Compliance Officers

The compliance function is staffed on a 24/7/365 basis and capable of handling up to a peak of 52,800 unique abuse incidents per year. Each incident by itself can relate to a few to hundreds of domain names.

While this team is trained to investigate and verify all types of issues, they can also fall back on support from our technical staff when required. Similarly, abuse cases following new or unexpected parameters may also be escalated to legal support staff for expert counsel.

Our estimates of resource sizing are directly derived from the abuse case incident volumes currently experienced. On a base of 4 million domains across our Registrar businesses within Directi, each year we experience approximately:

* 6000 malware related abuses
* 1600 phishing abuses
* 1200 spam cases
* 600 pharmacy related abuses
* 5600 large botnet related abuse cases annually

This averages an incident rate of approximately 15,000 cases of abuse per year or 3.75 incidents per 1000 names

Since registries delegate a large portion of their abuse responsibilities to registrars, it is fair to assume that our registry's abuse incident ratio will be lower than what we experience as registrars. In fact, in our case 2/3 categories of incidents will be delegated to the registrar and our direct involvement is expected in only 25%-35% of all incidents. However, given our proactive approach, importance on ensuring a clean and secure namespace, and aggressive SLAs, we choose to be conservative by assuming that we will be involved in 75% of all incidents.

Based on our projections, we expect .Web to reach 471,482 domain names at the end of the 3rd year. Extrapolating from our current rate of 3.75 incidents per 1000 names, we can expect around 1,768 abuse incidents yearly and be involved in 1,326 (75%) of them. Including the estimated 78 RPM incidents (details in our response to Q29), brings our total projected incident count to 1,404. This conservative estimate also accounts for the aggressive SLAs at multiple levels, law enforcement interfacing and having a single POC available at all times.

The Compliance desk works as a centralized team and all team members are responsible for all abuse complaints across all businesses of Directi. Costs of the Compliance team are then allocated to each business based on the % utilization of the compliance team by each business. We have assumed 25% of 2 compliance officers' time towards .Web. Given that our 15 people team has the capacity to handle 52,800 incidents yearly, 2 officers with 25% of their time, will have a total capacity to handle 1,760 incidents

annually. . It is important to point out that 25% of the 2 officers is merely a cost allocation method and in actuality all 15 members and more of the Compliance team will be available to resolve abuse issues for TLD.

Our planning provides us redundant capacity of 250%+ in Y1, 85% in Y2 and 25% in Y3, to handle both abuse as well as RPM related cases such as those involving URS. This leaves substantial headroom for rapid growth of domains under management, or a sudden surge in abuse incident rates per domain.

It is also important to note that there exists some economies of scale in our operations since a large number of these cases are dealt with in bulk, or large batches, as they relate to the same instigator(s).

The abuse team has a structured training program in place which enables them to rapidly scale-up resources when required. Typically a team of recruits are given four weeks of training and two weeks on the floor before they are fully activated.

Given the rapid growth rate of Directi businesses, Directi will continue to hire and maintain a sizable buffer over and above anticipated growth.

7.2 FINANCIAL CONSIDERATIONS

The usage of Directi Group's staff is included in our contract with Directi attached to Q46 ('Q46_References: Service and Facilities Commitment Agreement'). This cost is shown in the financial answers.

This completes our response to Q28.

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29. Rights Protection Mechanisms: Applicants must describe how their registry will comply with policies and practices that minimize abusive registrations and other activities that affect the legal rights of others, such as the Uniform Domain Name Dispute Resolution Policy (UDRP), Uniform Rapid Suspension (URS) system, and Trademark Claims and Sunrise services at startup.
A complete answer should include:

- A description of how the registry operator will implement safeguards against allowing unqualified registrations (e.g., registrations made in violation of the registry's eligibility restrictions or policies), and reduce opportunities for behaviors such as phishing or pharming. At a minimum, the registry operator must offer a Sunrise period and a Trademark Claims service during the required time periods, and implement decisions rendered under the URS on an ongoing basis; and
- A description of resourcing plans for the initial implementation of, and ongoing maintenance for, this aspect of the criteria (number and description of personnel roles allocated to this area).

>To be eligible for a score of 2, answers must also include additional measures specific to rights protection, such as abusive use policies, takedown procedures, registrant pre-verification, or authentication procedures, or other covenants.
A complete answer is expected to be no more than 10 pages.

DotWeb Inc. is a wholly owned subsidiary within the Directi Group. The Directi Group runs various businesses including several ICANN Accredited Domain Registrars (including ResellerClub.com and BigRock.com) and Web Hosting companies. At Directi, through our decade long experience as a domain name registrar, we have consciously strived to ensure that domain registrations through our platform do not violate the intellectual property or other rights of any person or organization.

Our experience as a domain name registrar gives us insight into the necessity and importance of rights protection, and the mechanisms that must be employed to assure it. With .Web, we shall leverage our experience to implement a comprehensive set of policies and procedures that will uphold intellectual property rights to the greatest possible extent.

The protection of trademark rights is a core goal of .Web. .Web will have a professional plan for rights protection. It will incorporate best practices of existing TLDs, going above and beyond the ICANN mandated RPMs to prevent abusive registrations and rapidly take-down abuse when it does occur.

1. PREVENT ABUSIVE REGISTRATIONS

We will put into place the following measures to ensure prevention of registrations that infringe the IP rights of others

1.1 SUNRISE PROCESS

Our sunrise registration service will provide trademark holders with atleast a 30-day priority period in which to register their trademarks as domain names.

Sunrise Timeline -
Day 1:Single sunrise round opens
Day 30:Sunrise round closes
Day 31:Sunrise allocation begins and Sunrise period ends

1.1.1 SUNRISE POLICY SUMMARY AND SDRP SUMMARY

This section provides a summary of our Sunrise Policy and SDRP. We have formulated our policies and processes based on existing guidance concerning Sunrise and TMCH provided by ICANN. Any additional guidance in the future that requires changes to our process and policies will be implemented.

Through our Sunrise Policy we will offer atleast one 30-day sunrise round in which trademark holders satisfying the Sunrise eligibility requirements proposed in the ‘gTLD Applicant Guidebook’ will be eligible to apply for a domain name. This sunrise period will be the first opportunity for registration of domain names in .Web. Trademarks upon which sunrise applications are based must

meet the criteria defined in the ‘gTLD Applicant Guidebook’ and be supported by an entry in the TMCH.

Sunrise allocation will start at the end of the 30-day sunrise period. If one validated application is received for a domain name, the same will be allocated to the applicant in the 10-day period following the end of the sunrise period. Where multiple validated applications are received for a domain name, the name will be allocated by auction. Domain names registered during the sunrise period will have a min. term of 2 yrs.

We will adopt a Sunrise Dispute Resolution Policy (‘SDRP’) to allow any party to raise a challenge on the four grounds identified in the ‘gTLD Applicant Guidebook’. All registrants will be required to submit to proceedings under the SDRP. SDRP claims may be raised at any time after registration of a domain name.

1.1.2 IMPLEMENTATION

1.1.2.1 SUNRISE PRICING

We plan to charge a non-refundable Sunrise application fee or validation fee of $80 for every Sunrise application. We have arrived at the fee to offset the cost of the trademark validation and other administrative over-heads.

1.1.2.2 SUNRISE IMPLEMENTATION PLAN

1. Prior to sunrise, trademark holders should apply for inclusion of their marks in the TMCH database.
2. Our Sunrise Policy and SDRP will be published on our website.
3. A trademark holder satisfying the sunrise eligibility requirements will pay the non-refundable sunrise application fee and submit its application corresponding to its TMCH entry to a registrar along with evidence of the corresponding TMCH entry.
4. Registrars will send the sunrise applications to CENTRALNIC. They will be charged the application fee at this time.
5. CENTRALNIC will perform standard checks to ensure that the domain name is technically valid and hold the application for subsequent allocation.
6. Upon conclusion of the 30-day sunrise period, CENTRALNIC will

allocate the applied-for names as follows:

* Where a single sunrise application exists for a particular domain name CentralNic will allocate the domain to the sponsoring registrar and will charge the sunrise registration fee to the registrar.

* Where multiple sunrise applications exist for a domain name, CentralNic will compile and communicate to a 3rd-party auction services provider appointed by us a list of competing applicants, who will be invited to participate in an auction for the domain name.

7. The auction services provider will facilitate the auction process and upon completion of the auction will notify all participants of the outcome and collect the auction payment from the winning participant.

8. Upon payment of the auction bid, the auction services provider will communicate to CentralNic the details of the winning auction participant and will submit the revenue collected to CentralNic. CentralNic will validate the communication from the auction services provider and allocate the domain name to the sponsoring registrar of the winning application.

9. Sometime during this process CentralNic will identify all sunrise applications which constitute an ‘Identical Match’ (as defined in the ‘gTLD Applicant Guidebook’) with a TMCH entry and provide notice to the TMCH via the List of Registered Domain Names (LORDN).

1.1.1.3 SDRP IMPLEMENTATION PLAN

When a domain is awarded and granted to a registrant, that domain will be available for lookup in the public WHOIS.

After a Sunrise name is awarded it will also remain under a “Sunrise Lock” status for at least 60 days. During this period the domain will not resolve and cannot be modified, transferred, or deleted by the sponsoring registrar. A domain name will be unlocked at the end of that lock period only if it is not the subject of a Sunrise Challenge. Challenged domains will remain locked until the dispute resolution provider has issued a decision, which the registry operator will promptly execute.

SDRP filings will be handled by an appropriate service provider as per ICANN guidance and policy.

1.1.1.4 IMPLEMENTATION THROUGH CONTRACTUAL RELATIONSHIPS

The following features of the Sunrise and SDRP implementation plans described above will be executed by the inclusion of corresponding clauses in our RRA, which will require inclusion in registrars’ Domain Name Registration Agreements:

* By making a sunrise application the applicant agrees to purchase the domain name if that name is allocated to the applicant.
* The sunrise application fee is non-refundable.
* All sunrise applicants must submit to proceedings under the SDRP.

1.2 TRADEMARK CLAIMS SERVICE

For atleast 60 days during general availability we will offer the trademark claims service as described in the ‘gTLD Application Guidebook’.

1.2.1 IMPLEMENTATION

1.2.1.1 TRADEMARK CLAIMS SERVICE IMPLEMENTATION PLAN

This process will be executed for atleast the first 60 days of general availability:

1. an applicant will make an application to a registrar for a domain name.
2. Registrars will be required to communicate land rush application information to our registry backend provider - CENTRALNIC.
3. CENTRALNIC or Registrars (as prescribed) will interface with the TMCH to determine whether an applied-for domain name constitutes an ‘Identical Match’ with a trademark in the TMCH. If an ‘Identical Match’ is identified, the registrar will provide to the land rush applicant a Trademark Claims Notice in the form prescribed by the ‘gTLD Applicant Guidebook’. Following receipt of this notice

a land rush applicant must communicate to the registrar its decision either to proceed with or abandon the registration.

4. CENTRALNIC or Registrar (as prescribed) will interface with the TMCH to promptly notify relevant mark holders of the registration of a domain name constituting an ‘Identical Match’ to their TMCH entry.

1.2.1.2 IMPLEMENTATION THROUGH CONTRACTUAL RELATIONSHIPS

The following features of our Trademark Claims Service Implementation Plan described above will be executed by the inclusion of corresponding clauses in our RRA:

* Registrars must comply with the TMCH as required by ICANN and the TMCH Service Provider/s.
* Registrars must not in their provision of the trademark claims service make use of any other trademark information aggregation, notification or validation service other than the TMCH.
* In order to prevent a chilling effect on registration, registrars must ensure that land rush applicants are not prevented from registering domain names considered an ‘Identical Match’ with a mark in the TMCH.
* Registrars must provide clear notice in the specific form provided by the ‘gTLD Applicant Guidebook’ to the prospective registrant of relevant entries in the TMCH.
* Registrars must interface with the TMCH as prescribed to relevant mark holders of the registration of a domain name constituting an ‘Identical Match’ to their TMCH entry.

2. ONGOING RIGHTS PROTECTION AND ABUSE PREVENTION

Below we describe ongoing RPMs which we will implement to mitigate cybersquatting and other types of abusive behaviour such as phishing and pharming.

2.1 UNIFORM RAPID SUSPENSION (URS)

The URS (Uniform Rapid Suspension) procedure is a new RPM the implementation of which is mandated in all new gTLDs. Understanding that a fundamental aim of the URS is expediency, all of the steps in our Implementation Plan below will be undertaken as soon as practical but without compromising security or accuracy.

2.1.1 IMPLEMENTATION

2.1.1.1 URS IMPLEMENTATION PLAN

1. We will provide to each URS provider an email address to which URS-related correspondence can be sent. On an ongoing basis, our compliance desk will monitor this email address for receipt of communications from URS providers, including the Notice of Complaint, Notice of Default, URS Determination, Notice of Appeal and Appeal Panel Findings.
2. We will validate correspondence from a URS provider to

ensure that it originates from the URS Provider.

3. We will within 24 hours of receipt of a URS Notice of Complaint lock the domain name/s the subject of that complaint by restricting all changes to the registration data, including transfer and deletion of the domain name. The domain name will continue to resolve while in this locked status.

4. We will immediately notify the URS provider in the manner requested by the URS provider once the domain name/s have been locked.

5. Upon receipt of a favourable URS Determination we will unlock the domain name and redirect the nameservers to an informational web page provided by the URS provider. While a domain name is locked, our backend provider - CENTRALNIC - will continue to display all of the WHOIS information of the original registrant except for the redirection of the nameservers and the additional statement that the domain name will not be able to be transferred, deleted or modified for the life of the registration.

6. Upon receipt of notification from the URS provider of termination of a URS proceeding we will promptly unlock the domain name and return full control to the registrant.

7. Where a default has occurred (because a registrant has not submitted an answer to a URS complaint in accordance with the 'gTLD Applicant Guidebook') and a Determination has been made in favour of the complainant, in the event that we receive notice from a URS provider that a Response has been filed in accordance with the 'gTLD Applicant Guidebook', we will as soon as practical restore a domain name to resolve to the original IP address while preserving the domain's locked status until a Determination from de novo review is notified to us.

8. We will ensure that no changes are made to the resolution of a registration the subject of a successful URS Determination until expiry of the registration or the additional registration year unless otherwise instructed by a UDRP provider.

9. We will make available to successful URS complainants an optional extension of the registration period for one additional year.

2.1.1.2 IMPLEMENTATION OF THE URS THROUGH CONTRACTUAL RELATIONSHIPS

The following features of our URS Implementation Plan described above will be executed by the inclusion of corresponding clauses in our RRA:

* In the event that a Registrant does not submit an answer to a URS complaint in accordance with the 'gTLD Applicant Guidebook', registrars must prevent registrants from making changes to the WHOIS information of a registration while it is in URS default.

* Registrars must prevent changes to a domain name when a domain is in locked status to ensure that both the Registrar's systems and Registry's systems contain the same information for the locked domain name.

* Registrars must not take any action relating to a URS proceeding except as in accordance with a validated communication from us or a URS provider.

2.2 UDRP

The UDRP (Uniform Domain Name Dispute Resolution Policy) is applicable to domain name registrations in all new gTLDs. It is available to parties with rights in valid and enforceable trade or service marks and is actionable on proof of all of the following three grounds:

1. The registrant’s domain name is identical or confusingly similar to a trademark or service mark in which the complainant has rights.
2. The registrant has no rights or legitimate interests in respect of the domain name.
3. The registrant’s domain name has been registered and is being used in bad faith.

The remedies offered by the UDRP are cancellation of a domain name or transfer of a domain name registration to a successful UDRP claimant.

2.2.1 IMPLEMENTATION

2.2.1.1 UDRP IMPLEMENTATION PLAN

We have two responsibilities in order to facilitate registrars’ implementation of the UDRP -

1. Our backend provider – CENTRALNIC - will maintain awareness of UDRP requirements and is capable of taking action when required and sufficiently skilled and flexible to respond to any changes to UDRP policy arising from future consensus policy reviews.
2. We will provide EPP and the SRS web interfaces to enable registrars to perform required UDRP functions in accordance with the Policy on Transfer of Registrations between Registrars.

2.2.1.2 IMPLEMENTATION OF THE UDRP THROUGH CONTRACTUAL RELATIONSHIPS

The UDRP is applicable to domain name registrations in all new gTLDs by force of a contractual obligation on Registry Operators to use only ICANN-accredited registrars, who in turn are contractually required to incorporate the UDRP in their Domain Name Registration Agreements.

3. ADDITIONAL RIGHTS PROTECTION MECHANISMS

The protection of trademark rights is a core goal of .Web. Our Right Protection Mechanisms, policies and procedures go significantly above and beyond the minimum mandated RPMs to prevent abusive registrations, rapidly take-down abuse when it occurs, and

foster a clean namespace for .Web

This section describes several other RPMs that .Web will implement that exceed the minimum requirements for RPMs and align with our goal of creating a namespace that provides maximum protection to trademark holders.

3.1 PROFILING & BLACKLISTING

This process, currently in practice for our registrar businesses within the Directi Group, is used for gathering intelligence on known offenders. We maintain abuse ratios for each of the 1,000,000 plus registrants and 65,000 plus resellers who use Directi.

Experience has enabled us to use these ratios accurately to uncover registrants who are known and repeated offenders. Expert offenders rarely reuse the same registrant profile and often maintain a myriad number of profiles to mask their true identity. Through pattern mapping we try and group registrant profiles that we believe belong to the same operator.

The same process is followed at the reseller level too, to identify those resellers who are knowingly harboring offenders, or are themselves involved in abuse.

When a registrant profile is confirmed to be involved in organized abuse, including but not limited to cybersquatting, phishing, pharming etc., our immediate step is to suspend that customer’s control over his abusive domain portfolio. Our compliance team then carefully analyzes each domain name to identify those which are abusive and not already taken-down. The necessary action is undertaken to diffuse any ongoing abuse.

We plan to adopt the ‘Profiling and Blacklisting’ process within our registry operations. Since all of our compliance resources will be trained and experienced in running this process, its implementation into .Web will be simple. Specifics of this policy and process, as it applies to our registry business, will be drawn out.

3.2 PROACTIVE DOMAIN QUALITY ASSURANCE

As a preventive safeguard against abusive domain registration, we follow a consistent review process for domain registrations on our registrar, where a sample of newly registered domain names are analyzed for potential abusive activity. Coupled with our profiling process (described above), it enables us to take proactive measures against domain names that are registered solely to perpetrate malicious activities such as phishing, or otherwise infringe on the rights of others. This helps us curb abusive activity before it can affect too many Internet users. We shall seek to implement similar safeguards for .Web, and encourage registrars to incorporate this practice as part of their abuse mitigation

processes.

3.3 INDUSTRY COLLABORATION

3.3.1 ACTIVE INVOLVEMENT WITH SECURITY AGENCIES

In order to mitigate abuse of domain names on our registrar business, our abuse team has active involvement in helping security vendors and researchers fight domain abuse. They provide us a constant feed of abuse instances and help us identify domain names involved in activities like phishing or pharming. Some of the prominent organizations we work with include PhishLabs (phishing), LegitScript (illegal pharmaceutical distribution), Artists Against 419 (financial scams), Knujon (spam) etc. We will leverage these relationships to ensure oversight for all domain names registered within .Web.

3.3.2 APWG REVIEW

Every six months, the Anti-Phishing Working Group (APWG) publishes its latest Global Phishing Survey [See http://www.apwg.org/resources.html#apwg]. This study contains an analysis of phishing per TLD. We will review the performance of our anti-abuse program against the APWG reports, and other metrics created by the security community. We will work closely with APWG to combat phishing within .Web

3.3.3. MESSAGE OF ZERO TOLERANCE

Our Anti-Abuse Policy will put Registrants on notice of the ways in which we will identify and respond to abuse and serve as a deterrent to those seeking to register and use domain names for abusive purposes. The policy will be made easily accessible on the Abuse page of our Registry website which will be accessible and have clear links from the home page along with FAQs and contact information for reporting abuse.

The Directi Group has vast experience in minimizing abusive registrations. Our zero tolerance procedures and aggressive proactive takedown measures as a Domain Registrar have resulted in a white-hat reputation discouraging abusive registrations to begin with. We intend on following the same approach with respect to Registry operations for .Web. Our proactive abuse procedures are geared towards building a reputation that discourages miscreants and malicious intent. Once it is known that abusive registrations and registrations in violation of our policies are suspended rapidly, this will directly result in discouraging abusive registrations and creating a clean namespace. While following this path will mean a higher compliance and abuse vigilance cost for us, we believe this effort will pay us long term rewards through abusers keeping away and .Web becoming recognized as a reputable namespace.

4. REDUCING PHISHING AND PHARMING

All of the measures we have described in the preceding sections significantly reduce phishing and pharming within .Web. These include RPMs like URS and UDRP.

Over and above this our coordination with APWG, Industry Collaboration, Profiling and Blacklisting processes and Proactive measures described in Section 3 above will go a long way in ensuring a clean namespace for .Web and considerably reduced phishing and pharming activities.

5. PREVENTING TRADEMARK INFRINGEMENT IN OPERATING THE REGISTRY

We take seriously our responsibilities in running a registry and we understand that while offering a sunrise registration service and the trademark claims service during start-up of our TLD and the URS and UDRP on an ongoing basis serves to minimise abuse by others, this does not necessarily serve to minimise trademark infringement in our operation of the TLD. This responsibility is now clearly expressed and imposed upon registries through the new Trademark PDDRP [Post-Delegation Dispute Resolution Procedure], which targets infringement arising from the Registry Operator's manner of operation or use of its TLD.

Whilst we will as required under the Registry Agreement agree to participate in all Trademark PDDRP procedures and be bound by the resulting determinations, we will also have in place procedures to identify and address potential conflicts before they escalate to the stage of a Trademark PDDRP claim.

5.1 IMPLEMENTATION

1. We will notify to the Trademark PDDRP provider/s contact details to which communications regarding the Trademark PDDRP can be sent.
2. We will publish our Anti-Abuse Policy on a website specifically dedicated to abuse handling in our TLD.
3. Using the single abuse point of contact discussed in detail in our response to Q28, a complainant can notify us of its belief that that one or more of its marks have been infringed and harm caused by our manner of operation or use of our TLD
4. We will receive complaints submitted through the single abuse point of contact.
5. The Compliance Team will acknowledge receipt of the complaint and commence investigation of the subject matter of the complaint and good faith negotiations with the complainant in accordance with the 'gTLD Applicant Guidebook'.
6. On an ongoing basis, our Compliance Team will monitor the email address notified to the Trademark PDDRP provider/s for all communications from the Trademark PDDRP provider, including the threshold determination, Trademark PDDRP complaint, complainant's reply, notice of default, expert panel determinations, notice of

appeal and determinations of an appeal panel.

7. In the event that a complaint cannot be resolved and a Trademark PDDRP claim is made, we will do the following:

* File a response to the complaint in accordance with Trademark PDDRP policy section 10 (thus avoiding, whenever possible, a default situation).
* Where appropriate, make and communicate to the Trademark PDDRP provider decisions regarding the Trademark PDDRP proceeding, including whether to request a three-person Trademark PDDRP Expert Panel, request discovery, request and attend a hearing, request a de novo appeal, challenge an ICANN-imposed Trademark PDDRP remedy, initiate dispute resolution under the Registry Agreement, or commence litigation in the event of a dispute arising under the Trademark PDDRP.
* Where appropriate, undertake discovery in compliance with Trademark PDDRP policy section 15, attend hearings raised under section 16 if required, and gather evidence in compliance with sections 20.5 and 20.6.

8. We will upon notification of an Expert Panel finding in favour of the Claimant (Trademark PDDRP policy section 14.3), reimburse the Trademark PDDRP Claimant.

9. We will implement any remedial measures recommended by the expert panel pursuant to Trademark PDDRP policy and take all steps necessary to cure violations found by the expert panel and notified by ICANN.

6. RESOURCING PLANS

6.1 PERSONNEL

Functions described herein will be performed by:

* Directi Group Abuse and Compliance team under contract with us -
** Overseeing Sunrise process
** URS
** Abuse complaints concerning RPM

* CENTRALNIC’s backend Registry
* Service Providers that are selected wrt TMCH, UDRP, URS and SDRP

* Director of Technology at .Web & Account Management staff at .Web
** Overseeing Sunrise process
** Communication of the sunrise process to Registrars

Directi Group possesses an exemplary track record of diffusing abuse on 4 million plus domains under their Registrar business. The Rights protection and abuse mitigation function of our Registry will be handled by the same team that currently manages this process for the registrar businesses.

The existing compliance team comprises of:

* 1 Compliance Manager
* 1 Team Supervisor
* 4 Cyber Security Analysts
* 9 Compliance Officers

The compliance function is staffed on a 24⁄7⁄365 basis and capable of handling up to a peak of 52,800 unique abuse incidents per year. Each incident by itself can relate to a few to hundreds of domain names.

While this team is trained to investigate and verify all types of issues, they can also fall back on support from our technical staff when required. Similarly, abuse cases following new or unexpected parameters may also be escalated to legal support staff for expert counsel.

Our estimates of resource sizing are directly derived from the abuse case incident volumes currently experienced. On a base of 4 million domains as a Registrar, we experience approximately the following incidents per year:

* UDRP Cases - 200
* Other RPM incidents - 20 cases

This averages an incident rate of approximately 220 cases of abuse per year or 0.055 incidents per 1000 names. Given that this is based on a more mature base of names, it would be prudent to assume a higher rate of activity for .Web. Based on our experience we have assumed the increase in activity rate to be three fold (300% of the current rate) and increase it to 0.165 per 1000 names.

Based on our projections, we expect .Web to reach 471,482 domain names at the end of the third year. Extrapolating from our estimated rate of 0.165 incidents per 1000 names, we can expect around 78 incidents yearly. Including the estimated 1,326 Abuse incidents that the registry will handle (details in our response to Q28), brings our total projected incident count to 1404.

The Compliance desk works as a centralized team and all team members are responsible for all abuse complaints across all businesses of Directi. Costs of the Compliance team are then allocated to each business based on the % utilization of the compliance team by each business. We have assumed 25% of 2 compliance officers’ time towards .Web. Given that our 15 people team has the capacity to handle 52,800 incidents yearly, 2 officers with 25% of their time, will have a total capacity to handle 1,760 incidents annually which is more than adequate for the Registry. It is important to point out that 25% of the 2 officers is merely a cost allocation method and in actuality all 15 members and more of the Compliance team will be available to resolve abuse issues for TLD.

Our planning provides us redundant capacity of 250%+ in Y1, 85% in Y2 and 25% in Y3, to handle both abuse as well as RPM related cases such as those involving URS. This leaves substantial headroom for rapid growth of domains under management, or a sudden surge in abuse incident rates per domain.

It is also important to note that there exist some economies of scale in our operations since a large number of these cases are dealt with in bulk, or large batches, as they relate to the same instigator(s).

The Abuse and Compliance team has a structured training program in place which enables them to rapidly scale-up resources when required. Typically a team of recruits are given four weeks of training and two weeks on the floor before they are fully activated.

Given our rapid growth rate and business expansion plans, we will continue to hire and maintain a sizable buffer over and above anticipated growth.

6.2 FINANCIAL COSTS

The usage of Directi Group’s staff is included in our contract with Directi attached to Q46. This cost is shown in the financial answers.

This completes our response to Q29.

30A. Security Policy: provide a summary of the security policy for the proposed registry, including but not limited to:

- indication of any independent assessment reports demonstrating security capabilities, and provisions for periodic independent assessment reports to test security capabilities;
- description of any augmented security levels or capabilities commensurate with the nature of the applied for gTLD string, including the identification of any existing international or industry relevant security standards the applicant commits to following (reference site must be provided);
- list of commitments made to registrants concerning security levels.

To be eligible for a score of 2, answers must also include:

- Evidence of an independent assessment report demonstrating effective security controls (e.g., ISO 27001).

A summary of the above should be no more than 20 pages. Note that the complete security policy for the registry is required to be submitted in accordance with 30(b).

Except where specified this answer refers to the operations of DotWeb Inc.'s outsource Registry Service Provider, CentralNic.

30(a).1. Introduction

CentralNic's Information Security Management System (ISMS) has been certified against ISO 27001. A copy of the certificate issued by Lloyd's Register Quality Assurance (LRQA), a UKAS accredited certifier, is provided as Appendix 30.1.1. The ISMS is part of a larger Management System which includes policies and procedures compliant to ISO 9001.

30(a).2. Independent Assessment

As part of ISO 27001 compliance, CentralNic's security policies are subject to biannual external audit. Further details can be found in Q30(b).

30(a).3. Augmented Security Levels

DotWeb Inc. believes that the TLD requires no additional security levels above those expected of any gTLD registry operator. Nevertheless, DotWeb Inc. and CentralNic will operate the TLD to a high level of security and stability in keeping with its status as a component of critical Internet infrastructure.

Registry systems are hardened against attack from external and internal threats. Access controls are in place and all systems are monitored and audited to mitigate the risk of unauthorised access, distribution or modification of sensitive data assets. The Authoritative DNS System has been designed to meet the threat of Distributed Denial-of-Service (DDoS) attacks by means of over-provisioning of network bandwidth, and deployment of Shared Unicast ("Anycast") addresses on nameservers. Whois services have been designed with built-in rate limiting and include mechanisms for

protection of personal information. The stability of the registry is supported by use of high-availability technologies including a "hot" Disaster Recovery site in the Isle of Man, as well as a backup provider relationship with GMO Registry in Japan.

30(a).4. Commitments to Registrars

DotWeb Inc. and CentralNic will make the following commitments to the TLD registrars:

*The SRS will be operated in a secure manner. Controls will be in place to prevent unauthorised access and modification of registry data.

*The Whois service will prevent unauthorised bulk access to domain name registration data, and provide tools to protect personal information.

*The DNS system will be designed to provide effective defence against DDoS attacks. The registry will proactively monitor the DNS system to provide early warning against threats to the stability of the TLD.

*The DNSSEC system will be operated in accordance with best practices and recommendations as described in the relevant RFC documents (described in Q43).

*Security incidents reported by registrars, registrants and other stakeholders will be acted upon in accordance with the Security Incident Response Policy (see below).

*Security vulnerabilities reported to the registry will be acknowledged and remediated as quickly as possible.

*Registrars will be promptly notified of all incidents that affect the security and stability of the registry system and their customers, and will be kept informed as incidents develop.

30(a).5. Access Controls

CentralNic operates an access control policy for the registry system. For example, the web-based Staff Console which is used to administer the SRS and manage registrar accounts supports a total of ten different access levels, ranging from "Trainee", who have read-only access to a subset of features, to "System Administrator" who have full access to all systems.

Underlying server and network infrastructure is also subjected to access control. A centralised configuration manager is used to centrally control access to servers. Individual user accounts are created, managed and deleted via the configuration server. Access to servers is authenticated by means of SSH keys: only authorised keys may be used to access servers. Operations personnel can escalate privileges to perform administration tasks (such as updating software or restarting daemons) using the "sudo" command which is logged and audited as described below.

Only operations personnel have access to production environments. Development personnel are restricted to development, staging and OT&E environments.

30(a).6. Security Enforcement

Security controls are continually monitored to ensure that they are enforced. Monitoring includes use of intrusion detection systems on firewalls and application servers. Attempted breaches of access controls (for example, port scans or web application vulnerability scans) trigger NOC alerts and may result in the execution of the Security Incident Response Policy (see below).

Since CentralNic operates a centralised logging and monitoring system (see Q42), access logs are analysed in order to generate access reports which are then reviewed by NOC personnel. This includes access to servers via SSH, to web-based administration systems, and to security and networking equipment. Unexpected access to systems is investigated with a view to correcting any breaches and/or revoking access where appropriate.

30(a).8. Security Incident Response Policy

CentralNic operates a Security Incident Response Policy which applies to all events and incidents as defined by the policy, and to all computer systems and networks operated by CentralNic.

The Policy provides a mechanism by which security events and incidents are defined (as observable change to the normal behaviour of a system attributable to a human root cause). It also defines the conditions under which an incident may be defined as escalated (when events affect critical production systems or requires that implementation of a resolution that must follow a change control process) and emergencies (when events impact the health or safety of human beings, breach primary controls of critical systems, or prevent activities which protect or may affect the health or safety of individuals).

The Policy established an Incident Response Team which regularly reviews status reports and authorises specific remedies. The IST conduct an investigation which seeks to determine the human perpetrator who is the root cause for the incident. Very few incidents will warrant or require an investigation. However,

investigation resources like forensic tools, dirty networks, quarantine networks and consultation with law enforcement may be useful for the effective and rapid resolution of an emergency incident.

The Policy makes use of CentralNic's existing support ticketing and bug tracking systems to provide a unique ID for the event, and means by which the incident may be escalated, information may be reported, change control processes put into effect, and ultimately resolved. The Policy also describes the process by which an incident is escalated to invoke an Emergency Response, which involves Lock-Down and Repair processes, monitoring and capturing of data for forensic analysis, and liaison with emergency services and law enforcement as necessary.

30(a).9. Role of the Network Operations Centre (NOC)

In addition to its role in managing and operating CentralNic's infrastructure, the NOC plays a key role in managing security. The NOC responds to any and all security incidents, such as vulnerability reports received from registrars, clients and other stakeholders; monitoring operator and security mailing lists (such as the DNS-OARC lists) to obtain intelligence about new security threats; responding to security-related software updates; and acting upon security alerts raised by firewall and intrusion detection systems.

30(a).10. Information Security Team

CentralNic maintains an Information Security Team (IST) to proactively manage information security. The IST is a cross-functional team from relevant areas of CentralNic. These key members of staff are responsible for cascading rules, regulations and information to their respective departments. They are also the first port of call for their departmental staff to report potential security incidences and breaches, the IST are all members of an

internal email group used to co-ordinate and discuss security related issues.

The IST is comprised of the CEO, CTO, Operations Manager, Senior Operations Engineer and Security Engineer.

IST responsibilities include:

*Review and monitor information security threats and incidents.

*Approve initiatives and methodologies to enhance information security.

*Agree and review the security policy, objectives and responsibilities.

*Review client requirements concerning information security.

*Promote the visibility of business support for information security company-wide.

*Manage changes to 3rd party services that may impact on Information Security

*Perform internal audits with the assistance of Blackmores.

30(a).11 Auditing and Review

ISO 27001 includes processes for the auditing and review of security systems and policies. Audits are performed annually by an independent assessor. The IST periodically reviews the ISMS and conducts a gap analysis, identifying areas where performance does not comply with policy, and where the Risk Assessment has identified the need for further work.

30(a).12. Testing of Controls and Procedures

CentralNic will conduct bi-annual penetration tests of its registry systems to ensure that access controls are properly enforced and that no new vulnerabilities have been introduced to the system. Penetration tests will include both "black box" testing of public registry services such as Whois and the Registrar Console, "grey box" testing of authenticated services such as EPP, and tests of physical security at CentralNic's offices and facilities.

CentralNic will retain the services of a reputable security testing company such as SecureData (who, as MIS-CDS, performed the 2009 assessment of CentralNic's security stance). The results of this test will be used in annual reviews and audits of the ISMS.

30(a).13. DotWeb Inc. Security Policy

In addition to the security of our technical back-end by CentralNic, we will implement the following security measures in our offices:

As explained earlier, some of our functions are outsourced to the Directi Group. The Directi Group operates offices across Mumbai, India and UAE. The office building has a 24⁄7 alarm system and cameras throughout the building, with a full view of entry and exits to the main areas. All critical physical and digital file storage areas are also closely monitored with controlled access.

The office doors are only accessible with access cards provided to employees. All entries and exits are recorded by the system. Access cards are de-activated as part of the employee discontinuation policy.

Access to sensitive areas are controlled by the electronic access control system managed by the IT team.

The facility is designed to have 100% power backup in case of a power failure. Currently, we have generators which are capable of providing power backup to critical requirements like servers, workstations & lights for atleast 48 hours.

With regards to our company systems and network security, we have adopted the following policies and processes:

Password Policy: We have policies and procedures to manage the creating, changing, and safeguarding of passwords.

*A password cannot contain your User Name and cannot match your first or last name

*A password must contain at least eight characters, and contain at least one alphabetic character and one number

*The last three passwords cannot be re-used when changing to a new password

*Account lockout after 8 failed login attempts, reset only possible after logging a ticket to internal IT help desk team

*Passwords are force-changed every quarter

Systems Security Policy:

*We use well-known Anti-Virus/Malware tools that constantly run scans during off peak hours and are updated on a regular basis

*Automatic Screen locking systems for idle users to prevent unauthorized access

*Hard disk encryption with domain login password preventing data duplication if the hard drive is attached to a different system

*Access to information that is deemed sensitive, requires the input of the employee’s password in conjunction with the password of a member from senior management

*Password protected BIOS in each system preventing any hardware level tampering

*Phishing/Malware sites blocked on all browsers by our Internet Security tools

*Unauthorized software is blocked and only while-listed after proper business justification and approvals

*We have an internal process to back-up critical data on a regular basis

*Redundancy for our all Critical Applications and Servers is ensured

Network Security Policy:

*The default passwords are always reset on all network devices

*Firewall is configured to block outbound traffic from VLAN workgroups or entire network segments that have no business establishing client connections to internet servers

*Requests to our internal servers are blocked unless authorized explicitly

*Our wireless network is encrypted using a signed certificate

*VPN traffic is encrypted using a CA signed certificate

*DMZ is implemented to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports

*Inbound Internet traffic is limited to servers in DMZ zone only

*Servers that store data are on an internal network zone are segregated from the DMZ and other untrusted networks

*We occasionally run intruder detection tests to identify insecure services/protocols/ports

*We have processes to ensure that ios/firmware/patches to switches/firewall/routers are updated regularly

*Tests are run regularly to ensure the internet redundancy links are working fine on our edge routers

Intranet Security Policy:

*Constant collaboration with leading security vendors and experts on specific threats

*Internal Mails (Webmail, SMTP, POP3, IMAP) are only accessible via VPN

*Internal Mail over mobile device is password protected screen locks with remote wipe supported if the device is lost

*Penetrating tests for each system (including virtual machine/network device) are run to check for weak passwords and security vulnerabilities

*SSO (Single Sign On) login for all our internal sites only work over our VPN

*Security audit logs are archived for a year

*Revoking all privileges and re-setting access details as part of the employee discontinuation process

*Some of the monitoring tools we use internally are:

*Cacti

*Nagios

*Zenoss

*Pingdom

*Whats up gold

*Observium

We are and will continue to be working with CentralNic and other security experts to enhance physical and network security measures in addition to policy development and employee training.

Given that the string is a generic TLD that does not propose to offer unique security policies beyond those detailed; we will not be making specific security commitments to our registrants. We trust that we will become known for providing a safe and secure platform for individuals and companies.

This completes our response to Q30(a).

EXHIBIT GS-25

GS-25

New gTLD Application Submitted to ICANN by: Charleston Road Registry Inc.

String: web

Originally Posted: 13 June 2012

Application ID: 1-1681-58699

Applicant Information

1. Full legal name

Charleston Road Registry Inc.

2. Address of the principal place of business

Contact Information Redacted

3. Phone number

Contact Information Redacted

4. Fax number

Contact Information Redacted

5. If applicable, website or URL

Primary Contact

6(a). Name

Sarah Falvey

6(b). Title

Senior Policy Analyst

6(c). Address

6(d). Phone Number

Contact Information Redacted

6(e). Fax Number

6(f). Email Address

Contact Information Redacted

Secondary Contact

7(a). Name

Chris Iannuccilli

7(b). Title

Director of Marketing

7(c). Address

7(d). Phone Number

Contact Information Redacted

7(e). Fax Number

7(f). Email Address

Contact Information Redacted

Proof of Legal Establishment

8(a). Legal form of the Applicant

Corporation

8(b). State the specific national or other jursidiction that defines the type of entity identified in 8(a).

State of Delaware (General Corporations Code)

8(c). Attach evidence of the applicant's establishment.

Attachments are not displayed on this form.

9(a). If applying company is publicly traded, provide the exchange and symbol.

9(b). If the applying entity is a subsidiary, provide the parent company.

Google Inc.

9(c). If the applying entity is a joint venture, list all joint venture partners.

Applicant Background

11(a). Name(s) and position(s) of all directors

Katherine Stevens	Director

11(b). Name(s) and position(s) of all officers and partners

Donald S. Harrison	Assistant Secretary
James Marocco	CFO and Treasurer
Katherine Stevens	CEO, President, and Secretary

11(c). Name(s) and position(s) of all shareholders holding at least 15% of shares

Google In.	Not Applicable

11(d). For an applying entity that does not have directors, officers, partners, or shareholders: Name(s) and position(s) of all individuals having legal or executive responsibility

Applied-for gTLD string

13. Provide the applied-for gTLD string. If an IDN, provide the U-label.

web

14(a). If an IDN, provide the A-label (beginning with "xn--").

14(b). If an IDN, provide the meaning or restatement of the string in English, that is, a description of the literal meaning of the string in the opinion of the applicant.

14(c). If an IDN, provide the language of the label (in English).

14(c). If an IDN, provide the language of the label (as referenced by ISO-639-1).

14(d). If an IDN, provide the script of the label (in English).

14(d). If an IDN, provide the script of the label (as referenced by ISO 15924).

14(e). If an IDN, list all code points contained in the U-label according to Unicode form.

15(a). If an IDN, Attach IDN Tables for the proposed registry.

Attachments are not displayed on this form.

15(b). Describe the process used for development of the IDN tables submitted, including consultations and sources used.

15(c). List any variant strings to the applied-for gTLD string according to the relevant IDN tables.

16. Describe the applicant's efforts to ensure that there are no known operational or rendering problems concerning the applied-for gTLD string. If such issues are known, describe steps that will be taken to mitigate these issues in software and other applications.

While the string for which Charleston Road Registry (CRR) is applying, .web, is not an IDN and, therefore, does not contain characters which require mixed right-to-left or left-to-right functionalities, CRR has nonetheless familiarized itself with the requirements and components of the IDNA protocol by reviewing the relevant RFCs and the relevant background information found on the ICANN IDN Wiki. CRR has also tested the .web string for rendering issues; none were found.

17. (OPTIONAL) Provide a representation of the label according to the International Phonetic Alphabet (http://www.langsci.ucl.ac.uk/ipa/).

Mission/Purpose

18(a). Describe the mission/purpose of your proposed gTLD.

18.a. Missionâ„Purpose of the Proposed gTLD

Charleston Road Registry is an American company, wholly owned by Google, which was established to provide registry services to the Internet public. Google is an American multinational public corporation and global technology leader focused on improving the ways its hundreds of millions of users connect with information. Since its formation, Google has been developing technology that can improve upon existing ways of doing business on the Internet. Google provides a variety of services and tools for Internet users and advertisers of all sizes, from simple search features and local ads to enterprise-scale business applications and global advertising solutions. These tools make it easier for people to make use of the worldâ€™s information and enable entrepreneurs and publishers around the world to grow their businesses.

In line with Googleâ€™s general mission, Charleston Road Registryâ€™s mission is to help make information universally accessible by extending the utility of the DNS while enhancing the performance, security and stability of the Internet for users worldwide. Charleston Road Registry aspires to create unique web spaces where users can learn about products, services and information in a targeted manner and in ways never before seen on the Internet. Its business objective is to manage Googleâ€™s gTLD portfolio and Googleâ€™s registry operator business. As discussed further in the responses to questions 23 and 31, Charleston Road Registry intends to outsource all critical registry functions to Google Registry Services.

The proposed gTLD will provide the marketplace with a new all-purpose gTLD for second-level domain names, .web. The mission of this gTLD is to act as an alternative to current gTLDs, in particular .com and .net. This mission will enhance consumer choice by providing new availability in the second-level domain space and increasing competition amongst generic gTLDs. Charleston Road Registry believes that registrants will find value in associating with this gTLD, which could have a vast array of purposes for enterprises, small businesses, groups or individuals seeking a second-level domain name already registered in .com or .net, or those simply seeking a competitive alternative to existing gTLDs. This assertion is supported by industry data: over 375,000 new second-level domains were registered in January 2012 in the .com and .net gTLDs, and the two gTLDs support a total of 115 million second-level domains -- more than 80% of all second-level domains registered in one of the 6 open U.S. gTLDs (.com, .net, .info, .org, .biz, .us) [Source: http:â„â„www.dailychanges.comâ„].

The proposed gTLD will also provide Charleston Road Registry with the means to meet its business objectives.

18(b). How do you expect that your proposed gTLD will benefit registrants, Internet users, and others?

18.b. Benefits to Registrants, Internet Users, and Others

18.b.i.1 Specialty

The goal of the proposed gTLD is to create a new Internet environment that provides registrants, Internet users, and the public with the opportunity to associate with a meaningful term. Specialization will arise from this environment through market dynamics as entities align their offerings with the term.

The specialization goal of .web is to provide an alternative, general purpose gTLD that offers consumers more choices to align their web spaces to a generic gTLD than the existing options today.

18.b.i.2 Service Levels

Through its association with Google, Charleston Road Registry is uniquely positioned to enable and support the proposed gTLD by providing its service reliability and speed of delivery as a part of its services. Google brings unique expertise and a proven record of excellence in infrastructure operations: Google now runs the largest DNS system in the world, has industry-leading uptime on its services, such as web search, and offers enterprise services on which governments and businesses depend.

Google is known for its high level of quality and speed, and Charleston Road Registryâ€™s service level goal for the proposed gTLD is to extend that high level of quality, speed, and service to registrars. Indeed, two of Googleâ€™s core principles in providing Internet search and related goods and services are â€œfocus on the user and all else will followâ€ and that â€œfast is better than slow.â€

Charleston Road Registry is committed to using the most technologically advanced, secure, and reliable registry services for all of the domain names in the gTLD so as to not compromise the service levels, security, and stability of the gTLD to users worldwide.

Charleston Road Registry will provide both Engineering and Customer Service support to registrars. All registrars will also have the same level of access to Charleston Road Registry resources to resolve disputes and technical andâ„or administrative customer service issues.

Charleston Road Registry will provide all registrars with 24-hours-a-day, 7-days-a-week Customer Support in the form of telephone, email, andâ„or web chat for technical and non-technical issues relating to the operation of the gTLD system. Charleston Road Registry will provide all registrars with the same level of access to customer support via telephone, email, and Charleston Road RegistryÊ¹s website; email and web-based interactions will be the primary method of provisioning customer service support to registrars.

Additionally, Charleston Road Registry will implement strict policies and procedures to minimize abusive domain name registrations and uses and other activities that have a negative impact on Internet users. It will dedicate ample resources for the purpose of responding promptly to abuse complaints from government, judicial andâ„or law enforcement.

18.b.i.3 Reputation

Google has a proven record of providing high-quality, secure online services. Charleston Road Registry seeks to enhance Googleâ€™s reputation for excellence, superior quality, and high level of security and become known as an exemplary domain name services provider. When registrants assess opportunities in the marketplace to obtain a name, they will have confidence in Charleston Road Registryâ€™s ability to meet ongoing needs as the registry operator for the proposed gTLD. When Internet users visit a domain name in the proposed gTLD environment, they will be able to reliably expect and experience the high level of security and quality on which Googleâ€™s reputation has been built.

The registry will be structured so that Charleston Road Registry allows registrars to register and oversee second-level domain names in the proposed gTLD; that

registrars develop and deploy a reasonable process for ensuring that those domain names are used for gTLD-relevant purposes as specified in the registry-registrar agreement; and per Specification 4 that the WHOIS is thick and reliable; and that the registry is responsive to legal rights owners (if applicable) who may have complaints about potentially abusive registrations.

In addition, Charleston Road Registryâ€™s operation of the new gTLD will provide the opportunity for registrars and registrants to build andâ„or bolster their unique brands and brand reputation in association with the proposed gTLD.

18.b.ii.1 Competition

Charleston Road Registry supports the advancement of registry operators as a whole and the diffusion of gTLDs amongst diverse stakeholders to generate increased competition for the benefit of the Internet public. Increased competition will result in more competitive prices for consumers, generate efficiencies and increase productivity in enterprises, and spur innovation in the gTLD space.

The proposed gTLD, .web, will provide a new online structure for the aggregation of other level domain-specific content. As an alternative to existing second-level domains, Charleston Road Registry anticipates that the .web gTLD will increase competition among registrars by increasing consumer choice and creating new opportunities for registrar pricing differentiation. Charleston Road Registry also anticipates the .web gTLD will help grow the volume of entities and individuals offering content online, thereby increasing competition among such entities and individuals to provide new, unique, and more relevant content and offerings.

Managing this Internet space will allow Charleston Road Registry to provide to registrars and registrants the high level of technical operations quality and service for which Google is known, which in turn will incent other existing and new gTLDs to improve the quality of their offerings.

Charleston Road Registry will facilitate a fair and equitable registrar process, providing open access to any registrar who meets ICANN accreditation guidelines by fully complying with the Registry Operator Code of Conduct. Charleston Road Registry is committed to treating all registrars equitably and will not offer preferential treatment to Google in its capacity as registrar.

18.b.ii.2 Differentiation

Charleston Road Registry believes in the commercial viability of alternatives to existing gTLDs such as .com and .net. The proposed gTLD will provide the marketplace with opportunities for differentiation not currently available in the gTLD space.

The .web gTLD providers registrants with the opportunity to differentiate from other web spaces based on their word choice within the second-level domain name.

Given its association with Google, Charleston Road Registry offers a unique value proposition to registrars resulting from the strength of Googleâ€™s trusted brand, technical leadership, and support for free speech on the Internet. Registrars will have the opportunity to leverage this brand in devising their own market positions.

18.b.ii.3 Innovation

The proposed gTLD will foster innovation by creating a new space for the categorization and classification of online content. It will therein provide a

mechanism by which registrars and registrants can better brand and manage their online presence by associating it with the .web namespace. This namespace delivers value to the public through the provision of new and differentiated content, goods, and services to Internet users.

The proposed gTLD provides registrars with the opportunity to create and offer tailored new products and services that benefit registrants andâ„or improve user experience in association with the registration of a second-level domain in the .web gTLD.

In addition, the proposed gTLD will promote innovation in the marketplace by providing additional second-level domain options for the publicâ€™s use. This will invite new entrants to establish a domain name presence, facilitating innovation in their offerings, and their interactions with Internet users.

Charleston Road Registry considers the proposed gTLD to be a platform for innovation with existing and future Google products and services. Charleston Road Registry, therefore, may incorporate these new offerings into future registry service options (subject to the ICANN approval process), infusing new ideas into the gTLD for the betterment of the public.

Google consistently aims to improve upon technologies that connect people with information, as demonstrated by a proven record of innovation and iteration. Charleston Road Registry strives to offer its constituents this same level of continuous development in advancing its management and operation of the gTLD, engendering benefits to registrars, registrants, and end users.

18.b.iii User Experience

Charleston Road Registry will strive to provide the highest level of user experience through operational stability, security, and performance to serve the interest of registrants in the proposed gTLD. Charleston Road Registry is uniquely positioned to provide this level of experience given its relationship with Google; Google invested over $3 billion in its IT infrastructure in 2011 and maintains a record of excellence in infrastructure operations.

The proposed gTLD will provide registrants with the opportunity to differentiate their dedicated domain space such that the end users are able to discern the type of content intended to be found within the proposed gTLD. This will enable increased user visibility of registrantsâ€™ offerings, as well as provide registrants with the opportunity to enhance their respective content offerings and innovate in new ways.

The proposed gTLD will provide a more trusted and user-friendly environment where domain names and content related to the .web gTLD can flourish. Charleston Road Registry seeks to have users deem the gTLD trustworthy and reliable and recognize it as an aggregated source of targeted goods, services, and information.

The proposed gTLD, furthermore, facilitates an improved online user experience through greater structure and categorization on the Internet.

18.b.iv Registration Policies

Charleston Road Registry believes that given its wide variety of uses, the .web gTLD will best add value to the gTLD space by remaining totally open and unencumbered by registrant restrictions. There will, therefore, be no restrictions on second-level domain name registrations in the proposed gTLD, .web.

Charleston Road Registry will make access to Registry Services, including the shared registration system, available to all ICANN-accredited registrars. Domain names within the proposed gTLD will be available to the general public for registration and use.

Charleston Road Registry is committed to implementing strong and integrated intellectual property rights protection mechanisms. Doing so is critical to Googleâ€™s goals of model Internet citizenship and fostering Internet development, especially in emerging regions. Accordingly, Charleston Road Registry intends to offer a suite of rights protection measures, which builds upon ICANNÊ¹s required policies while fulfilling our commitment to encouraging innovation, competition and choice on the Internet.

18.b.v Protection of Privacy and Confidential Information

Charleston Road Registry will strive to ensure the appropriate level of privacy and security will be met for its users. Charleston Road Registry and its provider of registry services, Google, have imposed measures to achieve this protection; additional specifics regarding the practices for the registry include but are not limited to the following:

- All data transmitted from registrars to the registry will be encrypted using transport layer security (TLS) or other similar data protection schemes to ensure that third parties cannot access personally identifying information or other sensitive data as it crosses the Internet.

- Charleston Road Registry will attempt to prevent the misuse of WHOIS data for improper purposes such as spam, intellectual property theft, or phishing. Charleston Road Registry will attempt to identify patterns of abusive usage of the WHOIS and will appropriately use CAPTCHA, query throttling or other techniques to prevent information scraping.

- Google will restrict access to data and information systems maintained by the registry to a specific list of individuals involved with supporting the Google Registry system in production. Google will review this list on a periodic basis to ensure that the level of access granted to individuals is appropriate. Google uses two-factor authentication and other mechanisms to ensure that staff with access to user information are properly identified prior to using registry systems.

- Google data backups stored offsite are encrypted with passwords that are securely managed on Googleâ€™s internal systems. Google can effectively remove the ability to access this data by destroying the relevant encryption password.

- Supplying Google account information will be optional for registrants unless the domain registration is directly associated with another Google product offering. Google will not disclose Google account information except for any contact information provided by the user that is required by ICANN (per Specification 4) to be displayed in response to a WHOIS query.

- Registrar billing and payment information will not be stored alongside domain name registration information. All registrar billing and payment information will be stored in a payment card industry (PCI)-compliant billing system similar to that used by Google Ads.

- Data will not be shared with third parties without the permission of registrants, except as required for registry operations or as required under the law, such as in response to a subpoena, other such court order, or demonstrated official need by law enforcement.

Beyond these specific mechanisms, both Charleston Road Registry and Google will govern its approach to privacy by the Google Privacy Policy. This policy applies to registrars, registrants and end users of registry services such as DNS zone publication and WHOIS data publication. The Privacy Policy is located at http:â„â„www.google.comâ„policiesâ„privacyâ„.

18.b.vi. Outreach and Communications Efforts

Once Charleston Road Registry begins developing public-facing resources in its gTLD, it intends to inform the public about the gTLD and the opportunity to obtain domain space there through investments in marketing and public relations.

Charleston Road Registry intends to promote gTLDs in its portfolio, such that the public gains an awareness and understanding of new gTLDs and the availability of new second-level domain space on the Internet. Charleston Road Registry believes that this approach will make the strongest impact in modifying consumer behavior and is the best path to achieving success for all new gTLDs collectively.

Charleston Road Registry will reach out to the Internet community via a number of different outreach and communications methods and venues to deliver its mission and message to the public, including but not limited to: press briefings, videos posted on various Internet sites, blogs and other social media, and paid advertising. In addition, when developing resources for localized Internet registrars in different global regions, Charleston Road Registry will use local marketing and communications platforms as needed.

18(c). What operating rules will you adopt to eliminate or minimize social costs?

18.c. Minimizing Social Costs and Other Negative Consequences

18.c.i
Registration will be managed by Charleston Road Registry in three phases.

Phase 1 - The first phase will be an extended 60-day sunrise phase. Only owners of trademarks listed in the Trademark Clearinghouse may participate in this phase, and such owners may register domain names that consist of an identical match to their listed trademarks. If multiple qualified parties express an interest in registering the same domain name, Charleston Road Registry will award the domain name on a strictly first come, first served basis. At the end of the sunrise phase, at a minimum, Charleston Road Registry will follow ICANN rules for subsequent attributions of trademarked second-level domains and will offer other protections for trademark owners, including but not limited to an extended Trademark Claims Service of indefinite length.

Phase 2 - The second phase will be a four-week open registration phase. During this phase, any interested applicant may apply for all second-level domain names not previously registered in the sunrise period. Trademarked terms will be subject to the Rights Protection Mechanisms set forth in Response 29. At the end of the second phase, if multiple parties have expressed an interest in registering the same second-level domain name, Charleston Road Registry will award the domain name through an auction to the highest bidder.

Phase 3 - The third phase will be a steady state phase for the duration of registry operation. During this phase, any interested applicant may apply for all second-level domain names not previously registered in an earlier phase. Trademarked terms will be subject to the Rights Protection Mechanisms set forth in Response 29. If multiple parties express an interest in registering the same domain name, Charleston Road Registry will award the domain name on a strictly first come, first served basis.

18.c.ii
While Charleston Road Registry reserves the right to charge different prices for unique second-level domains within the gTLD, once Charleston Road Registry determines the price for a particular second-level domain, Charleston Road Registry will not price discriminate among ICANN-accredited registrars. Charleston Road Registry does not intend but reserves the right to offer introductory discounts and bulk registration discounts. Volume discounts, marketing support and incentive programs may be made available, and if so will be offered to all ICANN-accredited registrars without preference.

18.c.iii
Pursuant to the ICANN-Registry Operator Agreement, Charleston Road Registry will provide written notice a minimum of 30 days prior to any increases in price for initial registrations, as well as written notice 180 days prior to any increase in registration renewals. Further, Charleston Road Registry will offer uniform pricing for renewals as specified in the ICANN-Registry Operator Agreement.

Charleston Road Registry does not currently intend to make contractual commitments to registrants regarding the magnitude of price escalation. Charleston Road Registry does, however, intend to keep its practices competitive and aligned to activity in the marketplace.

Community-based Designation

19. Is the application for a community-based TLD?

No

20(a). Provide the name and full description of the community that the applicant is committing to serve.

20(b). Explain the applicant's relationship to the community identified in 20 (a).

20(c). Provide a description of the community-based purpose of the applied-for gTLD.

20(d). Explain the relationship between the applied-for gTLD string and the community identified in 20(a).

20(e). Provide a description of the applicant's intended registration policies in support of the community-based purpose of the applied-for gTLD.

20(f). Attach any written endorsements from institutions/groups representative of the community identified in 20(a).

Attachments are not displayed on this form.

Geographic Names

21(a). Is the application for a geographic name?

No

Protection of Geographic Names

22. Describe proposed measures for protection of geographic names at the second and other levels in the applied-for gTLD.

As specified throughout this application, Charleston Road Registry (CRR) plans to implement comprehensive anti-abuse mechanisms. CRR will protect against the abusive registration of geographic names at the second and other levels in the applied-for gTLD by reserving to the registry protected geographic names in order to prevent registration of such strings.

In that regard, CRR has thoroughly reviewed Specification 5 of the Registry

Agreement, the Government Advisory Committeeâ€™s (GAC) â€œPrinciples Regarding New gTLDsâ€, and the .info methodology for reservation and release of country names. Accordingly, CRR will, in connection with its registry services operator and registrar, initially reserve from registration by any party names with national or geographic significance within the TLD during the TLDâ€™s Sunrise Period and Trademark Claims Period.

The names with national or geographic significance (hereto referred to as â€œgeographic namesâ€) that will be initially blocked are those specified in Specification 5 of the New gTLD Registry Agreement, namely:

(1) The short form (in English) of all country and territory names contained on the ISO 3166-1 list, as updated from time to time, including the European Union, which is exceptionally reserved on the ISO 3166-1 list, and its scope extended in August 1999 to any application needing to represent the name European Union;
(2) The United Nations Group of Experts on Geographical Names, Technical Reference Manual for the Standardization of Geographical Names, Part III Names of Countries of the World; and
(3) The list of United Nations member states in 6 official United Nations languages prepared by the Working Group on Country Names of the United Nations Conference on the Standardization of Geographical Names.

As noted above, the top-level domain shall not permit the public to register domain names with national or geographic significant at the second-level. The names will be set aside by use of the Reserved state making them inaccessible (See response to Question 27 for details). Google, as the registry services provider, has arranged for such reservation to occur prior to the launch of the TLD.

In the event there is a compelling use of a two-character geographic name, the two-character label string may be released to the extent that CRR reaches agreement with the government and country-code manager and consults with the GAC and ICANN. The Registry may also propose the future release of these reserved names based on the implementation by the prospective registrant of measures to avoid confusion with the corresponding country codes.

As with the .info TLD, only if a potential second-level domain registrant makes a proper showing of governmental support for country or territorial names will CRR relay this request to ICANN. CRR also plans to consult with the GAC and of ICANN before proceeding to delegate the domain at issue.

Registry Services

23. Provide name and full description of all the Registry Services to be provided.

Charleston Road Registry (CRR) will outsource the entirety of its technical operations to Google. In addition to running the technical platform, Google will provide CRR with staffing and support to ensure that all registry services meet both the requirements laid out by ICANN in the new generic top-level domain (gTLD) Applicant Guidebook as well as in the gTLD registry agreement. Additional details of Googleâ€™s provision of services to CRR are set forth in Question 31, Section

31.1.

By making use of Googleâ€™s Registry platform, CRR will provide the following registry services:

- Receipt of data from registrars concerning registration of domain names and name servers
- Dissemination of top-level domain (TLD) zone files
- Dissemination of contact or other information concerning domain name registrations (WHOIS service)
- Internationalized Domain Names (IDN) Support for all domain names
- Domain Name System Security Extensions (DNSSEC) support
- IPv6 Support
- Data escrow
- Redemption grace period for domain names
- Registrar and developer account creation

â€œQ23_Registry Services Diagramâ€ shows major services being exposed by high-level systems. Note that this diagram shows only data flow and does not specify the physical deployment characteristics of these services.

Details on these services are discussed below.

23.1. Receipt of Registration Data

Google will receive registration data from users in a manner consistent with standard registry operations. This will be handled via the extensible provisioning protocol (EPP) interface through ICANN-accredited third-party registrars. Google will operate a robust Shared Registration Service (SRS) that allows registrars to add, modify, and delete domain registrations and provides full support for the domain registration lifecycle.

Googleâ€™s shared registration system (SRS) infrastructure consists of three major components: an extensible provisioning protocol (EPP) server that provides an EPP interface to registrars; the Google SRS Frontend, which provides web-based access to the state of the Google Registry, the registrarâ€™s profile and access to registration reports for the registrar; and the Google SRS Backend, which implements most business logic, interacts with the data store, and pushes updates to DNS and WHOIS servers in order to disseminate TLD Zone files as well as registrant contact information.

Details of the SRS are described in Question 24, EPP support in Question 25, and the registration lifecycle in Question 27.

23.2. Dissemination of TLD Zone Files

TLD zone data will be propagated in near real time to Googleâ€™s Authoritative DNS infrastructure, which will serve as the primary means of publication of the TLD zone files. This DNS infrastructure is based on Googleâ€™s existing Public DNS product, which handles over 70 billion queries per day. This DNS implementation will be fully compliant with RFCs 1034, 1035, 1982, 2181, 2182, 2671, 3226, 3596, 3597, 3901, 4343, 4472, 4972, and 5966 as well as ICANNâ€™s Specification 10. A full description of Googleâ€™s Authoritative DNS infrastructure is described in Question 35.

In addition to real-time publication via port 53, the Google Registry will also support publication of the entire zone, as described below:

The master zone file will be internally generated and cached in the Google Shared Registration System (GSRS) as modifications to GSRSâ€™s persistent store are made. The zone data will be signed by the Authoritative DNS infrastructure; a copy of the signed data is also returned to the GSRS. The entire master zone file will then be available to authorized parties at an HTTP URL shared with them over the web.

The master zone file at this location will be guaranteed to be no more than one hour old.

When retrieving the zone file, the client will pass a single HTTP request parameter (â€œkeyâ€), in order to identify individually the qualified client requesting access. This parameter will be the API key given to the registrar during account signup.

The mimetype â€œtextâ„dnsâ€ will be set on the HTTP response and the content encoding will be gzip.

The master zone file will follow the format specified by RFC 1035, with the additional restrictions as specified in Specification 4, Section 2.1.4 of the gTLD Applicant Guidebook. DNSSEC resource records will also be present.

In addition, the master zone file will be made available through the Centralized Zone Data Access Provider as specified in Specification 4, Section 2.1.4 of the gTLD Applicant Guidebook.

23.3. Dissemination of Contact Information (WHOIS)

Google will create an implementation of the WHOIS protocol (as defined by RFC 3912) that will listen on port 43 for WHOIS requests. GoogleÊ¹s WHOIS service will communicate to the name registry through a private API end-point in order to retrieve the necessary information for WHOIS responses. In addition, Google will operate a public WHOIS, web-based Directory Service at ã€ˆWHOIS.nic.webã€‰ providing free, public query-based access. Both traditional WHOIS and web-based WHOIS will be made available over both IPv4 and IPv6.

As required by Specification 4 in the gTLD Applicant Guidebook, GoogleÊ¹s WHOIS service will perform in the following manner:
- Semi-free text format followed by a blank line and disclaimer specifying the rights of the Registry Operator, and user querying the database.
- Each data object shall be represented as a set of keyâ„value pairs, with lines beginning with keys, followed by a colon and a space as delimiters, followed by the value.
- For fields where more than one value exists, multiple keyâ„value pairs with the same key shall be allowed.
- The first keyâ„value pair after a new-line starts a new record, and is used to identify the record itself.
- The format of fields governed by EPP RFCs 5730-5734 (domain status, individual and organizational names, address, street, city, stateâ„province, postal code, country, telephone and fax numbers, email addresses, date and times) will be formatted as specified by those RFCs.

Updates to WHOIS data will be made in near real-time, with the registryâ€™s service level agreement (SLA) committing to 95% of the updates reaching the serving infrastructure within 15 minutes. Details of WHOIS support are included in Question 26.

23.4. Internationalized Domain Names

IDNs allow registrars to register domain names with unicode code points representing non-ASCII-based character sets. IDNs constrained by the IDN Tables for this TLD will be supported by the Google Registry. Googleâ€™s IDN implementation will make use of the IDNA standard and be fully compliant with both RFCs 5890-5893 and ICANNâ€™s IDN implementation guidelines. For more information on the IDN implementation for the TLD, see Question 44.

23.5. DNS Security Extensions

The Google Registry will support DNSSEC. In particular, registrants will be able to specify a DS record as part of normal domain name registration with their registrars, which will be transmitted to the Google Registry via its EPP interface. The Google Registry will then sign the DS record, along with all other DNS resource records in the TLD Zone, forming a chain of trust between the Google Registry and second-level domain name. The Google Registry itself will publish its own DS record with the root. Googleâ€™s DNSSEC implementation will be fully compliant with RFCs 4033, 4034, 4035, 5910, 4509, 4641, and 5155. More information on this topic, including the DNSSEC Policy statement for the TLD is contained in Question 43.

23.6. IPv6 Support

The Google Registry operates on Googleâ€™s production network, which supports IPv6. Specifically, the Google Registry will specifically support IPv6 access to all registry service endpoints (WHOIS, EPP, DNS, etc.). All services are provided through dual-stack, which is considered the industry-standard best practice for supporting IPv6. In addition, domain name registrants will be able to create IPv6 AAAA glue records for nameservers in the TLD zone. Further detail about Googleâ€™s IPv6 implementation is available in Question 36.

23.7. Data Escrow

Google will escrow relevant registration data, as required by ICANNâ€™s registry agreement. Google will ensure that its data escrow will be fully ICANN compliant and performed in accordance to industry best practices. In addition to Googleâ€™s practice of hosting critical data on redundant and geographically disparate datacenters, data escrow will provide further assurance against data loss and ensure that all Google Registry data can be retrieved in a timely manner. For more information on Data Escrow, see Question 38.

23.8. Redemption Grace Period for Domain Names

After a domain name has been deleted by a registrar, the domain name shall move into a Redemption Grace Period. The status of the domain will be listed as PENDING DELETE RESTORABLE. When a domain is in this state, it is deleted from the zone for the TLD. This is a strong indicator to the registrant that it must act take action in order to restore the domain to its previous state. For details, see Question 27.

23.9. Creation of Registrar and Developer Accounts

Googleâ€™s Registry will use Google Accounts to manage registrars.

To create a Google Account, all parties will be directed to the following URL:

http:â„â„www.google.comâ„accounts

Once a prospective registrar or developer has created an account in Google, the registrar or developer can upgrade from a standard Google account to a registrar andâ„or developer, if certain requirements are met.

To obtain a set of credentials used to interact with the Google Registry, a registrar will proceed through the following workflow:
A. The Google registrar logs in with Google account credentials.
B. The Google registrar submits an application identifying that it is an accredited ICANN registrar, and that it wishes to interact with the Google Registry.
C. The Google registrar requests and resets initial EPP credentials, which are separate from a Google account.

Once a Registrar has been certified and authorized for billing, they will be ready to interact with Google through Google EPP. At this point, the registrar can also view reports on domains registered, EPP transactions, remaining account balance, and other TLD registry statistics.

â€œQ23_Registrar Registration Process Diagramâ€ shows the registration process for registrars.

In addition to registrars, Google will also provide accounts to developers and other authorized users, who will obtain credentials through the following workflow:
A. The developer logs in the previously created Google account.
B. The developer requests an API key to be used for all public API calls.
C. The developer reviews access restrictions, quota, and service-level agreements and agrees to appropriate terms.
D. Google Registry grants access to zone data exported by the domain.

â€œQ23_Developer Registration Process Diagramâ€ shows the registration process for developers.

Demonstration of Technical & Operational Capability

24. Shared Registration System (SRS) Performance

All Shared Registration System (SRS) services described in Question 23 will run on Googleâ€™s robust, high-performance platform. Googleâ€™s production platform is an extremely high-capacity, high-availability, scalable platform designed to support some of the most resource-intensive and often-used applications on the Internet, including Google Search, Gmail, and YouTube. Google builds large clusters out of thousands of individual servers. Google uses a common set of tools to allocate resources, provide access to basic services such as storage and locking, and to simplify programmersâ€™ ability to build distributed systems using the clusterâ€™s hardware. Rather than relying on expensive hardware to provide reliability, Google uses a more cost effective approach based on commodity components, and builds fault tolerance into its software. Google simultaneously increases performance, reliability, and scalability of our production systems by splitting work into shards and running multiple replicas of the same process.

The numbered sections below discuss details of our SRS implementation and capacity plans.

24.1. Google SRS (GSRS)

The Google Shared Registration System (GSRS) will provide all standard registry services:

- Receipt of data from registrars concerning registration of domain names and name servers
- Dissemination of top-level domain (TLD) zone files
- Dissemination of contact or other information concerning domain name registrations (WHOIS service)
- Internationalized Domain Names Support for all domain names
- Domain Name System Security Extensions (DNSSEC) support
- IPv6 Support
- Data Escrow

For descriptions and details of all SRS functions, see Question 23.

24.2. Google SRS Components

GSRS will be a multi-tier application that consists of the following components.

- Google SRS Front End (GSRS-FE): Presentation. A web application which provides an interface between registrars, developers, and other parties that need access to Google Registry information through a web interface. GSRS-FE will also include a web-based WHOIS interface.
- Google SRS Back End (GSRS-BE): Business Logic. A representational state transfer (RESTful) service that exposes and controls all registry data. Most business logic related to registry data storage and persistence will be implemented in GSRS-BE.
- Google EPP (GEPP): API Proxy. A public end-point for EPP (Extensible Provisioning Protocol) for the top-level domain. GEPP will translate all EPP requests and responses to interface with GSRS-BE. For more information on EPP support, see Question 25.
- Google WHOIS (GWHO): A public end-point for WHOIS queries for the top-level domain. GWHO will translate all WHOIS requests and responses to interface with the GSRS-BE. For more information on WHOIS support, see Question 26.

In addition, GSRS will integrate with the following internal systems. These internal systems are designed for extremely high performance and robustness, and use the same technologies used for other high-capacity services currently in production.

- Google Persistence Service (Persistence): A multi-master persistence solution which will run on top of Googleâ€™s proprietary database, BigTable. The Google Persistence Service coordinates between masters using an algorithm for fault-tolerant distributed systems, such as Paxos. BigTable is Googleâ€™s internal implementation of a distributed hash table used for the majority of our persistence needs.
- Google Accounts (Authentication): An existing platform for creation and authentication of user accounts. Google Accounts provides a standard login page for all Google products, as well as programmatic access for internal applications to retrieve credentials for the logged-in user.
- Google Monetization (Billing, as needed for the TLD): A monetization and billing system. Enables Google products to create accounts, create invoices, and perform financial transactions for Google customers.
- Google Authoritative DNS (Master Zone File): A robust public DNS server. Google Authoritative DNS will receive master zone file information from the GSRS-BE and distribute DNS information to clients.

â€œQ24_SRS Services Diagramâ€ shows the interactions with these systems as requests come into a Google datacenter and are handled appropriately. Note that, as shown in

â€œQ24_SRS Services Diagramâ€, all SRS requests are passed to the GSRS-BE, which contains all business logic for Google Registry. Integrated services are then used as needed. Google plans to provision these services to handle significantly greater load than our most aggressive expectations -- see below for details.

24.3. Google SRS Deployment Parameters

Google plans to deploy GSRS in five geographically-distributed datacenters throughout North America. Traffic to these datacenters is dynamically adjusted according to load, and the system will be provisioned to allow two simultaneous datacenter outages without substantial performance impact.

Each datacenter will include several replicas to handle specific machine failures for any GSRS service. Googleâ€™s production servers include the ability to expand to add new servers dynamically according to need. If SRS performance suddenly requires additional throughput capacity -- for instance, during a Distributed Denial of Service (DDoS) attack -- Google will be able to enable up to 100 additional replica servers in any datacenter dynamically. The limit of 100 additional replica machines is a self-imposed limit and may be revised upward based on ongoing operational considerations.

Each machine will be able to support a minimum of 250 queries per second (read or write), where one query contains one record. For architectural simplicity, our initial implementation will read data without any additional SRS-level caches.

24.4. GSRS Performance Scaling

Google plans to deploy sufficient capacity to handle SRS request load on the same scale as the largest top-level domains on the Internet. These computations are detailed in â€œQ24_GSRS Performance and Scalingâ€.

The key factor for scaling GSRS performance capacity will be the GSRS-BE component. Other components for GSRS (both GSRS-FE and GEPP) will receive user requests and then transform them into Remote Procedure Call (RPC) calls to GSRS-BE. GSRS-FE and GEPP will not perform any CPU-, disk-, or memory-intensive computations themselves. The performance capacity estimations below will therefore discuss only GSRS-BE capacity.

Based on existing domains and calculations for inbound traffic, Google estimates that there will be about 2300 queries per second for EPP operations, consisting mostly of checks for existing domains, and 3600 queries per second for WHOIS operations. In total, Google estimates that GEPP-BE must handle roughly 5900 queries per second for a scale of 100 million domains. Other operations, such as zone file operations and developer API calls, will create a relatively negligible level of load.

Google will meet the SRS throughput requirement, with a 50% utilization rate, with 48 machines allocated across the five datacenters. At this level of utilization, our active capacity will be double the expected throughput requirement. If a datacenter is lost through a production outage or change request, then additional machines will be enabled immediately to take upon the additional load with no manual intervention required. Google production systems have the standard capability to enable new machines to handle increased capacity needs immediately.

These estimations do not include any smart caching anywhere in the architecture. If the Google Registry reaches a very large number of domains and additional capacity measures are required, Google will consider a design for an appropriate WHOIS and EPP check result caching plan to relieve load and to improve latency

characteristics.

These estimates use a very aggressive set of assumptions for scaling, which should be sufficient for a large open domain.

24.5. GSRS Network Scaling

Google expects that our SRS network bandwidth requirements will be greatly below Googleâ€™s existing per-datacenter network capacity, even for its lowest-capacity datacenters in production. Details of its computations are included below.

Google assumes that 99% of RPC calls across both EPP and WHOIS will be less than 5 kB. EPP and WHOIS queries return more of a fixed number of records, and most queries will return only one record. 5 kB is derived as an estimate from taking the sample WHOIS output in the applicant guidebook, and multiplying it by three to account for XML inflation as if the same information passed through an EPP interface. Considering that most EPP commands are expected to be â€ˆcheckâ€‰ commands, this is a very conservative estimate.

Google then uses 5 kB as the assumed size to calculate the estimates for bandwidth per machine and per datacenter at maximum load.

Network Bandwidth Requirements per Machine = Queries per Second * Size of RPC Calls

With 250 qps and 5 kB per query, Google expect a maximum of about 12.5 MBâ„s of bandwidth requirement. This is about one-eighth of our current absolute minimum commodity standard of 1 Gb Ethernet. Our backbone routers connect many metro networks around the globe at 10Gb or greater.

Network Bandwidth Requirement per datacenter = Requirements per Machine * Number of Machines

With 12.5 MBâ„s of bandwidth per machine, and 100 machines maximum per datacenter, Google expects a maximum of about 1.25 GBâ„s data requirements during a major event that requires increased load demand. All Google datacentersâ€™ connections to its production network have a multiple 10 GBâ„s links, and many exceed this by far.

Based on these computations, Google believes that the network bandwidth required by the SRS system for as many as 100 million second-level domains will never exceed the capacity that even our smallest datacenter can provide.

24.6. Multi-Master Design

GSRS will use a multi-master architecture. This architecture is detailed further in Question 32. Machines across multiple datacenters will serve active traffic, with no machines on cold or hot standby. All instances of the data store update in real-time, and updates to registry data are committed across a quorum of replicas before the write is confirmed. When GSRS or a dependent service goes down or is drained by an outage, Googleâ€™s network architecture will redirect all affected traffic to another datacenter. Google will design most services as stateless, so service instances will not require any coordination mechanisms.

24.7 Google SRS Adherence to Specification 6

The Google Registry, and in particular the SRS will be compliant with all RFCs outlined in Specification 6. Any RFCs mentioned below and their successors will be complied with.

24.7.1 - Standards Compliance

24.7.1.1 DNS

Googleâ€™s domain name system (DNS) implementation will comply with RFCs 1034, 1035, 1982, 2181, 2182, 2671, 3226, 3596, 3597, 4343, and 5966. See Question 35 for more details on DNS RFC implementation compliance.

24.7.1.2 EPP

Googleâ€™s EPP implementation will comply with RFCs 5910, 5730, 5731, 5732, 5733, 5734, 3915, and 3735 for any extensions developed. Please see Question 25 for more details on EPP RFC implementation compliance.

24.7.1.3 DNSSEC

Googleâ€™s DNSSEC implementation will comply with RFCs 4033, 4034, 4035, 4509, 5155, and the best practices indicated in RFC 4641. A DPS statement will be published for each TLD supported by the Google Registry. Please see Question 43 for more details on DNSSEC implementation compliance.

24.7.1.4 IDN

Googleâ€™s implementation of internationalized domain names (IDN) will comply with RFCs 5890, 5891, 5892, 5893 and ICANNâ€™s published IDN Guidelines. Please see Question 44 for more details on IDN RFC implementation compliance.

24.7.1.5 IPv6

Googleâ€™s implementation of IPv6 will follow BCP 91 and RFCs 4472. All Registry services will be offered over IPv6. Please see Question 36 for more details on Googleâ€™s IPv6 implementation.

24.7.2 Registry Services and Wildcard Prohibition

Google understands the definition of â€œregistry servicesâ€ as defined in section 2.1 of Specification 6. Google will not support wildcard matching or resolution in the TLD zone as required by Section 2.2 of Specification 6.

24.7.3 Registry Continuity

Google will ensure registry continuity as specified in Section 3 of Specification 6. High availability, extraordinary event handling, and business continuity will be provided with respect to the TLD. See Question 39 for more details on Googleâ€™s Registry continuity plan.

24.7.4 Abuse Mitigation

Google will implement the abuse mitigation requirements as specified in Section 4 of Specification 6. An abuse contact will be made available. See Question 28 for more details on Googleâ€™s abuse handling. Google will also take action to remove malicious use of orphan glue records when provided evidence in written form that such records are present in connection with malicious content.

24.7.5 Supported Initial and Renewal Registration Periods

Google will implement the supported initial and renewal registration periods as specified in Section 5 of Specification 6. The Google Registry will support domain

name registration with validity periods of between one to 10 years in increments of one year. Renewal registration may extend registration to a maximum of 10 years from renewal date in increments of one year.

24.8. Google SRS SLA and Adherence to Specification 10

The Google SRS will significantly exceed the requirements of the Service Level Requirement Matrix defined in Specification 10 in the gTLD Applicant Guidebook. All EPP and WHOISâ„RDDS calls supported by the Google SRS system will have a 99.9% monthly uptime.

For the purpose of measuring this commitment, Google uses the following definitions:
RPC: A series of TCPâ„IP packets forming a distinct request, and the corresponding TCPâ„IP packets forming the response.
Error RPC: An RPC which does not return with 3x 95th percentile latency, or which fails because of internal transient errors.
Error Minute: Any minute during which 10% of RPC requests are error RPCs.
Monthly Uptime: The total number of minutes in a month minus the number of error minutes divided over the total number of minutes in the month, rounded to the nearest .01%.

When calculating monthly uptime percentage, Google does not distinguish between scheduled and unscheduled downtime.

Google will meet or exceed all service level agreements (SLA) described in the ICANN Applicant Guidebook. Specifically, Google will meet the commitments as specified in attachment â€œQ24_SLAsâ€. Note that the values represent a commitment to exceed SLA Requirements in Specification 10.

DNS
- DNS Availability: 0 minutes of downtime.
- DNS Name Server Availability: Less than 31 minutes of downtime per month (At least 99.93% availability)
- TCP DNS resolution RTT: 300ms for at least 95% of the queries
- UDP DNS resolution RTT: 300ms for at least 95% of the queries
- DNS update time: 15 min, for at least 95% of the probes

RDDS (WHOIS)
- RDDS Availability: Less than 43 minutes of downtime per month. (At least 99.9% availability)
- RDDS Query RTT: Less than 400 ms.
- RDDS Update Time: Less than 15 minutes for 95% of probes.

EPP
- EPP Service Availability: Less than 43 minutes of downtime per month. (At least 99.9% availability)
- EPP Session-Command RTT: Less than 1000 ms for at least 95% of commands.
- EPP Query-Command RTT: Less than 400 ms for at least 95% of commands.
- EPP Transform-Command RTT: Less than 800 ms for at least 95% of commands.

Downtime values are on a monthly basis.

Google has the track record to deliver SRS to 99.9% availability. Google is confident in its ability to meet these SLAs for SRS because of its experience with engineering highly-available platforms. As discussed by Urs Hoelzle, Senior Vice President of Technical Architecture, Google has designed its major services to obtain 99.99% reliability [1].

24.9. SRS Technical Support

Charleston Road Registry will provide registrars with access to telephone, email, and web chat support, and will escalate issues to the Google technical team as technical faults are identified. For a further elaboration of the escalation process, see Question 42.

Google will notify ICANN and registrars, at least 24 hours beforehand, of maintenance for all planned outages and maintenance which will directly, significantly, and visibly affect users of the SRS.

24.10. Resourcing Plans

Google will implement these technical requirements using the teams and resources discussed below.

The cost of these services will generally be set at reasonable market rates per agreement between Charleston Road Registry and Google. The expected costs are discussed in Questions 46 and 47.

All services that GSRS will depend on are already well-provisioned and ready to assume the additional load of the Google SRS, including up to 100 million second-level domains, which is well in excess of expected need. The load that GSRS will generate for existing systems will be significantly less than the capacity already designated as part of normal growth for Google and the companyâ€™s need for high-performance hardware and support personnel resources.

24.10.1. Registry Team

The Google Registry Team will be responsible for designing and implementing our SRS, EPP, and WHOIS systems, including IDNs. They will also be responsible for creating tests and monitoring for these systems.

During initial implementation, this team will consist of at least four to seven software engineers responsible for implementing the project. Additionally, Google plans to staff one software engineer who is responsible for engineering testing and monitoring for the Google Registry, and one software engineer who is responsible for backup, restoration and escrow. In total, Google plans to implement the Google Registry with a team of six to nine software engineers.

After the Google Registry is complete, Google expects to staff a team to support the ongoing operation of the registry. This team will consist of at least four engineers who will participate in on-call rotation, respond to alerts, provide support to ICANN and registrars for emergency escalations, and maintain responsibility for bug fixes and improvements. This team will continue maintenance throughout the life of the registry.

This teamâ€™s responsibilities will generally be limited to registry-specific components. The Google Registry Team will work closely with other relevant teams, including the Authoritative DNS support team, Storage Site Reliability Engineering team, network engineering and operations, and customer support teams. These other teams are described in more detail in Question 31 (Section 31.16) as well as the relevant sections throughout this application.

24.11. Summary and Key Insights

Google has an existing production infrastructure that can exceed the performance

requirements of the SRS platform:
- Google has a global network of datacenters to provide the scalability to meet the performance requirements of SRS.
- Google has a multi-master high availability strategy to meet the reliability requirements of SRS.
- Google has the proven operational processes and personnel to support the requirements going forward.
- The use of Googleâ€™s platform allows Charleston Road Registry to commit to service levels that substantially exceed the ICANN requirements in Specification 10.

24.12. Footnotes

[1] New York Times, â€œ99.999% Reliable? Donâ€™t Hold Your Breathâ€. http:â„â„www.nytimes.comâ„2011â„01â„09â„businessâ„09digi.html

25. Extensible Provisioning Protocol (EPP)

The primary purpose of Google EPP will be to provide for a provisioning interface to the Google Registry using the standardized EPP protocol.

Google has no initial plans to provide a software development kit, since there already are a variety of open- and closed-source EPP client implementations available on the web today.

Googleâ€™s EPP service will act as a connector between EPP clients and Googleâ€™s backend systems, which will handle business logic for registry operations.

25.1. RFC Compliance

Googleâ€™s EPP interface will handle the follow tasks:

- Listen for EPP connections over port 700.
- Support and maintain the EPP session through the life of the connection.
- Translate EPP requests and responses between equivalent requests and responses exposed by the Google SRS Backend private API.
- Terminate the Transport Security Layer (TLS) connection as defined by RFC 5734. TLS client certificates will be self-certified and transmitted to Google via the registrar application process. The credentials in the certificate will be matched against the account identified by the EPP username and password.

Google EPP will support a well-defined set of EPP RFCs with no additional EPP extensions.

25.1.1. Core Protocol - RFC 5730 (http:â„â„tools.ietf.orgâ„htmlâ„rfc5730)

RFC 5730 defines EPP, a simple object provisioning XML protocol. The base protocol itself is agnostic to the type of objects being provisioned and allows for extensions to the protocol.

Upon connection, a session is established with a â€ˆgreetingâ€‰ message from the server as defined by the RFC. From there, the client will login with a â€ˆloginâ€‰ command, then entertain a series of request and response cycles, and then finally ends the session with a â€ˆlogoutâ€‰ command.

All EPP commands will be supported according to the RFC in their standard command and response formats.

As part of the ã€ˆgreetingã€‰, a ã€ˆdcpã€‰ element is presented indicating Googleâ€™s data-collection-policy for the Registry. In general, the ã€ˆdcpã€‰ element will attempt to mirror (as far as the protocol can mirror) Googleâ€™s Privacy Policy as stated in http:â„â„www.google.comâ„policiesâ„privacyâ„. A copy of our full Privacy Policy as of March 1, 2012, is also included in Question 31 as an attachment.

For all commands, only objects defined by RFCs 5731 (domains), 5732 (hosts), and 5733 (contacts) will be supported. No other extensions will be used.

For the ã€ˆloginã€‰ command, the following policy specifics will be implemented:
- A maximum of three failed login attempts per connection
- On the 12th failed login attempt, the account will be locked out and require support to reactivate.
- Changing the EPP password with the optional ã€ˆnewPWã€‰ element will not be supported. Password changes will instead be handled through the password change interface on the Google SRS Front End. Error code 2501, ÊºAuthentication error; server closing connectionÊº will always be returned if this command is used.
- The ã€ˆversionã€‰ element must be set to 1.0.
- The ã€ˆlangã€‰ element must be set to â€œenâ€.

For all other EPP commands there will be no implementation policy specifics.

Standard behavior as defined by the RFC for each command is expected:
- ã€ˆcheckã€‰: Determine if an object can be provisioned within the registry
- ã€ˆinfoã€‰: Retrieve information associated with a given object
- ã€ˆpollã€‰: Discover and retrieve service messages by a server for individual clients
- ã€ˆcreateã€‰: Create an instance of an object
- ã€ˆdeleteã€‰: Remove an instance of an existing object
- ã€ˆrenewã€‰: Extend the validity of an existing object
- ã€ˆtransferã€‰: Determine real-time status of pending and completed transfer requests
- ã€ˆtransfer op=â€requestâ€ã€‰: Request that an object be transferred
- ã€ˆtransfer op=â€approveâ€ã€‰: Approve a transfer request
- ã€ˆtransfer op=â€rejectâ€ã€‰: Reject a transfer request
- ã€ˆtransfer op=â€cancelâ€ã€‰: Cancel a transfer request
- ã€ˆupdateã€‰: Update the information in an existing object

25.1.2. Domain Objects - RFC 5731 (http:â„â„tools.ietf.orgâ„htmlâ„rfc5731)

RFC 5731 defines support for domain objects over the EPP protocol.

Since RFC 5732 will be supported as well, domain objects will not be able to specify attributes to describe a name server host machine, but rather must reference the relevant host with ã€ˆdomain:hostObjã€‰ references.

When ã€ˆdomain:authInfoã€‰ is used, a ã€ˆdomain:pwã€‰ must be passed within to denote the password for the domain (or registrant using the â€œroidâ€ attribute to denote this), or a ã€ˆdomain:nullã€‰ to null it out.

For EPP commands dealing with domain object validity, domains will be by default valid indefinitely unless otherwise specified.

A 2305 error response code will be issued if there are dependent children

subordinate to the domain, which still exist in the repository if a ã€ˆdeleteã€‰ command is issued.

For all domains which require additional vetting of the registrant because of gTLD registration policy reasons, offline review of the domain may occur for transformation EPP commands. Otherwise, no offline review will occur in general.

25.1.3. Host Objects - RFC 5732 (http:â„â„tools.ietf.orgâ„htmlâ„rfc5732)

RFC 5732 provides EPP mappings for host objects. This RFC will be supported in its entirety. There are no special considerations needed for the Google Registry.

There will be no offline review before provisioning of any host.

25.1.4. Contact Objects - RFC 5733 (http:â„â„tools.ietf.orgâ„htmlâ„rfc5733)

This RFC provides EPP mapping for contact objects. This RFC will be supported in its entirety.

As specified by the RFC, unless prohibited by the serverâ€™s stated data collection policy, per-field disclosure policies will be supported via the ã€ˆcontact:discloseã€‰ element when provisioning contacts.

There will be no offline review before provisioning of any contact.

25.1.5. EPP Transport over TCP - RFC 5734 (http:â„â„tools.ietf.orgâ„htmlâ„rfc5734)

RFC 5734 defines connection handling procedures regarding the EPP mechanism.

The following policy is adopted from suggestions from this RFC:
-There will be no more than ten concurrent TCP connections from a single source destination IP without first contacting Google to establish an alternate upper limit.
- If a well-formed EPP request is not received at least every 30 seconds, the TCPâ„IP connection may be severed.
- TLS is mandatory to connect to Google EPP.
- A single TLS client certificate will be required for each EPP user and password pair. Multiple userâ„password pairs will not be permitted for a single TLS client certificate.
- A Certificate Name (CN) and subject AltName:dnsName will be set to the hostname of GEPP to be validated against by the client.

25.1.6. DS records - RFC 5910 (http:â„â„tools.ietf.orgâ„htmlâ„rfc5910)

RFC 5910 governs the additions to the EPP domain mapping RFC for provisioning DS records for a particular domain. Of the two possible supported mechanisms by the RFC, Google EPP will support the Ê°DS Data InterfaceÊ°, where the client is responsible for the creation of the DS information and is required to pass DS information when performing adds and removes.

Other particular implementation specifics include:
- The optional ã€ˆsecDNS:maxSigLifeã€‰ element will not be initially supported, and a 2102 error code will be returned.
- ã€ˆsecDNS:updateã€‰ with an attribute of urgent will not be initially supported, and a 2102 error code will be returned if present.

25.1.7. Grace periods - RFC 3915 (http:â„â„tools.ietf.orgâ„htmlâ„rfc3915)

RFC 3915 extends the EPP RFCs to account for grace period functionality. Grace periods allow for actions to be reversed or revoked within a specified period of time. In particular, this RFC governs four grace periods: add grace period, auto renew grace period, renew grace period and transfer grace period. Google will comply with this RFC in its entirety.

25.1.8. IDN RFCs

In addition to RFCs directly related to EPP, RFCs defining internationalized domain names (IDN) (5890, 5891, 5892, and 5893) and how they are specified will be implemented for Google EPP. In particular, IDNs will be specified using punycode and in the subset of unicode character code points dictated by the IDN tables attached to this gTLD application.

25.2. EPP Extensions

Beyond RFC 5910 which extends EPP to support DNSSEC DS records, no additional EPP extensions will be implemented or supported.

25.3. Google EPP Testing

Google will develop Google EPP using a software methodology, which ensures correct functionality by concurrently developing unit and large functional tests alongside the production code itself. Standard XML parsing libraries will be used depending on the implementation language. Implementation will also include monitoring rules that test EPP workflows in production on an ongoing basis. Before deploying to production, Google will create staging environments during development for internal manual and automated testing.

25.4. Operational Testing and Evaluation for Registrars

All ICANN-accredited registrars must first complete operational testing and evaluation (OT&E) before submitting EPP commands through the production Google EPP environment. The aim of this testing is to ensure that registrars are functioning properly.

OT&E instructions will be presented to the registrar after it has created a registrar account with the Google Registry. In general, these instructions will include a series of ordered EPP commands the registrar must perform along with test account credentials.

The registrar, once the registrar is ready for certification, it will request a Google Registry Front End evaluation. The test environment will reset to a nominal state, and at this point, the registrar must execute the series of ordered EPP commands within a specified amount of time. If registrar fails OT&E, the registrar will be notified of the failure, and can try again at a later date. If the registrar passes OT&E, the registrar will be notified, and be given production EPP credentials.

25.5. Resourcing Plans

Google Inc. will implement these technical requirements using the teams and resources discussed below.

The cost of these services will generally be set at reasonable market rates per agreement between Charleston Road Registry and Google. The expected costs are discussed in Questions 46 and 47.

25.5.1. Registry Team

The Registry Team will be responsible for designing and implementing the shared registration system (SRS), EPP, and WHOIS systems, including IDNs. They will also be responsible for creating tests and monitoring for these systems.

During initial implementation, this team will consist of at least four to seven software engineers responsible for implementing the project. Additionally, Google plans to staff one software engineer who is responsible for engineering testing and monitoring for the registry, and one software engineer who is responsible for backup, restoration and escrow. In total, Google plans to implement the registry with a team of six to nine software engineers.

After the registry is complete, Google expects to staff a team to support the ongoing operation of the registry. This team will consist of at least four engineers who will participate in on-call rotation, respond to alerts, provide support to ICANN and registrars for emergency escalations, and maintain responsibility for bug fixes and improvements. This team will continue maintenance throughout the life of the registry.

This teamâ€™s responsibilities will generally be limited to registry-specific components. The Registry Team will work closely with other relevant teams, including the Authoritative DNS support team, Storage Site Reliability Engineering team, network engineering and operations, and customer support teams. These other teams are described in more detail in Question 31 (Section 31.16), as well as the relevant sections throughout this application.

25.6. Summary and Key Insights

Google can design, build and run EPP interface that meets the requirements of a gTLD registry because of:
- A thorough understanding of the requirements for the systems.
- A reuse of existing industry, standard EPP XML schemas to de-risk system implementation.
- A proven software development methodology that will verify implementation against requirements.
- Operational procedures that facilitate the ongoing maintenance of the platform and the support of onboarding of new registrars.

26. Whois

Google will implement and maintain a â€œthickâ€ data model WHOIS service, in which the registry will store and serve contact information related to each domain name -- as opposed to a â€œthinâ€ model, which provides a query referral to a registrar.

Google will operate a public WHOIS service available via port 43 in accordance with RFC 3912, and a web-based Directory Service at ã€ˆWHOIS.nic.webã€‰ providing free, public query-based access. Both of these services will be made available over both IPv4 and IPv6.

Googleâ€™s WHOIS service on port 43 will comply with the WHOIS protocol as described in RFC 3912 by accepting an ASCII request (terminated with a ã€ˆCRã€‰ ã€ˆLFã€‰) and replying with an ASCII response, terminating the TCP connection once the output is finished. RFC 3912 does not contain further detail on the format of

the response payload itself; the format will be as described in â€œSPECIFICATION 4: SPECIFICATION FOR REGISTRATION DATA PUBLICATION SERVICESâ€, Section 1, and relevant Best Practices.

If ICANN specifies alternative formats and protocols, Google will implement these as soon as reasonably practical and will implement IDN related WHOIS requirements as they evolve. As a matter of policy, Google WHOIS will not return IDN variants for WHOIS queries. Queries for specific domains must be made.

26.1 High-level overview of the WHOIS service.

The attachment â€œQ26_WHOIS Services Diagramâ€ shows an overview diagram of WHOIS services, and other relevant aspects of Googleâ€™s network.

Step 1: Request.
When a request is received (via the web or â€œtraditionalâ€ interface), the appropriate service will extract the query from the request and perform checks to combat abusive behavior (such as Denial of Service and â€œWHOIS scrapingâ€). Google has extensive infrastructure that profiles requests and applies heuristics to determine if requests are legitimate or â€œscrapingâ€, and we plan to use this infrastructure to limit abuse of the WHOIS service. This functionality is described in Question 30, Section 30.b.3.2.

The request will also increment a counter to allow for reporting of statistics.

Step 2: Lookup.

The service will then query the registry database service, using the GSRS backend API. As the WHOIS service will query the database for the response, Google will provide fresh answers, instead of extracting all of the data from the database and synchronizing the data between servers. In order to provide fast, accurate responses, and to act as the first line of defense against DoS attacks, the WHOIS service may cache the result and reply from cache on subsequent queries for a maximum of 15 minutes.

Step 3: Reply
Once a result, or an indication that the requested information does not exist, is received from the database it will be converted into the appropriate response format: HTML for web-based requests, or RFC 3912 style responses for port 43 requests.

Step 4: Response.
The result of the lookup will then be returned to the requester.

26.2. WHOIS Infrastructure

Google operates a fast, reliable, and redundant network, and has developed frameworks for encoding and making remote procedure calls (RPCs). This infrastructure can be leveraged to provide communication and connectivity with other registry systems.

Google has significant experience developing secure, stable, resilient, and high-performance applications that perform lookups against a datastore, and has built substantial infrastructure for running such applications and scaling them to meet demand.

As described in detail in the responses to Questions 31 and 32, the WHOIS service will be designed as a simple, stateless server that accepts user queries and

transforms them into RPCs that will be serviced by the SRS backend server. This model allows additional capacity to be scaled in accordance with need simply by adding additional replicas of the WHOIS server, and means that the resource requirements to operate this layer of the service should be minimal. Google continuously monitors the load on production servers and systems and proactively upgrades and supplements systems before there is any degradation in service. The registry will be initially provisioned to support at least 100 million domain names, which substantially exceeds the expected load, but Googleâ€™s overall scale would allow the scope of the service to be increased substantially if required.

We estimate that each second-level domain will generate slightly more than 3 WHOIS queries per day. Based on our projections, this will result in an expected load of 3600 qps (queries per second) from WHOIS requests. Since each machine can handle 250 qps, and we plan for a 50% utilization rate, we expect to provision about 30 machines. For more details of our expected WHOIS load and performance capacity, see Question 24.

This infrastructure will also help Google meet and exceed the specified Service Level Agreements, including those in Section 10 of the Registry Agreement, as discussed in the response to Question 24. We plan to serve WHOIS queries with at least 99.9% availability, with less than 500 ms latency, and an update time of less than 15 minutes for 95% of updates.

26.3 WHOIS Synchronization

As mentioned in previous sections, all incoming RPCs to equivalent calls to the Google SRS Backend. This means that there is no synchronization between Google WHOIS and the SRS since Google WHOIS maintains no persistent state. However, as also previously mentioned, Google may deploy a cache in the WHOIS service to reduce load on the GSRS BE and database while reducing latency, creating a freshness delay of up to 15 minutes.

26.4. WHOIS Data and Requestâ„Response Example

Google WHOIS will follow data formats specified in Specification 4 in the application guidebook. Here is an example WHOIS domain query and response.

Query::
EXAMPLE.web

Response:
Domain Name: EXAMPLE.web
Domain ID: D424242-web
WHOIS Server: WHOIS.nic.web
Updated Date: 2012-08-13T20:13:00Z
Creation Date: 2012-02-14T00:45:00Z
Registry Expiry Date: 2014-10-08T00:44:59Z
Sponsoring Registrar: EXAMPLE REGISTRAR LLC
Sponsoring Registrar IANA ID: 314159265
Domain Status: clientDeleteProhibited
Domain Status: clientRenewProhibited
Domain Status: clientTransferProhibited
Domain Status: serverUpdateProhibited
Registrant ID: 5372808-ERL
Registrant Name: EXAMPLE REGISTRANT
Registrant Organization: EXAMPLE ORGANIZATION
Registrant Street: 123 EXAMPLE STREET
Registrant City: ANYTOWN

Registrant Stateâ„Province: AP
Registrant Postal Code: A1A1A1
Registrant Country: EX
Registrant Phone: +1.5555551212
Registrant Phone Ext: 1234
Registrant Fax: +1.5555551213
Registrant Fax Ext: 4321
Registrant Email: Contact Information Redacted
Admin ID: 5372809-ERL
Admin Name: EXAMPLE REGISTRANT ADMINISTRATIVE
Admin Organization: EXAMPLE REGISTRANT ORGANIZATION
Admin Street: 123 EXAMPLE STREET
Admin City: ANYTOWN
Admin Stateâ„Province: AP
Admin Postal Code: A1A1A1
Admin Country: EX
Admin Phone: +1.5555551212
Admin Phone Ext: 1234
Admin Fax: +1.5555551213
Admin Fax Ext:
Admin Email: Contact Information Redacted
Tech ID: 5372811-ERL
Tech Name: EXAMPLE REGISTRAR TECHNICAL
Tech Organization: EXAMPLE REGISTRAR LLC
Tech Street: 123 EXAMPLE STREET
Tech City: ANYTOWN
Tech Stateâ„Province: AP
Tech Postal Code: A1A1A1
Tech Country: EX
Tech Phone: +1.1235551234
Tech Phone Ext: 1234
Tech Fax: +1.5555551213
Tech Fax Ext: 93
Tech Email: Contact Information Redacted
Name Server: NS01.EXAMPLEREGISTRAR.web
Name Server: NS02.EXAMPLEREGISTRAR.web
DNSSEC: signedDelegation
DNSSEC: unsigned
ã€‰ã€‰ã€‰ Last update of WHOIS database: 2012-08-13T20:15:00Z ã€ˆã€ˆã€ˆ

26.5 Bulk Registration Data Access to ICANN

The Google Registry will comply with Section 3 of Specification 4 in the application guidebook to provide ICANN bulk registration data access.

Data will be provided on a weekly basis. Data will include data committed as of 00:00:00 UTC on the day previous to the one designated for retrieval by ICANN.

The Google Registry will provide at a minimum all content requested in the specification: domain name, domain name repository, object id, registrar id, statuses, last updated date, creation date, expiration date, and name server names. For sponsoring registrars, the registry will provide: registrar name, registrar repository object id, hostname of registrar Whois server, and URL of registrar.

The format of the data will be provided as specified in Specification 2 for Data Escrow.

The Google Registry will have the file ready for download as of 00:00:00 UTC on the

day designated for retrieval by ICANN. The file will be made available for download by SFTP with a hostname, username, and password provided to ICANN.

26.6. Resourcing

Google Inc. will implement these technical requirements using the teams and resources discussed below.

The cost of these services will generally be set at reasonable market rates per agreement between Charleston Road Registry and Google. The expected costs are discussed in Questions 46 and 47.

26.6.1. Registry Team

Our Registry Team will be responsible for designing and implementing our SRS, EPP, and WHOIS systems, including IDNs. They will also be responsible for creating tests and monitoring for these systems.

During initial implementation, this team will consist of at least 4-7 software engineers responsible for implementing the project. Additionally, we plan to staff one software engineer who is responsible for engineering testing and monitoring for the registry, and one software engineer who is responsible for backup, restoration and escrow. In total, we plan to implement the registry with a team of 6-9 software engineers.

After the registry is complete, we expect to staff a team to support the ongoing operation of the registry. This team will consist of at least four engineers who will participate in on-call rotation, respond to alerts, provide support to ICANN and registrars for emergency escalations, and maintain responsibility for bug fixes and improvements. This team will continue maintenance throughout the life of the registry.

This teamâ€™s responsibilities will generally be limited to registry-specific components. The Registry Team will work closely with other relevant teams, including the Authoritative DNS support team, Storage Site Reliability Engineering team, network engineering and operations, and customer support teams. These other teams are described in more detail in Question 31 (Section 31.16), as well as the relevant sections throughout this application.

26.7. Summary and Key Insights

- Google will operate a thick WHOIS service with an interface on port 43 complying with RFC 3912 as well as a web-based query interface. These services will display data in accordance with Specification 4 of the registry agreement.
- Googleâ€™s WHOIS service offers a simple, stateless, scalable front end to the registryâ€™s SRS-BE servers. The capacity of the service can be expanded simply by adding additional replica WHOIS servers. Google will initially scale the service to support a registry with 100 million domain names.

27. Registration Life Cycle

Charleston Road Registry (CRR) sets forth below a description of the various stages and states of a second-level domain (SLD) in its proposed registry system. Please see â€œQ27_Registry Life Cycle Diagramâ€ for a graphical depiction of the domain registration lifecycle.

27.1. Life Cycle States

The following registration life cycle states are described in the sections below:

- Reserved
- Available
- Add Grace Period
- Registered
- Renew Grace Period
- Auto-Renew Grace Period
- Pending Restore
- Redemption Grace Period
- Pending Delete
- Pending Transfer
- Transfer Grace Period

State changes provide specific use cases to the DNS (Domain Name System) architecture explained in responses for Question 31 (Technical Overview), Question 32 (Architecture) and Question 35 (DNS Service). Note that this response makes references to EPP (Extensible Provisioning Protocol) functionality which is fully described in Question 25. Additionally, state changes may change the information retrievable via Registration Data Directory Services (RDDS, a combination of WHOIS and Web-based WHOIS) as described in Question 26.

27.2. Reserved

Reserved domains are not generally available to register. For example, such restrictions may result from agreements with ICANNâ„IANA for operationalâ„technical reasons or with governments for geographic names. See response to Question 22 (Protection of Geographic Names) for further details. The registry will maintain a schedule of reserved words as per Specification 5 of the Registry Agreement. For a reserved domain, an EPP ã€ˆcheckã€‰ query would return a value of avail=Êº0Êº, and there would be no entry in the zone file or RDDS associated with the domain name. EPP ã€ˆcreateã€‰ requests will result in a rejection, except those that have prior approval from CRR. The registry foresees two cases as envisioned by Specification 5 of the New gTLD Agreement, particularly applicable to geographic names: 1) CRR releases an SLD for use by the applicable government or country-code manager. In this case, at the end of the registration, the SLD would return to the Reserved state. 2) CRR works with the affected government(s) or country-code manager(s) to permanently make available SLD(s). In this case, at the end of a reservation the string would revert to the Available state.

In addition to an explicit Reserved state, CRR will also support a functional equivalent to reserving through registration. This approach follows the practices of the .info registry. That is, CRR will reserve certain names by registering them for the registry, pursuant to Section 2.6 of the gTLD registry agreement. Names reserved using this approach follow the life cycle described below. Generally, CRR will use the state machine to control reservations but leaves open the possibility of using reservation by registration when more appropriate.

27.3. Available

If a second level domain (SLD) is not reserved, it is considered available if either of the following holds true:
- The SLD has not existed previously.
- The SLD has passed through the Pending Delete state.

Domains that are available do not exist in the zone file or RDDS. The Shared Registry System - Back End (SRS-BE) would return a value of avail=Êº1Êº when responding to the EPP ã€ˆcheckã€‰ query for domain in the Available state.

All other states would return a value of avail=Êº0Êº.

27.4. Add Grace Period (AGP)

Names that are selected for registration are entered into the zone file at the start of this five-day add-grace period (ã€ˆaddPeriodã€‰). Registrars are charged for submitting ã€ˆcreateã€‰ requests to the registry.

The Google SRS-Backend (GSRS-BE) manages the 5-day grace period countdown, including the transition of the state to Registered. During the Add Grace Period, registrars can cancel the registration and receive a credit for the cost of the original registration (with domain names becoming immediately Available or Reserved, as appropriate), subject to ICANNÊ¹s AGP Limits Policy. GSRS-BE will set the status of the Domain Name to ã€ˆaddPeriodã€‰ while making the zone file and RDDS updates, and then reset it when grace period ends.

27.5. Registered

Owners of domain names can register them for a period of one to ten years. The registrar may renew the SLD for no less than one and no more than ten years from the current day using the EPP ã€ˆrenewã€‰ command. GSRS-BE will manage state changes based on expiration date of domains, including updates to the zone file and RDDS. By default, status of the object is â€œokâ€. Subsequent EPP ã€ˆtransformã€‰ commands or actions by SRS-BE may change that value to indicate restrictions present or transformations pending.

27.6 Renew Grace Period (RGP)

Upon receipt of a ã€ˆrenewã€‰ EPP command, SRS-BE will transition the domain name to the state of Renew Grace Period (ã€ˆrenewPeriodã€‰). The renew grace period allows registrars to correct the mistaken renewal of an SLD. The Renew Grace Period lasts for five (5) days during which the receipt of a ã€ˆdeleteã€‰ EPP command will result in the crediting back to the registrar the cost of the renewal. After this grace period ends, the domain name will revert to the Registered state. Domains in the RGP may transition to the following states: Redemption Grace Period (by meaning of a delete) or Pending Transfer (by means of a transfer) as described in sections 27.8 and 27.11, respectively.

27.7. Auto-Renew Grace Period (ARGP)

GSRS-BE will automatically renew a registration once it has expired and charge the registrar the current renewal fee. By default, CRR will extend the registration for one year. The ARGP is intended to allow registrars to delete a registration which has been auto-renewed and to receive a refund for the renewal fee. For the first 45 days after an automatic renewal, the domain is in state of the Auto-Renew Grace Period (ã€ˆautoRenewPeriodã€‰). During this 45-day grace period, GSRS-BE will accept requests from the EPP for the existing owner to update, renew, transfer and delete the registration provided there is not a corresponding status that prohibits the transformation. The registrar will then be charged the cost of this new transaction. If the registry happens to receive a ã€ˆdeleteã€‰ EPP command during the ARGP, CRR will credit the cost of a renewal to the registrar. Without intervention, SRS-BE will then update the domainâ€™s state to Registered.

27.8. Redemption Grace Period (RdGP)

SLDs that are deleted, such as when a registrar uses the ã€ˆdeleteã€‰ EPP command, then enter the Redemption Grace Period (RdGP) (ã€ˆredemptionPeriodã€‰), with the exception of those deleted during the Add Grace Period (see above). The RdGP permits registrars to restore domains that were mistakenly deleted. The RdGP lasts for thirty (30) days. SRS-BE will first check for a clientDeleteProhibited or a serverDeleteProhibited prohibition before making the transition, and will not make the transition if those prohibitions exist.

Domains which enter this state become non-operational and are removed from the zone file and RDDS. The SRS-BE will accomplish this change by updating the DNS service. GSRS-BE will also set the status to â€œpendingDeleteâ€.

During the RdGP, the SRS-BE will reject all EPP requests other than ã€ˆrestoreã€‰. Registrars have 30 days to submit a ã€ˆrestoreã€‰ request in order for the transaction to be accepted and the transaction cost credited back to the registrar. Registrars must provide a ã€ˆreportã€‰ that provides, among other things, a reason (ã€ˆresReasonã€‰) and supporting information (ã€ˆstatementã€‰) within 5 days (during which time the status will be Pending Restore or ã€ˆpendingRestoreã€‰). CRR will not process a ã€ˆrestoreã€‰ without a ã€ˆreportã€‰. If a ã€ˆrestoreã€‰ request is not received or if a ã€ˆreportã€‰ is not received on time, GSRS-BE transitions the domain name to the Pending Delete state. Should a registrar reactivate the domain, SRS-BE will update the DNS zone file and RDDS. When complete, SRS-BE will update the state to Registered.

27.9. Pending Delete

This state is the final stage of the lifecycle prior to the domain again being made available. It lasts for 5 days. During this period, registrars shall not have the ability to reactivate the domain, but would have to wait to make a new request once the domain becomes available. During the Pending Delete phase, the SRS-BE will reject all requests to transform a domain name received through the EPP interface. The status of the domain name will be ã€ˆpendingDeleteã€‰. After this stage, the domain shall be removed from the registryâ€™s database and once again made available for registration.

27.10. Releasedâ„Available

As noted above, at the conclusion of the Pending Delete state, GSRS-BE removes the domain name entirely from its database. It is now available for registrars. See 27.3 above for further details of â€œAvailableâ€ state. The exception would be those domain names on the reserved list, which will instead return to the Reserved state after they are released.

27.11. Transfers

CRR and Google will adhere to the 15 March 2009 ICANN Policy on Transfer of Registrations (as well as its successor scheduled to take effect on 1 June 2012). Therefore, registrars are allowed to transfer domains between each other, provided that the states and status allow for it.

Transfer requires the following conditions:
- The domain must be in one of the following states: Add Grace Period, Registered, Renew Grace Period, Transfer Grace Period, or Auto Renew Grace Period.
- Neither a clientTransferProhibited nor a serverTransferProhibited status must be present.

Provided those two conditions are met, GSRS-BE will set the status to

ã€ˆpendingTransferã€‰ while it performs its activities (during this period, the domain is considered to be in the Pending Transfer state). First, the registry will notify both registrars of the pending transfer. The registry will complete the transfer if it receives an ã€ˆACKã€‰ response from the Registrar of Record if received within the first five (5) days. If after five (5) days and the registry has not received any message, the transfer will be automatically completed. If a ã€ˆNACKã€‰ response is received from the Registrar of Record, the transfer will be rejected. A rejected transfer would result in the SRS-BE setting the state back to its previous value.

Upon completion of the transfer, CRR will update the zone file and RDDS and send another notification to both registrars. When a transfer is complete, the registration period for the SLD is extended by a year (but not to exceed ten (10) years from the date of the transfer) and the gaining registrar will be charged for submitting a ã€ˆtransferã€‰ EPP request.

27.11.1. Transfer Grace Period (TGP)

The registry places the domain name into the Transfer Grace Period (ã€ˆtransferPeriodã€‰) for the first 5 days after the completion of the ã€ˆtransferã€‰ request. During this time, the Gaining registrar will receive a credit for the cost of the transfer if a ã€ˆdeleteã€‰ EPP transaction is received. Provided the domain is not deleted, at the end of the 5 day period the domain will return to the Registered state. A transfer received during TGP would result in the domain moving to ã€ˆpendingTransferã€‰ as described above.

27.12. Resourcing

Google Inc. will implement these technical requirements using the teams and resources discussed below.

The cost of these services will generally be set at reasonable market rates per agreement between Charleston Road Registry and Google. The expected costs are discussed in Questions 46 and 47.

27.12.1. Registry Team

The Registry Team will be responsible for designing and implementing the SRS, EPP, and WHOIS systems, including details related to domain name lifecycle. They will also be responsible for creating tests and monitoring for these systems.

During initial implementation, this team will consist of at least 4-7 software engineers responsible for implementing the project. Additionally, Google plans to staff one software engineer who is responsible for engineering testing and monitoring for the registry, and one software engineer who is responsible for backup, restoration and escrow. In total, Google plans to implement the registry with a team of 6-9 software engineers.

After the registry is complete, Google expects to staff a team to support the ongoing operation of the registry. This team will consist of at least four engineers who will participate in on-call rotation, respond to alerts, provide support to ICANN and registrars for emergency escalations, and maintain responsibility for bug fixes and improvements. This team will continue maintenance throughout the life of the registry.

This teamâ€™s responsibilities will generally be limited to registry-specific components. The Registry Team will work closely with other relevant teams, including the Authoritative DNS support team, Storage Site Reliability Engineering

team, network engineering and operations, and customer support teams. These other teams are described in more detail in Question 31 (Section 31.16), as well as the relevant sections throughout this application.

27.12.2. Customer Services Team

The Google Customer Services Team will be responsible for supporting customers and partners, including life cycle requests. Google has a very large existing customer service team of both internal staff as well as staff contracted through third parties, with many hundreds of dedicated staff members already in place. Since these teams and their management are already in place, no standalone implementation resources are needed.

To continue ongoing maintenance of CRR support needs, Google plans to add additional resources for capacity as needed. Google expects to add a total of approximately fifteen additional personnel (including both Google employees and outside vendors) to support all of CRRâ€™s customers and partners. The individual staffing allocation to each TLD is described in Question 47.

27.13. Summary and Key Insights

- The registry will support a full registration lifecycle consistent with that offered by other major gTLDs. State changes are triggered by registrar commands via the EPP interface or by the SRS-BE, which manages changes triggered by the passage of time.

28. Abuse Prevention and Mitigation

Specifically, we will implement in our internal policies and in our Registryâ„Registrar and Registration Agreements that all registered domain names will be subject to a Domain Name Anti-Abuse Policy (â€œAbuse Policyâ€). The Abuse Policy will provide CRR with broad power to suspend, cancel, or transfer domain names that violate the Abuse Policy. We plan to post the Abuse Policy on a publicly facing website at nic.webâ„abuse, which will provide a reporting mechanism whereby violations of the policy can be reported by those who are impacted; an easy to find place to report policy violations; â€œplain languageâ€ definitions of what constitutes a â€œreportableâ€ problem; and compliance processes to provide due process, and sanctions that will be applied, in the case of policy violations. The nic.webâ„abuse website will list CRRâ€™s Abuse Point of Contact. The Abuse Point of Contact shall consist of, at a minimum, a valid e-mail address dedicated solely to the handling of abuse complaints. CRR will ensure that this information is kept accurate and up to date and will be provided to ICANN if and when changes are made.The Abuse Point of Contact will review complaints regarding an alleged violation of the Abuse Policy.

28.1. Abuse Tracking

CRR also plans to catalog all abuse communications in Googleâ€™s customer relationship management (CRM) software using a ticketing system and to maintain records of all abuse complaints for an appropriate amount of time. We shall only provide access to these records to third parties under limited circumstances, such as in response to a subpoena or other such court order or demonstrated official need by law enforcement.

The Abuse Policy will define abuse as an action that:

a. Causes actual and substantial harm, or is a material predicate of such harm; and
b. Is illegal or illegitimate, or is otherwise considered contrary to the intention and design of a stated legitimate purpose, if such purpose is disclosed.

28.2. Abuse Definitions

The Abuse Policy will also name and provide basic definitions as to what constitutes the abusive registration andâ„or use of domain names within the TLD. These will include, but not be limited to, the following activities:
1. Unqualified Applicant - not authorized to register domain name;
2. Child Pornography - Web sites that contain content that exploits children, such as child pornography (including cartoon child porn) or content that presents children in a sexual manner;
3. Fake renewal notices - Fake renewal notices are misleading correspondence sent to registrants from an individual or organization claiming to be or to represent the current registrar. These are sent for a variety of deceptive purposes, such as obtaining an unnecessary fee (fraud); getting a registrant to switch registrars unnecessarily (â€œslammingâ€, or illegitimate market-based switching); or to obtain registrant credentials or authorization codes to facilitate theft of the domain;
4. Cross-TLD Registration Scam - a deceptive sales practice where an existing registrant is sent a notice that another party is interested in or is attempting to register the registrantâ€™s domain string in another TLD;
5. Domain kitingâ„tasting - Registrants may abuse an Add Grace Period through continual registration and deletion of domain names to test their monetization (â€œtastingâ€), and re-registration of the same names in order to avoid paying the registration fees (â€œkitingâ€);
6. Phishing - a Web site fraudulently presenting itself as a trusted site (often a bank) in order to deceive Internet users into divulging sensitive information (e.g. online banking credentials, email passwords);
7. Spam - use of electronic messaging systems from email addresses from domains in the TLD to send unsolicited bulk e-mail;
8. Malware â„ Botnet Command-and-Control - Malware authors sometimes use domain names as a way to control and update botnets. Botnets are composed of thousands to millions of infected computers under the common control of a criminal. Botnets can be used to perpetrate many kinds of malicious activity, including distributed denial-of-service attacks (DDoS), spam, and fast-flux hosting of phishing sites;
9. Use of Stolen Credentials â€“such as stolen credit card numbers, to register domain names for malicious purposes;
10. Pharming - redirecting of unknowing users to fraudulent Web sites or services, typically through domain name system (DNS) hijacking or poisoning;
11. Fast flux hosting - use of fast-flux techniques to disguise the location of Web sites or other Internet services, or to avoid detection and mitigation efforts, or to host illegal activities. Fast-flux techniques use DNS to frequently change the location on the Internet to which the domain name of an Internet host or name server resolves. Fast flux hosting may be used only with prior permission of CRR;

28.3. Abuse Policy Rights Reserved

The Abuse Policy will state, at a minimum, that CRR reserves the right to deny, cancel, or transfer any registration or transaction, or place any domain name(s) on registry lock, hold, or similar status, that it deems necessary, in its discretion: (1) to protect the integrity and stability of the registry; (2) to comply with any applicable laws, government rules or requirements, requests of law enforcement, or any dispute resolution process; (3) to avoid any liability, civil or criminal, on the part of CRR, as well as its affiliates, subsidiaries, officers, directors, and employees; (4) per the terms of the registration agreement or any agreement CRR has with any party; (5) to correct mistakes made by CRR, its registry services provider, or any registrar in connection with a domain name registration; (6)

during resolution of any dispute regarding the domain; and (7) to remedy the abusive registration or use of any domain name.

28.4. Orphan Glue

We will remove orphan glue records for names removed from the zone when provided with evidence in written form to the Abuse Point of Contact that the glue is present in connection with malicious conduct according to Specification 6 of the New gTLD Registry Agreement. Googleâ€™s back-end systems will also periodically search for orphaned glue. We will inform its registrants that it removes glue if the covering zone is removed, and thus registrants should not reference it from outside the domain.

28.5. Resourcing

CRR and its affiliates will commit ample resources for the purpose of implementing its internal policies and its Registryâ„Registrar and Registration Agreements. As described herein, we will create an Internal Abuse Team, including an Abuse Point of Contact, whose responsibilities will include reviewing, responding, cataloging, and, if applicable, remedying complaints regarding alleged violations of the Abuse Policy. This team will be dedicated to manually reviewing abuse complaints. The roles and responsibilities of the team members are anticipated to include, but are not limited to, the following:
- Reviewing, responding, and if applicable, resolving complaints regarding alleged violations of the Abuse Policy
- Enforcing the Abuse Policy
- Monitoring productivity and efficiency of the manual review process
- Addressing high priority escalations from Law Enforcement quickly
- Collaborating with internal and external partners to drive issues to resolution
- Interface with the technical team to improve workflow, prioritize escalations, create tools for the manual review process

28.6. Anti-abuse Notice and Takedown Procedure

In order to reduce abusive registrations that affect the security of the TLD and its users, CRR plans to provide a domain anti-abuse notice and takedown procedure. Specifically, we will operate an anti-abuse website at the URI address nic.webâ„abuse that will provide the contact information for the Abuse Point of Contact. The nic.webâ„abuse website will prominently display CRRâ€™s Abuse Policy and a fill-in section wherein the user will then be asked to fill in several fields, including the userâ€™s identity and contact information, and the identity and relevant information of the individual or organization that is making an abusive registration or use of a domain name within the TLD, and specific details on how, why, and when the complainant believes the registration or use of the domain name is abusive. The user will be asked to read the Abuse Policy before it submits a complaint and then click on a check box to indicate that the user has read and understands the Abuse Policy.

28.7. Abuse Response

CRR will then provide a targeted response time as to the decision regarding the complaint. We will review with the Internal Abuse Team and render a decision regarding the alleged abuse, and decide whether to deny, cancel, or transfer any registration or transaction, or place any domain(s) on registry lock, hold, or similar status that violates the Abuse Policy, if applicable. In accordance with the applicable terms of service, CRR reserves the right to terminate the accounts or domains of repeat abusers.

Specifically, the process is anticipated to occur as follows: an email containing the information relayed in the complaint will be sent to the Abuse Point of Contact. The Abuse Point of Contact will send an email to the complainant within twenty-four hours of receiving the complaint confirming receipt of the email. The Abuse Point of Contact will preliminarily review to determine whether the complaint reasonably falls within an abusive use as defined by the Abuse Policy. If the complaint does not, the Abuse Point of Contact will email the complainant within forty-eight business hours of the confirmation email to indicate that the subject of the complaint does not fall within the abusive uses as defined by the Abuse Policy, and that CRR considers the matter closed.

If the preliminary review does not resolve the matter, the Abuse Point of Contact will relay the complaint to CRRâ€™s Abuse Team.

All requests from law enforcement will be flagged for prompt review by the Internal Abuse Team. With the resources of Googleâ€™s registry services team, CRR can meet its obligations under Section 2.8 of the Registry Agreement where required to take reasonable steps to investigate and respond to reports from law enforcement and governmental and quasi-governmental agencies of illegal conduct in connection with the use of its TLD.

In high-priority cases the Internal Abuse Team will seek to determine within forty-eight business hours whether the registration or use of the domain within the TLD is abusive as defined by the Abuse Policy. In all cases, the Internal Abuse Team will determine whether a domain is abusive within seven business days or sooner of receipt of the Complaint. If an abusive use is determined, the Internal Abuse Team may alert the registry services team to immediately suspend resolution of the domain name, as appropriate. Thereafter, if we decide to suspend resolution of the domain name at issue, the Abuse Point of Contact will immediately notify the abusive domain name registrant of such action, the nature of the complaint, and provide the registrant with the option to respond within ten days. All such actions will be ticketed in Googleâ€™s CRM software to maintain accurate complaint processing records.

If the registrant responds within ten business days, the Internal Abuse Team will review the response to determine if the registration or use is not abusive. If the Internal Abuse Team is satisfied by the registrantâ€™s response, the Abuse Point of Contact will submit a request to the registry services team to reactivate the domain name. If the registrant does not respond within ten business days or the Internal Abuse Team is not satisfied by the registrantâ€™s response, the Abuse Point of Contact will notify the registry services team to continue the suspension, transfer or cancel the abusive domain name, as appropriate.

The anti-abuse procedure will not prejudice either partyâ€™s election to pursue another dispute mechanism, such as the Uniform Rapid Suspension System (URS) or Uniform Domain-Name Dispute-Resolution Policy (UDRP). If CRRâ€™s registrar receives notice of a URS or UDRP complaint pertaining to a domain name within the TLD, the registrar will ensure that the domain name is locked within twenty-four hours of receipt of the complaint. The registrar will also notify CRRâ€™s Abuse Point of Contact and the registrant.

28.8. Abuse Prevention

In order to further minimize abusive domain name registrations and other activities that have a negative impact on Internet users, CRR will promote the ability to contact a domain registrant using information in WHOIS by providing accessibility in a reliable, consistent, and predictable fashion. CRR will adhere to port 43 WHOIS Service Level Agreements (SLA), which require that port 43 WHOIS service be

highly accessible and fast.

CRR will authenticate registrant information by providing an email verification link sent to the registrant to confirm its email address. In addition, we will ensure an ongoing ability to contact the registrant via email by confirming the new email address as part of changes affecting the contact information.

CRR plans to regularly monitor registration data for accuracy and completeness, employing authentication methods, and establishing policies and procedures to address domain names with inaccurate or incomplete WHOIS data.

As required by Specification 4 of the new gTLD Registry Agreement, CRR will offer thick WHOIS services, in which all authoritative WHOIS data is maintained at the registry. Through CRRâ€™s registrar and registry services team, we will maintain timely, unrestricted and public access to accurate and complete WHOIS information, including registrant, technical, billing, and administrative contact information, identity of the registrar, domain nameâ€™s expiration date, nameservers associated with the domain, and specified fields of data for the Registrant Contact, Administrative Contact, and Technical Contact.

CRR will employ query rate limiting and CAPTCHA procedures for its WHOIS database to minimize abuse of its features.

28.9. Summary and Key Insights

Abusive activity on the Internet has been a growing problem, creating security and stability issues for registrants, registrars and users of the Internet in general. CRR intends to address this issue across its TLDs by dedicating ample resources for the purpose of implementing its strict abuse policies and procedures.

29. Rights Protection Mechanisms

Abusive registrations and uses of domain names in the global top-level domain (gTLD) will not be tolerated. The nature of such abuses creates security and stability issues for the registry, registrars and registrants, as well as for users of the Internet in general. As set forth in prior responses, Charleston Road Registry (CRR) will employ a stringent verification process to establish that every prospective registrant meets the registration criteria. In addition to this verification process, the registry promises to incorporate the following Rights Protection Mechanisms.

29.1. Rights Protection Mechanisms â€“ Sunrise Period

Subject to the Sunrise Eligibility Requirements (SERs) outlined herein, Charleston Road Registry (CRR) will offer a Sunrise Period of 60 days for owners of trademarks listed in the Trademark Clearinghouse to register domain names that contain a second level consisting of an identical match to their listed trademarks. In addition, CRR plans to implement a pricing structure to make it easy for brand owners to secure their trademarks and brand names within the gTLD. CRRâ€™s registrar will confirm all Sunrise and Registration eligibility. As an added measure of security for brand owners, CRR will staff an internal sunrise team (the â€œSunrise Contactâ€) which will review all Sunrise registrations to ensure Sunrise and registration eligibility.

The SERs, which will be verified by Clearinghouse data, will include the following: (i) proof of membership in eligible registrant class, (ii) ownership of a mark that is (a) nationally or regionally registered and for which proof of use, such as a declaration and a single specimen of current use â€“ was submitted to, and validated by, the Trademark Clearinghouse; or (b) that have been court-validated; or (c) that are specifically protected by a statute or treaty currently in effect and that was in effect on or before 26 June 2008; (iii) representation that all provided information is true and correct; and (iv) provision of data sufficient to document rights in the trademark.

Upon submission of all of the required information and documentation, the registrar will review the submissions and verify the trademark and eligibility information and all contact information provided for registration. The registrar shall then send confirmation messages, listing any deficiencies regarding the trademark information provided with the application. If a registrant does not cure any eligibility deficiencies andâ„or respond by the means listed within one week, the registrar will release the name.

CRR will incorporate a Sunrise Dispute Resolution Policy (SDRP). The SDRP will allow challenges to Sunrise Registrations by third parties for a ten-day period after acceptance of the registration based on the following four grounds: (i) at the time the challenged domain name was registered, the registrant did not hold a trademark registration of national effect (or regional effect) or the trademark had not been court-validated or protected by statute or treaty; (ii) the domain name is not identical to the mark on which the registrant based its Sunrise registration; (iii) the trademark registration on which the registrant based its Sunrise registration is not of national or regional effect or the trademark had not been court-validated or protected by statute or treaty; or (iv) the trademark registration on which the domain name registrant based its Sunrise registration did not issue on or before the effective date of the Registry Agreement and was not applied for on or before ICANN announced the applications received.

After receiving a Sunrise Complaint, the Sunrise Contact will review the Complaint to see if the Complaint reasonably asserts a legitimate challenge as defined by the SDRP. If the Complaint does not, the Sunrise Contact will email the complainant within 36 hours of the complaint to indicate that the subject of the complaint does not fall within SDRP, and that CRR considers the matter closed.

If the domain name is not found to have adequately met the SERs, the Sunrise Contact may alert the registrar to immediately suspend resolution of the domain name, as appropriate. Thereafter, the Sunrise Contact will immediately notify the registrant of such action, the nature of the complaint, and provide the registrant with the option to respond within ten days to cure the SER deficiencies or the domain will be canceled. All such actions will be ticketed in Googleâ€™s customer relationship management (CRM) software to maintain accurate SDRP processing records.

If the registrant responds within ten business days, its response will be reviewed by the Sunrise Contact to determine if the SERs are met. If the Sunrise Contact is satisfied by the registrantâ€™s response, it will submit a request by the registry services team to reactivate the domain name. The Sunrise Contact will then notify the Complainant that its complaint was ultimately denied and provide the reasons for the denial. If not, both the registrant and the complainant will be notified that the domain name will be released.

29.2. Rights Protection Mechanisms â€“ Trademark Claims Service

CRR will offer a Trademark Claims Service during the Sunrise Period and plans to

continue to offer the service for an indefinite period of time thereafter during general registration. CRR will staff an internal team that will be considered the Trademark Claims Contact. The registrar will verify whether any domain name requested to be registered in the gTLD is an identical match of a trademark that has been filed with the Trademark Clearinghouse. It is anticipated that a domain name will be considered an identical match when the domain name consists of the complete and identical textual elements of the mark, and includes domain names where (a) spaces contained within a mark that are either replaced by hyphens (and vice versa) or omitted; (b) certain special characters contained within a trademark are spelled out with appropriate words describing it (e.g., @ and &); and (c) punctuation or special characters contained within a mark that are unable to be used in a second-level domain name are either (i) omitted or (ii) replaced by hyphens or underscores.

If the registrar determines that a prospective domain name registration is identical to a mark registered in the Trademark Clearinghouse, the registrar will provide a â€œTrademark Claims Noticeâ€ (â€œNoticeâ€) in English on the registrarâ€™s website to the prospective registrant of the domain name. The Notice will provide the prospective registrant with access to the Trademark Clearinghouse Database information referenced in the Trademark Claims Notice to enhance its understanding of the Trademark rights being claimed by the trademark holder via a link. The Notice will be provided in real time without cost to the prospective registrant.

After receiving the Notice, the registrar will require the prospective registrant to click a link that specifically warrants that: (i) the prospective registrant has received notification that the mark(s) is included in the Clearinghouse; (ii) the prospective registrant has received and understood the Notice; and (iii) the registration and use of the requested domain name will not infringe on the rights that are the subject of the Notice.

CRR reserves the right to adopt other procedures and requirements for the Trademark Claims Service. At a minimum, it is anticipated that after the effectuation of a registration that is identical to a mark listed in the Trademark Clearinghouse, the registrar will then provide a clear notice to the trademark owner of the trademark with an email detailing the WHOIS information of the registered domain name. The trademark owner then has the option of filing a Complaint under the Uniform Domain Name Dispute Resolution Policy (UDRP) andâ„or the Uniform Rapid Suspension System (URS) against the domain name. As discussed in its right protection mechanisms, CRR will require in its domain name registration agreements that its registry operator and registrar providers, as well as all registrants, submit to the Uniform Domain Name Dispute Resolution Policy (UDRP) and the Uniform Rapid Suspension System (URS) procedures. CRR and its registrar(s) will abide by decisions rendered under the UDRP and URS on a timely and ongoing basis upon notification.

29.3. Rights Protection Mechanisms â€“ URS

CRR will specify in the Registry Agreement, all Registry-Registrar Agreements, and all Registration Agreements used in connection with the gTLD that it will abide by all decisions made by panels in accordance with the Uniform Rapid Suspension System (URS). CRRâ€™s registrar will be tasked with receiving all URS Complaints and decisions. After receiving a URS complaint about a domain name within the gTLD, the registrar will ensure that the domain name is locked within twenty-four (24) hours of receipt of a URS complaint from the URS Provider and will notify CRRâ€™s Abuse Point of Contact and the registrant. In the event of a determination in favor of the complainant, the registrant will notify the Abuse Point of Contact and the registry services provider to ensure that the registry suspends the domain name in a timely fashion and has the website at that domain name is redirected to an

informational web page provided by the URS Provider about the URS throughout the life of its registration. CRRâ€™s Abuse Point of Contact will oversee and monitor the status and resolution of all URS complaints and decisions.

29.4. Rights Protection Mechanisms â€“ UDRP

CRR will specify in the Registry Agreement, all Registry-Registrar Agreements, and all Registration Agreements used in connection with the gTLD, that it will abide by all decisions made by panels in accordance with the Uniform Domain-Name Dispute-Resolution Policy (UDRP). CRRâ€™s registrar will be tasked with receiving all UDRP complaints and decisions. After receiving a UDRP complaint about a domain name within the gTLD, the registrar will ensure that the domain name is locked within twenty-four (24) hours of receipt of a UDRP complaint from the UDRP Provider and will notify CRRâ€™s Abuse Point of Contact and the registrant. In the event of a determination in favor of the complainant, the registrant will notify the Abuse Point of Contact and the registry services provider to ensure that the registry cancels or transfers the domain name in a timely fashion as provided for by the decision. CRRâ€™s Abuse Point of Contact will oversee and monitor the status and resolution of all UDRP complaints and decisions.

29.5. Rights Protection Mechanisms â€“ Proven Registrars

CRR will contract with various ICANN-accredited registrars. CRR is committed to reducing abusive registrations, and will ensure that its registrar operates accordingly.

29.6. Rights Protection Mechanisms â€“ Pre-Authorization and Authentication

CRR will authenticate registrant information by providing an email verification link sent to the registrant to confirm its email address. In addition, CRR will ensure proper access to domain functions by requiring multi-factor authentication from registrants to process update, transfer, and deletion requests.

No name will resolve until the registrant has been verified by the internal team as an eligible registrant.

29.7. Rights Protection Mechanisms â€“ Grace Period

See Question 27 for a detailed discussion of CRRâ€™s policies with respect to Add Grace Periods.

29.8. Rights Protection Mechanisms â€“ Domain Anti-Abuse Policy

CRR will implement in its internal policies and its Registry-Registrar and Registration agreements that all registered domain names will be subject to a Domain Name Anti-Abuse Policy (â€œPolicyâ€). See Question 28 for a detailed discussion of CRRâ€™s Anti-Abuse Policy.

29.9. Resourcing

Google will implement these technical requirements using the teams and resources discussed below.

The cost of these services will generally be set at reasonable market rates per agreement between CRR and Google. The expected costs are discussed in Questions 46 and 47.

29.9.1. Registry Team

The Registry Team will be responsible for designing and implementing the SRS, EPP, and WHOIS systems, including implementation of the rights protection mechanisms. They will also be responsible for creating tests and monitoring for these systems.

During initial implementation, this team will consist of at least 4-7 software engineers responsible for implementing the project. Additionally, Google plans to staff one software engineer who is responsible for engineering testing and monitoring for the registry, and one software engineer who is responsible for backup, restoration and escrow. In total, Google plans to implement the registry with a team of 6-9 software engineers.

After the registry is complete, Google expects to staff a team to support the ongoing operation of the registry. This team will consist of at least four engineers who will participate in on-call rotation, respond to alerts, provide support to ICANN and registrars for emergency escalations, and maintain responsibility for bug fixes and improvements. This team will continue maintenance throughout the life of the registry.

This teamâ€™s responsibilities will generally be limited to registry-specific components. The Registry Team will work closely with other relevant teams, including the Authoritative DNS support team, Storage Site Reliability Engineering team, network engineering and operations, and customer support teams. These other teams are described in more detail in Question 31 (Section 31.16), as well as the relevant sections throughout this application.

29.9.1. Customer Service Team

The Customer Services Team will be responsible for supporting customers and partners, including responding to abusive registrations. Google has a very large existing customer service team of both internal staff as well as staff contracted through third parties, with many hundreds of dedicated staff members already in place. Since these teams and their management are already in place, no standalone implementation resources are needed.

To continue ongoing maintenance of CRR support needs, Google plans to add additional resources for capacity as needed. Google expects to add a total of approximately fifteen additional personnel (including both Google employees and outside vendors) to support all of CRRâ€™s customers and partners. The individual staffing allocation to each gTLD is described in Question 47.

29.10. Summary and Key Insights

CRR is committed to implementing strong and integrated intellectual property rights protection mechanisms. Doing so is critical to Googleâ€™s goals of model Internet citizenship and fostering Internet development, especially in emerging regions. Accordingly, CRR intends to offer a suite of rights protection measures which builds upon ICANNÊ¹s required policies while fulfilling our commitment to encouraging innovation, competition, and choice on the Internet.

30(a). Security Policy: Summary of the security policy for the proposed registry

30.a. Security Policy

Google plans to use the same common secure infrastructure to support the proposed registry that we use for our other production networks and computing environments. Google currently provides best-in-class security technologies and processes to protect Googleâ€™s products, services, infrastructure and user data. Googleâ€™s common secure infrastructure supports some of the webâ€™s most widely-used services, such as Google Search YouTube, and Google Apps. These services are used by many millions of consumers, businesses and government customers for their daily operations. Google does not have any plan to support High Security Top Level Domain (HSTLD).

30.a.1. Google Security Policies

Googleâ€™s security programs are governed through the Google Security Team. The Security Team is led by Googleâ€™s Vice President of Security, who reports to Google Senior Leadership including the President of Technology and Chief Executive Officer. Googleâ€™s VP of Security has approved the security policies that underpin Googleâ€™s information security program.

Our Security Team is committed to:
- Control and maintain the confidentiality, integrity, and availability of information and information systems.
- Limit Googleâ€™s exposure to the risks arising from loss, corruption or misuse of our information assets.
- Ensuring consistency, which is attained against legal, regulatory, policy and best practice requirements.

Google regularly reviews and updates the security policies that address purpose, scope, responsibilities, management commitment, coordination among organizational entities, and
compliance.

To ensure the consistent implementation of security controls across the various layers of infrastructure and services, Google has documented the following security policies.

- Basic Security Policy: States the foundation and principles of Googleâ€™s Security Policies.
- Physical Security Policy: States how the safety of people and property is protected at Google.
- Accounts Access and Administration Policy: States the kinds of internal accounts Google has and how to access, use, and administer them in a way that reduces risk and provides the ability to audit account activity.
- Data Security Policy: States how data should be handled at Google to help ensure its confidentiality, integrity, and availability.
- Corporate Services Security Policy: Informs Google employees of what to expect regarding access, monitoring, and other security considerations for communications and other data sent, received, or stored using GoogleÊ¹s corporate services.
- Network and Computer Security Policy: States how to reduce the likelihood of compromise to GoogleÊ¹s data and infrastructure from devices connected to Google networks.
- Applications, Systems, and Services Security Policy: Ensures that adequate attention is paid to security in the design, procurement, development, deployment, and maintenance of Applications, Systems, and Services.
- Change Management Policy: Describes the safeguards that protect Google from accidental or malicious changes to GoogleÊ¹s systems.
- Information Security Incident Response Policy: States the minimal requirements

for preparing for and responding to information security incidents.
- Datacenter Security Policy: Ensures that adequate attention is given to verifying that each datacenter hosting Google systems maintains security controls that provide protection appropriate to the criticality of those systems.

30.a.2. Independent Assessment Reports

Google regularly engages independent assessors to independently assess its information systems, infrastructure and security program and controls for compliance with the following:

- Federal Information Security Management Act (FISMA). Independent assessments conducted every two years. In 2011, Google received FISMA certification for Google Apps Cloud, another service that uses the same production network as the Google registry will use. Grant Thornton LLP performed independent assessment, and United States General Services and Administration (GSA) issued FISMA certification to Google based on this independent assessment.
- Statement on Standards for Attestation Engagements (SSAE16). Independent assessments conducted annually.
- Sarbanes-Oxley (SOX). Independent assessments conducted annually.
- Payment Card Industry (PCI). Independent assessments conducted annually.

Government agencies and Enterprise customers are currently using Google Apps Cloud Services. Googleâ€™s corporate and production networks were both in scope for FISMA and SSAE16 independent assessments. Google is also currently preparing for ISO 27001 certification of Google Apps Cloud.

30.a.3. Commitments made to Registrants

Google will make the following commitments to registrants.

- Googleâ€™s existing dedicated Security Organization will remain the focal point for ensuring implementation of adequate system security in order to prevent, detect, and recover from security breaches. Various teams in the security organization ensure that Googleâ€™s infrastructure and services are operated, used, maintained, and disposed of in accordance with internal security policies.
- Google will continue to contemplate threats from internal and external sources, and will exercise our existing incident response capability.
- Google will continue to perform quarterly scanning of our internal and external infrastructure to detect network, database, application, and OS vulnerabilities.
- Google will continue to maintain robust Logging, Monitoring and Auditing capabilities for its systems and networks. These policies are discussed further in Section 30b.
- Googleâ€™s externally facing network infrastructure will continue to enforce strict access control restrictions to deny all traffic and allow only authorized protocols to enter the Google network.
- Google has established background investigations for all Google employees in accordance with local laws and will continue to do background investigations for any new Google employees.

EXHIBIT GS-26

Editorial : The domain future is on the .Web :DomainGang

GS-26

Dot .Web

Another month, another **DomainGang editorial** is due.

Now that **Verisign** made its involvement in the Nu Dot Co acquisition of dot .Web official, we can openly speculate on the future of this upcoming new gTLD.

According to the **press release on dot .Web** by Verisign, the managers of .COM and .NET plan *"to quickly grow .web and establish it as an additional option for registrants worldwide in the growing TLD marketplace."*

At a cost of $130 million dollars, Verisign positions itself against a growing variety of new gTLDs, the biggest "nuisance" of which has been **.XYZ.**

First off, I find the original lawsuit against the XYZ Registry, asserting that their car commercial was disparaging the .COM name to be rather far-fetching.

However, everyone in this business, and every other business for that matter, is in it for the money.

As a 20 year veteran in the domain industry, Verisign has considerably more at stake, than new-comers XYZ, hence their taking notice of the topmost gTLD in registration numbers.

With .Web in its possession, Verisign has a very strong weapon, and an advantage against XYZ, as .Web is **both generic and pronounceable**, not to mention that to everyone who's been on the Net for the past 20+ years, the "web" is almost synonymous with the Internet.

Even the **Internet of Things** will still be a "web" of sorts, and having dot .Web as a fresh, clean, and global gTLD on top of .COM and NET is a huge advantage for Verisign.

I expect the dot .Web rollout to be well-coordinated, relentless and well-placed around the world after all, .COM can co-exist and retain its supremacy, undisturbed, when it belongs to the same stable of domain TLD purebreds.

As a large, publicly-traded corporation, Verisign has a **strategic vision** window of several years – *if not decades* – into the future. The acquisition of .Web via an agreement with Nu Dot Co ensures that the company's future maintains the company ahead of the curve.

It'll be interesting to see what .XYZ comes up with next, in the game of press releases and strategic alliances, particularly with its obvious focus on the Chinese domain market.

Related DomainGang Posts:

- Verisign Thanksgiving shocker : Rights to .turkey gTLD acquired for…
- #Verisign stock jumps on Domain Scalping Marketplace ™ announcement
- Verisign : Happy New Year with an 8.8% price increase for domains
- ICANN warning : Moore's Law affects gTLD domains!
- Blog vs. Web : Verisign, please don't follow the Automattic paradigm
- #Hebrew dot COM : #Verisign rolls out support for .קום IDN #gTLD

Filed under Editorial · Tagged with Domainers, Domains, Editorial, Nu Dot Co, Verisign, domaingang, dot .Web

Comments are closed.

EXHIBIT GS-27

Authentic Web

BLOG

PERSPECTIVES, STRATEGIES AND NEWS

BRAND TLDS & DIGITAL STRATEGIES

.WEB Acquired for $135 Million. Too much? How does it compare?

At $135 million, .WEB is the highest valued first round new Top Level Domain registry sold at auction. It sets a new high bar on the value of TLDs. Nu Dot Co and its investors, prevailed in an ICANN auction and are now the proud owners of the .WEB Registry. Industry tea leaves point to Verisign as the backer but that has yet to be confirmed.

In the past two years, other TLD registries have sold for millions of dollars. Now that the big one (.WEB) is done, it is interesting to look at the relative value of these

acquisitions and consider how these investments make sense for the buyers. The top 5 new TLD acquisition prices are listed below and a discussion follows.

TLD	VALUE (USD)	BUYER
.WEB	$135,000,000	Nu Dot Co
.SHOP	$41,500,000	GMO Registry, Inc.
.APP	$25,000,000	Charleston Road Registry Inc. (Google)
.BLOG (1)	$19,000,000	Automattic Inc. (Wordpress)
.TECH	$6,760,000	Dot Tech LLC (Radix)

SOURCE: **HTTPS://GTLDRESULT.ICANN.ORG/APPLICATION-RESULT/APPLICATIONSTATUS/AUCTIONRESULTS**
[1] REPORTED BUT UNVERIFIED

In March 2015, I wrote an article; Did Google Overpay for .APP? The conclusion was, “no they did not overpay”. This was based on Google’s leading mobile app market position and .APP would allow them to own a new channel, introduce a new paradigm on app discoverability, and leverage Google’s Android market position in the application distribution market.

Then there was .SHOP, purchased for $41.5 million by GMO Registry. This one, I find to be a head scratcher in terms of the valuation. It is a good TLD, no question. It has clear meaning as an ecommerce destination but $41.5 million for a niche or single purpose TLD seems rich to me. .SHOP operators and investors will need to take a long view, dedicate significant marketing spend to develop a value proposition to deliver a new, better, and different offering to ecommerce merchants, and gain market traction. Did GMO overpay? Probably.

How about .BLOG, purchased for a reported $19 million by Automattic Inc., parent of WordPress? Wordpress is a leading website building and blogging software company. By various reports 25 – 27% of all websites use WordPress and millions of bloggers use their tools. WordPress is a big deal. There are parallels with .APP and .BLOG. Both were purchased by industry leaders in their respective lines of business. Each can use the TLD as a differentiator to leverage and extend their market position to drive growth. They can offer services that are unique in the market, increasing the value of their entire business. Secondly, as a defensive position, they ensure competitors are not armed with a powerful digital asset to disrupt their respective positions. .BLOG gets a thumbs up and in my view a good buy for Automattic. Not only will they sell millions of .BLOG domains, they will dramatically increase the worldwide awareness of new TLDs. That’s a win for the industry as well.

Where .APP and .BLOG have explicit meanings and added power due to the market positions of the acquirers, .SHOP is seeking to carve a new extension as an ecommerce destination alternative. This all makes sense but $41.5 million is a big number to dig out of, from a return on investment perspective.

.WEB is a different animal. This acquisition valuation is proof. .WEB is what we call a "super generic" and arguably the best new TLD alternative to .COM. It is a word that is commonly used with intuitive meaning. WEB could make a serious dent to .COM over the long run. With an initial investment of $135 million you have to assume the owners will follow their acquisition capital with serious marketing spend. Domain speculation in the .WEB space will be furious at launch. Premium domain sales for .WEB are likely to be orders of magnitude larger than in any other TLD introduced and as the .WEB space matures, those premium values will rise. Of course, this assumes Nu Dot Co drives forward with the now familiar premium domain strategy.

$135 million is a shocking number. It can be a winner assuming funds to support a major marketing and communication plan as the best alternative to .COM, or if Verisign, a cozy super-generic companion to .COM. .CO positioned as a viable alternative and currently have under 2 million registrations versus .COM at 126 million. Recall, Neustar acquired .CO for $109 million on $21 million in revenue with approximately 1.5 million domains under management.

Let's assume Verisign is indeed the .WEB backer. Today, Verisign generates over $1 billion in revenue and a +60% operating profit. Nice business. The challenge for Verisign is not EBITDA or cash flow, it is growth. In their recent quarterly financial release, Verisign grew by 9% in the quarter compared to the same quarter in 2015. Not bad but not enough to excite and drive up shareholder value, where a single digit CAGR and cash generation is already baked into their market cap. The company is trading at ±9 times revenue and ±15 times EBITDA. If they did indeed acquire .WEB, the company now owns a new growth engine and they are uniquely positioned to drive it. Some suggest they would bury it to protect .COM. That is not in the best interest of shareholders. .COM is still king, will be for some time and .WEB can immediately contribute healthy operating profits out of the gate. If well executed, .WEB can add significant shareholder value.

If the tea leaves are misleading and everybody is wrong about Verisign, then we will have to write another blog on those implications. If it is Neustar, for example, then the market dynamics are entirely different. We are also likely to see a gun fight on how this all materialized with the secret backer of Nu Dot Co.

THE ECONOMICS OF A TLD REGISTRY

Let's now assume it is not Verisign, the economics of a TLD registry are very good at scale from 1 million to 100 million Domains Under Management (DUM).

This chart models Domain Under Management (DUM), an assumed registry price of $8, the annual revenue, (ignoring one-time premium domain revenues) and assumed EBITDA improving from 10% to 50% as economies of scale kick in for a well run registry. Then apply business valuations at 5 times revenue (conservative low bar) or 20 times EBITDA, whichever you prefer.

DUM	1,000,000	2,000,000	5,000,000	10,000,000	100,000,000
Registry Price	$8.00	$8.00	$8.00	$8.00	$8.00
Revenue	$8,000,000	$16,000,000	$40,000,000	$80,000,000	$800,000,000
EBITDA	$800,000	$3,200,000	$12,000,000	$32,000,000	$400,000,000
Operating Margins	10%	20%	30%	40%	50%
Value @ 5x Revenue	$40,000,000	$80,000,000	$200,000,000	$400,000,000	$4,000,000,000
Value @ 20x Profit	$16,000,000	$64,000,000	$240,000,000	$640,000,000	$8,000,000,000
For comparison, Verisign with 126 million DUM, $1B in revenue, generates 60% in profit and a $9B Market Cap and .CO was acquired by Neustar for $109 with revenue at $21 million and 1.6 million DUM.					

The trick of course is getting to scale, how much additional investment will be required to get to scale and will the market demand exist for .WEB. For the investors at Nu Dot Co, you now own a valuable asset that will take time and skilled execution to monetize. We will need a few years to determine if $135 million was too much, just right or a home run investment. The potential to create a highly valuable business that generates tremendous profit and cash is there if they drive to scale.

If it is Verisign, it is a brilliant move, not unlike .BLOG and .APP, it extends Verisign's .COM position and is the growth engine they need.

The new TLD market continues be increasingly dynamic and interesting with each passing day.

Thanks for checking in – Peter

ICANN WORLD VS REAL-WORLD

BRAND LEADERS TAKE NOTE! NEW TLD ROUND PROPOSED FOR SEPTEMBER 2018

BRAND TLDS 2016 YEAR END STATUS

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EXHIBIT GS-28

Verisign likely $135 million winner of .web gTLD

Kevin Murphy, August 1, 2016, 08:51:12 (UTC), Domain Registries

Verisign has emerged as the likely winner of the .web gTLD auction, which closed on Thursday with a staggering $135 million winning bid.

The shell company Nu Dot Co LLC was the prevailing applicant in the auction, which ran for 23 rounds over two days.

Just hours after the auction closed, Domain Name Wire scooped that Verisign had quietly informed investors that it has committed to pay $130 million for undisclosed "contractual rights".

In its Securities and Exchange Commission quarterly report, filed after the markets closed on Thursday, Verisign said:

> Subsequent to June 30, 2016, the Company incurred a commitment to pay approximately $130.0 million for the future assignment of contractual rights, which are subject to third-party consent. The payment is expected to occur during the third quarter of 2016.

There seems to be little doubt that the payment is to be made to NDC (or one of its shell company parents) in exchange for control of the .web Registry Agreement.

The "third-party consent" is likely a reference to ICANN, which must approve RA reassignments.

We speculated on July 14 that Verisign would turn out to be NDC's secret sugar daddy, which seems to have been correct.

Rival .web applicant Donuts had sued ICANN for an emergency temporary restraining order, claiming it had not done enough to uncover the identity of NDC's true backers, but was rebuffed on multiple grounds by a California judge.

Donuts, and other applicants, had wanted the contention set settled privately, but NDC was the only hold-out.

Had it been settled with a private auction, and the $135 million price tag had been reached, each of the seven losing applicants would have walked away with somewhere in the region of $18.5 million in their pockets.

This draws the battle lines for some potentially interesting legal fallout.

It remains to be seen if Donuts will drop its suit against ICANN or instead add Verisign in as a defendant with new allegations.

There's also the possibility of action from Neustar, which is currently NDC's named back-end provider.

Assuming Verisign plans to switch .web to its own back-end, Neustar may be able to make similar claims to those leveled by Verisign against XYZ.com.

Overall, Verisign controlling .web is sad news for the new gTLD

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AlpNames could get PAID for abandoning its customers
O.com might be a one-off for Verisign
Andruff escalates Disspain feud, asks ICANN to ban him from chair
Rumors swirl as AlpNames suffers "days" of downtime
ICANN plays tough over Amazon dot-brands
Data beats Merdinger to head universal acceptance group
Radix sees revenue up 30%
Verisign gets approval to sell O.com for $7.85
At eleventh hour, most .uk registrants still don't own their .uk names
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andrew:
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John:
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John:
And though I'm sure it doesn't even need to be added - yes, that means the rich and famous Overstock company is NOT enti... read more

John:
Thanks for those links, I will examine them later. The issue is whether premium renewals are even allowed at all, and... read more

Greg:
UDRP pertains to use of a domain name, not registration of a domain name. Not to mention, it's a bit of a Johnny-come-la... read more

B:
Zak Muscovitch addressed this in the ICA public comment (see point 4): mm.icann.org/pipermail/comments-o-com-single-ch... read more

John:
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John:
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Cook Islands mulls name change
Donuts founder replaces Pitts as MMX's premium guru
Phishing still on the decline, despite Whois privacy
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Court rules generic dictionary domains CAN be trademarked
ICANN director Burr leaving Neustar
Right of the colon? IDN getting killed over dot confusion
Despite Afilias lawsuit, Neustar names date for Indian takeaway
Endurance domain revenue dips
After ICANN knockback, Amazon countries agree to .amazon talks
Operation September Thrust leads to another million-domain Radix gTLD
Brexit blamed as .eu hits six-year low
CentralNic expects flat profit as revenue almost doubles
XYZ reveals .monster gTLD launch dates
Huge batch of Afilias TLDs approved in China
.SE sells off $3.2 million registrar biz
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ICANN approves two new TLDs, including THAT one
MMX sees better profits than expected
Pay up or sell up, ICANN tells failing new gTLD
Brexit boost for Irish domains
Brexit won't just affect Brits,

industry, in my view.

.web has been seen, over the years, as the string that is both most sufficiently generic, sufficiently catchy, sufficiently short and of sufficient semantic value to provide a real challenge to .com.

I've cooled on .web since I launched DI six years ago. Knowing what we now know about how many new gTLD domains actually sell, and how they have to be priced to achieve volume, I was unable to see how even a valuation of $50 million was anything other than a long-term (five years or more) ROI play.

Evidently, most of the applicants agreed. According to ICANN's log of the auction (pdf) only two applicants — NDC and another (Google?) — submitted bids in excess of $57.5 million.

But for Verisign, .web would have been a risk in somebody else's hands.

I don't think the company cares about making .web a profitable TLD, it instead is chiefly concerned with being able to control the impact it has on .com's mind-share monopoly.

Verisign makes about a billion dollars a year in revenue, with analyst-baffling operating margins around 60%, and that's largely because it runs .com.

In 2015, its cash flow was $651 million.

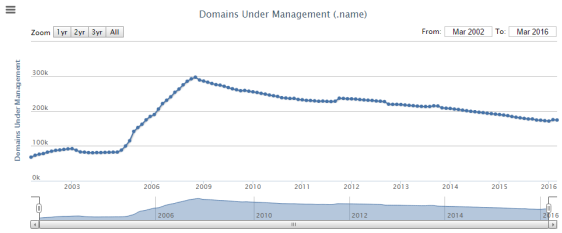
So Verisign has dropped a couple of months' cash to secure .web — chickenfeed if the real goal is .com's continued hegemony.

In the hands of a rival new gTLD company's marketing machine, in six months we might have been seeing (naive) headlines along the lines of "Forget .com, .web is here!".

That won't happen now.

I'm not privy to Verisign's plans for .web, but its track record supporting the other TLDs it owns is not fantastic.

Did you know, or do you remember, that Verisign runs .name? I sometimes forget that too. It bought it from Global Name Registry in late 2008, at the high point of its domains under management in this chart.



I don't think I expect Verisign to completely bury .web, but I don't think we're going to see it aggressively promoted either.

It will never be positioned as a competitor to .com.

If .web never makes $135 million, that would be fine. Just as long as it doesn't challenge the perception that you need a .com to be successful, Verisign's purchase was worth the money.

Related posts (automatically generated):

Google buys .app for over $25 million

Donuts files $10 million lawsuit to stop .web auction

Donuts spends $50 million on new gTLD auctions

powerfu... read more

Bob Hawkes:
I can confirm personally that as of now at least customers can indeed sign in via the LogicBoxes interface and manage se... read more

EXHIBIT GS-29

Technology

How a $135 million auction affects the domain name industry and your business

The cost of protecting assets and creating a new revenue stream

By Cybele Negris | August 10, 2016, 11:24am

niroworld/Shutterstock

On July 27, the Internet Corporation for Assigned Names and Numbers (ICANN) ran an auction for the generic top-level domain (gTLD) .web that culminated in a winning bid of $135 million. Nu Dot Co LLC produced the winning bid and on August 1, Verisign, a global leader in domain names and internet security, confirmed in a #4f81bd;">press release that they provided the necessary funds for Nu Dot Co's successful bid. But wait one second, let's back this up - $135 million for .web?

The previous highest public price for a gTLD happened just over seven months ago when GMO Registry of Japan acquired the .shop gTLD for $41.5 million. While not a number to sneeze at, Verisign blew away the previous record high. And while we're making comparisons, remember that $100 million venture capital investment in Shopify back in 2013? Shopify is now a public company and an absolute force in the e-

commerce game while its value is soaring past a billion dollars.

So that brings us back to Verisign and their brand new $135-million baby. What exactly are Verisigns plans for .web? To turn the new investment into a billion-dollar web sensation? According to their press release, “as the most experienced and reliable registry operator, Verisign is well-positioned to widely distribute .web.” They plan on utilizing their “expertise, infrastructure, and partner relationships to quickly grow .web and establish it as an additional option for registrants worldwide.” This can certainly hold true as .web is widely considered the gTLD with the most potential out of 1,930 applications for new domain extensions ICANN received to battle .com and .net for widespread adoption.

In the past 30 years, Verisign has registered over 127 million .com domain names and nearly 16 million .net domain names. These are two of the most popular top-level domains available while the most adopted new gTLD, .xyz, has garnered over six million registrations since entering the market a little over two years ago. If Verisign is able to average three million .web registrations year-over-year, like .xyz, at a guesstimated price of $10 USD, with an annual renewal rate of 50%, they would break even on their investment in about 3 years ($30,000,000 in year one, $45,000,000 in year two and $52,500,000 in year three). Of course, if renewal rates are lower or Versign cannot achieve three million domains a year, it will take longer to reach break-even.

The runner-up in the .web auction, potentially a giant with immense resources such as Google, could eat into Verisign’s top-level domain market share, taking aim at its .com and .net properties. Let’s say Verisign bowed out of the auction early and allowed another registry to directly compete against .net with a synonymous .web domain name. With a stagnating stock price, Verisign would not be in a fantastic position to improve on that with a strong competitor nipping at its heels. From this perspective, the cost of doing business for Verisign is more than worthwhile, even if they happen to not generate a single dollar of revenue from .web for years to come.

What does this all mean for your business and web presence?

.Web will not be publicly available for some time; and while Verisign may or may not have acquired the gTLD mainly to keep competitors away, most pundits believe that they will make it publicly available. Once

released, it would be prudent for all businesses that already own a .com and/or .net to register the .web variation for their business to avoid resellers from scooping them up and charging a premium.

Be sure to #4f81bd;">pre-register for .web domain names as soon as you can so that you are alerted as soon as .web launches and becomes publicly available.

If you are a trademark owner, be sure to register with the #4f81bd;">Trademark Clearinghouse in advance to ensure that yourtrademark.web can be secured during the "#4f81bd;">sunrise period." This stretch of time is designed specifically for trademark holders to reserve their domain names before anyone else has access.

Perhaps you missed out on the .com or .net variation of your business; now you have an excellent opportunity to grab the .web version of your domain name and once you register the domain, a simple 301 redirect from your existing domain to the .web variation will provide a seamless transition to your ideal domain name.

Put your thinking cap on and begin generating lists of relevant generic domain names for your industry that will not infringe on another businesses' trademarks. Once .web launches, consider registering these domain names under the .web gTLD. These could be incredibly useful as landing pages for search engine marketing tactics or as a new revenue stream for your business as others may start knocking on your door looking to take these domain names off your hands for a price.

If you have a .com or .net domain name, keep a close eye on the costs of these as Verisign might be looking to boost their margins on these assets. While #4f81bd;">Verisign cannot increase their price for .com under their current contract with ICANN which ends in 2018, they are able to increase the price of .net by 10% every year until the end of that agreement in 2017.

Cybele Negris (Contact Information Redacted is president, CEO and co-founder of Webnames.ca, Canada's original .CA registrar. She serves on the boards of Small Business BC, Small Business Roundtable of BC, Capilano University and the Capilano University Foundation.

EXHIBIT GS-30

THIS WEEK IN SEO 60

BRANDS, DOMAINS, AND YOUTUBE

THE DEATH OF GENERICS AND THE DOMINANCE OF BRANDS

http://www.seobook.com/brands-beat-generics

lol, get it?!

Aaron Wall, the Cormac McCarthy of SEO (google it), published a great post looking at how generic domains like cooking.com and drugstore.com have failed to thrive, but the big brands behind them (Target and Walgreens,

respectively) are doing just fine.

> *If you invest in zero-sum markets there needs to be some point of differentiation to drive switching. There might be opportunity for a cooking.com or a drugstore.com targeting emerging and frontier markets where brands are under-represented online (much like launching Drugstore.com in the US back in 1999), but it is unlikely pure-play ecommerce sites will be able to win in established markets if they use generically descriptive domains which make building brand awareness and perceived differentiation next to impossible.*

Digging in to how brands succeed/fail in SEO (and business in general) is one of the topics that hasn't yet been beaten to death by the SEO conference-circuit (R.I.P., my interest in reading about content marketing).

I enjoyed this article, definitely give it a read.

THE NEXT BIG DOMAIN EXTENSION

http://domainnamewire.com/2016/07/29/verisign-paid-135-million-web-top-level-domain/

Speaking of domain names…

Verisign, the juggernaut of a company behind .com/.net (a.k.a.the big 3) just paid $135,000,000 to acquire the .web extension.

You've seen these new extensions over the last few years–.ninja, .rent, .guru (side note: still waiting for http://seo.guru to be developed…).

Some of these new extensions are kind of garbage, like .FYI, but .web makes sense to a lot of people, and is poised to be one of the most popular new extensions.

Here's why Verisign paid 3x as much as any other new gTLD for .web:

> ***It views it as competitive to .com*** *– a handful of industry watchers and top level domain name companies have said that .web is the one domain that could unseat .com. While that's open to debate, Verisign might have viewed this as an opportunity to take the greatest threat from the new TLD program off the table.*
>
> ***It views it as competitive of .net*** *– this might sound odd, but keep in mind .net is a 9-figure-a-year business for Verisign. You can argue that .web has a similar connotation to .net. It could be a viable alternative for*

> *people who traditionally buy a .net when the .com is taken.*

So start coming up with those domain names now, so hit the ground running when this domain hits the registrars (no date on that yet).

EVERYTHING YOU EVER WANTED TO KNOW ABOUT ANCHOR TEXT

https://ahrefs.com/blog/anchor-text/

There are a lot of guides out there on anchor text… and this is another one.

J/K — shout out to David McSweeney at Ahrefs, this is a solid guide on the subject. Five day old post, already ranking fifth for "anchor text."

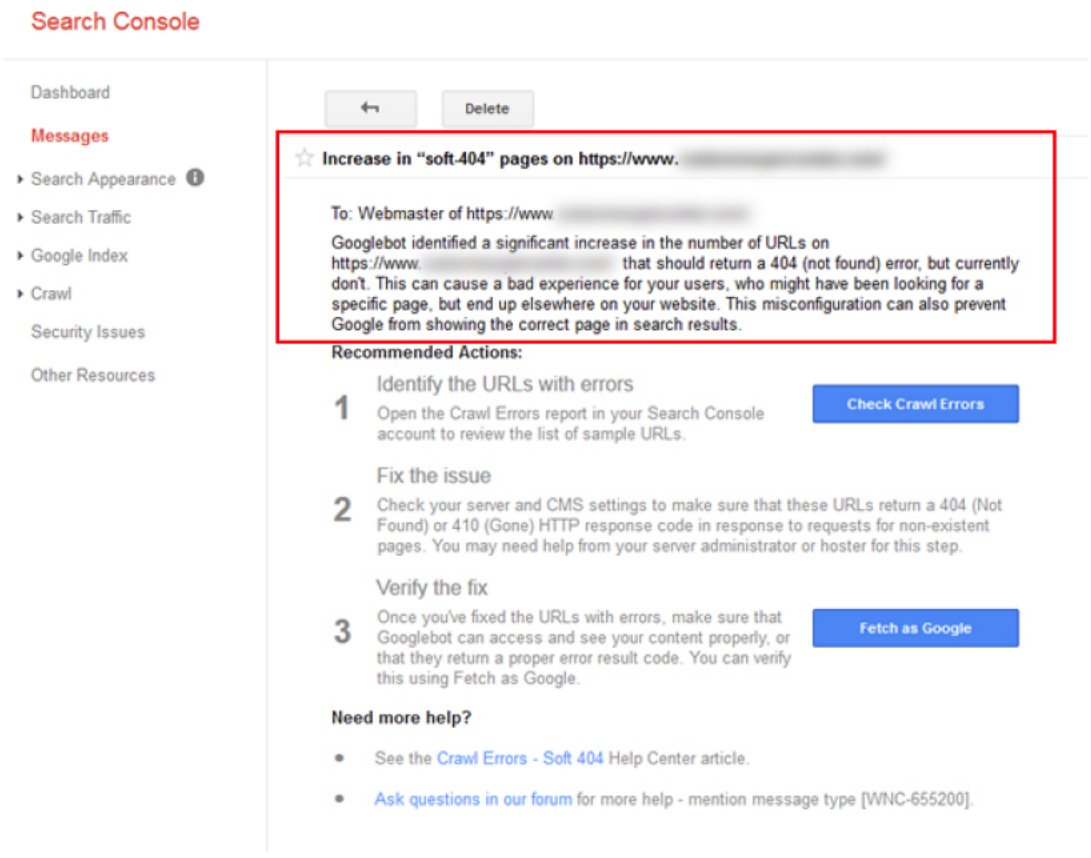
That's the power of authority, baby.

> *The more sites that link with the anchor containing the phrase "dog biscuits" (exact or partial), the more certain Google will be that the linked page should rank for that query.*
>
> *But of course, nothing in SEO is ever simple. At least not any more.*

A really good post that covers all the basics and gets into the real meat. A must-read for an SEO rookie, and a recommended "refresher" for the experienced SEO.

301 REDIRECT TO LESS RELEVANT PAGES SEEN AS SOFT 404S

http://www.gsqi.com/marketing-blog/redirects-less-relevant-pages-soft-404s/



> *And with Google treating those pages as 404s, rankings and traffic began to drop quickly for the older pages that were now being redirected to less relevant pages. So the morale of the story is that you won't be tricking Google anytime soon with 301 redirects to less-relevant pages. This is important to know for any website that will be changing urls, going through a redesign, or CMS migration.*

Basically, if you 301 redirect a page to a not-very-relevant page, instead of passing along that sweet, sweet link juice, Google will treat it as a "soft 404."

YOUTUBE MARKETING AND SEO

http://www.slideshare.net/RyanStewart3/13-tips-to-explode-youtube-channel-growth

We're not super big into Youtube, as we are pretty focused on link building.

But it's not a bad idea to focus down on Youtube if you're in the kind of niche where videos would work well.

As everyone always says "it's the number 2 search engine, might as well rank well on it…"

Ryan Stewart has been impressing me this year by consistently producing good content.

Here's the slide deck where you can learn about getting your Youtube game leveled up.

13 Tips to Explode YouTube Channel Growth from Ryan Stewart, MBA

*Note: In regards to YouTube, we are big fans of both ranking YouTube videos IN Google, and embedding relevant YouTube videos on your website for the pages you want to rank. A video in your pages is one of the best ranking hacks around for onpage seo.

« TWS61: AMP in the SERPs, CDNs, Penguin & Ahrefs

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EXHIBIT GS-31

GS-31

Mail us : Contact Information Redacted

TheHostingFinders

Inside the High Stakes Auction for .Web

July 25, 2016 Hosting News DEREK VAUGHAN

Inside the High Stakes Auction for .Web

Some very deep-pocketed internet giants are facing off on July 27, 2016 for a high stakes game of poker. The pot isn't cash but the rights to sell the coveted .web top level domain (TLD) extension to eager website owners, domain speculators, online entrepreneurs, developers, designers and digital ad agencies. Google, Web.com, United Internet and Afilias are among the seven competing entities who will bid in real time on July 27 via an online auction conducted by the non-profit organization ICANN (Internet Corporation for Assigned Names and Number) to confer the rights to sell .web.

The auction

If you have a ton of time on your hands and want to brush up on the legal details of how the auction process works you can read all about it here. For those who aren't lawyers here's a tl;dr version of how it works.

Step 1 – Become eligible for participating in the auction. The criteria are basically you must have an extra large sum of American dollars (auctions are all conducted in American dollars regardless of the top level domain) and be in good standing with ICANN.

Step 2 – Login to the auction interface on the day of the auction to bid. The larger your deposit is, the higher you can bid. A deposit of $2 million gives you an unlimited bidding potential. The bids are made through a series of ”rounds” where the floor and ceiling of that round are specified. If all bidders meet the ceiling of the round then a new round is started after a short break with the floor being set at the ceiling of the previous round. The rounds continue at higher and higher floors until there is only one bidder remaining. That bidder pays the second place bidder’s highest bid.

Big money bids and big money profits

So exactly what would the rights to sell the .web TLD be worth and what might the winning bid be? Consider that on Jan. 27, 2016 a number of large firms including Amazon, were bidding via an ICANN auction for the rights to the .shop TLD. After 14 rounds of bidding GMO Registry, Inc. won the rights with a winning bid of $41,501,000. Clearly the expectation is that the revenues derived from the .shop domains would well exceed the price paid. Note also that the current champion of newly minted TLDs is .xyz which has registered a total of nearly 6.5 million domains as of July 20, 2016. At a conservative estimate of only a one year registration period and an average price of $10 per domain that works out to around $65 million so far. Clearly the current bidders for .web hope that the number of .web registrations surpass those of .xyz making it potential worth in excess of $65 million.

So what could a winning bid look like? Using .shop as a proxy – it is certainly possible that .web could fetch a higher bid that .shop ($41,501,000) – but how much higher? Only the bidders know what their upper limits are. It is clear that the bidders all have substantial funds to bring to bear on the auction. Here are the recent market caps of three of the bidders who are publicly traded:

Alphabet Inc Class A (Google) – $514 Billion
United Internet AG – $8 Billion
Web.com – $950 Million

Would Google with its massive war chest of cash even blink at paying $50 million or more? Not likely. In fact Google paid over $18 million just to submit a list of TLDs that it wanted to pursue before ever arriving at the final sale price.

Could .Web become the new .Com

Is it likely that .web will be a standout among new TLDs? Here are a few points that may indicate .web is poised to gain traction relative to other recently introduced TLDs.

1. We're already used to using the term 'web' for internet-related activities. We refer to online properties as 'websites' or 'web pages' and the talent who create them are 'web designers' and 'web developers'. We use 'web servers' and 'web browsers' and even 'web apps'. The common references make a transition to a .web domain a natural activity for a mass online and mobile audience.

2. .Web is short and memorable. With the explosion of new top level domains, it's literally hard to keep track of them all or their proper use. A short generic term like .web could cut through all the clutter. It's just simpler to type: yourcomany.web than say: yourcompany.company or yourcompany.solutions. It's certainly less prone to confusion as well. Was it yourcompany.solution or yourcompany.solutions?

3. Large companies set standards. Imagine if Google won the auction and decided that every time someone searched for anything related to 'domain names' on Google – they would suggest trying the .web TLD as an alternative to .com. Standard set.

4. Dictionary names and short phrases are still available on .web. This is true of all new TLDs so it's not unique to .web. However, simply offering a short, memorable and generic alternative to .com could be enough if the momentum gets behind this new domain.

Stuart Melling is co-founder of UK domain name firm 34SP.com with decades of domain name experience and he offered up his expert opinion on whether .web could be the next .com.

"There's such a huge array of new domains available to buyers now making it very difficult for them to really understand the selection on offer. Likewise, I've yet to see any registrar (ourselves included) deliver a domain search tool that really nails domain discovery," he says. "It boils down to marketing might at this point. The registries that will win are most likely going to be those that have the heftiest budgets to market and promote their domains. I personally see .com being the de facto domain for any new website for some time to come. Right now, the new TLDs seem to represent a fallback, a secondary area to secure a relevant domain if the .com space isn't viable. I'd imagine it would take years to unseat this kind of approach; but then this is the web, and making predictions is really a fools game."

What other domain experts think

Mark Medina, Director of Product, Domain Names with Dreamhost has been selling domain names to web businesses for over 15 years. Medina has some strong predictions for .web: "The winning bid for .shop was $41.5M, so I think the winning bid will definitely be north of $50M. Because there are multiple bidders, one of them being the mighty Google, I can foresee some pretty aggressive bids, which I think will take the final winning bid into the $80M – $100M range."

"Everyone still wants a .com. We've done user testing on people searching for domains, where users speak their thoughts during the test, and almost all of them say 'Where's the .com?' With that said, I can't foresee .web becoming the new .com, but I think it will be one of the more popular new TLDs that could overtake .net in a few years," Medina says. "The .net TLD has been losing its popularity, and I think TLDs like a .web or a .xyz could become more popular than .net in a few years time. .Com will remain number 1 but number 2 is up for the taking."

Chris Sheridan is currently Head of Channel Sales at Weebly.com and has also held senior positions at domain registrars eNom and VeriSign.

Sheridan shares his take: "When new TLDs first launched, the larger registrars had to dedicate themselves to just focusing on the integration of hundreds of new TLDs per quarter. I look at 2014 as a year basically focused on integrating as many of the new TLDs as possible so that 2015 and 2016 could be more focused on marketing and sales. What I see today is more focus by the larger registrars on marketing the new TLDs and raising their visibility to their existing customer base. Since new TLDs are typically priced higher than a '.com' they give the advantage to the registrars of driving higher revenue sales and allowing them to capture more margin on each individual domain name sale as well."

He continues: "I think the .web TLD has big potential. For starters, there is no consumer education hurdle here. I think people will just get it…so that is a major advantage. I think we will have to see how the future .web registry addresses two key areas: pricing and marketing."

"In regards to pricing, the wholesale cost to registrars will be key to adoption by larger registrars and its inclusion in key hosting bundles managed by the larger registrars (which impacts distribution). In regards to marketing, there will need to be a big effort to raise awareness of .web globally. This will require the help of the larger registrars (marketing programs) but will also re-

quire the .web registry to be involved as well," Sheridan says. "The manner in which the future .web registry address pricing and marketing could potentially dictate its success. The future delegation of .web to a registry provider represents the final batch of remaining new TLDs to go live. I think it is great to have a big TLD like .web being delegated toward the end of this long new TLD rollout. It generates more media attention to the overall program and re-ignites excitement around domains. So that is good thing on all levels."

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What Really Matters in Auction Design

Paul Klemperer

Auctions have become enormously popular in recent years. Governments are now especially keen, using auctions to sell mobile-phone licenses, operate decentralized electricity markets, privatize companies and for many other purposes. The growth of e-commerce has led to many business-to-business auctions for goods whose trade was previously negotiated bilaterally.

Economists are proud of their role in pushing for auctions; for example, Coase (1959) was among the first to advocate auctioning the radio spectrum. But many auctions—including some designed with the help of leading academic economists—have worked very badly.

For example, six European countries auctioned off spectrum licenses for "third-generation" mobile phones in 2000. In Germany and the United Kingdom, the spectrum sold for over 600 euros per person ($80 billion in all, or over 2 percent of GDP). But in Austria, the Netherlands, Italy and Switzerland, the revenues were just 100, 170, 240 and 20 euros per person, respectively. To be sure, investors became more skeptical about the underlying value of the spectrum during 2000 (and they are even more skeptical today). But this is just a fraction of the story. The Netherlands auction was sandwiched between the U.K. and German auctions, and analysts and government officials predicted revenues in excess of 400 euros per person from the Italian and Swiss auctions just a few days before they began (Michelson, 2000; Roberts, 2000; Total Telecom, 2000; Klemperer, 2002). These other auctions were fiascoes primarily because they were poorly designed.

So what makes a successful auction?

What really matters in auction design are the same issues that any industry

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regulator would recognize as key concerns: discouraging collusive, entry-deterring and predatory behavior. In short, good auction design is mostly good elementary economics.

By contrast, most of the extensive auction literature (as summarized in, for example, Klemperer, 1999a, 2000a) is of second-order importance for *practical* auction design. The auction literature largely focuses on a fixed number of bidders who bid noncooperatively, and it emphasizes issues such as the effects of risk aversion, correlation of information, budget constraints and complementarities. Auction theorists have made important progress on these topics from which other economic theory has benefited, and auction theory has also been fruitfully applied in political economy, finance, law and economics, labor economics and industrial organization, often in contexts not usually though of as auctions (Klemperer, 2001a). But most of this literature is of much less use for actually designing auctions.

This paper will list and give examples of some critical pitfalls in auction design and discuss what to do about them. We show that ascending and uniform-price auctions are both very vulnerable to collusion and very likely to deter entry into an auction. We consider including a final sealed-bid stage into an otherwise-ascending auction to create an "Anglo-Dutch" auction, and we emphasize the need for stronger antitrust policy in auction markets.

Collusion

A first major set of concerns for practical auction design involves the risk that participants may explicitly or tacitly collude to avoid bidding up prices. Consider a multiunit (simultaneous) *ascending* auction. (This is just like the standard auction used, for example, to sell a painting in Sotheby's or Christies—the price starts low, and competing bidders raise the price until no one is prepared to bid any higher, and the final bidder then wins the prize at the final price bid. However, in this case, several objects are sold at the same time, with the price rising on each of them independently, and none of the objects is finally sold until no one wishes to bid again on any of the objects.) In such an auction, bidders can use the early stages, when prices are still low, to signal who should win which objects and then tacitly agree to stop pushing up prices.

For example, in 1999, Germany sold ten blocks of spectrum by a simultaneous ascending auction with the rule that any new bid on a block had to exceed the previous high bid by at least 10 percent. Mannesman's first bids were 18.18 million deutschmarks per megahertz on blocks 1–5 and 20 million DM per MHz on blocks 6–10; the only other credible bidder—T-Mobil—bid even less in the first round. One of T-Mobil's managers then said (Stuewe, 1999, p. 13): "There were no agreements with Mannesman. But [T-Mobil] interpreted Mannesman's first bid as an offer." The point is that 18.18 plus a 10 percent raise equals approximately 20. It seems T-Mobil understood that if it bid 20 million DM per MHz on blocks 1–5,

but did not bid again on blocks 6–10, the two companies would then live and let live with neither company challenging the other on the other's half. Exactly that happened. So the auction closed after just two rounds with each of the bidders acquiring half the blocks for the same low price (Jehiel and Moldovanu, 2001; Grimm, Riedel and Wolfstetter, 2001).

Ascending auctions can also facilitate collusion by offering a mechanism for punishing rivals. The threat of punishment may be implicit; for example, it was clear to T-Mobil that Mannesman would retaliate with high bids on blocks 1–5 if T-Mobil continued bidding on blocks 6–10. But an ascending auction can also allow more explicit options for punishment.

In a multilicense U.S. spectrum auction in 1996–1997, U.S. West was competing vigorously with McLeod for lot number 378: a license in Rochester, Minnesota. Although most bids in the auction had been in exact thousands of dollars, U.S. West bid $313,378 and $62,378 for two licenses in Iowa in which it had earlier shown no interest, overbidding McLeod, who had seemed to be the uncontested high bidder for these licenses. McLeod got the point that it was being punished for competing in Rochester and dropped out of that market. Since McLeod made subsequent higher bids on the Iowa licenses, the "punishment" bids cost U.S. West nothing (Cramton and Schwartz, 1999).

A related phenomenon can arise in one special kind of sealed-bid auction, namely a *uniform-price* auction in which each bidder submits a sealed bid stating what price it would pay for different quantities of a homogenous good, like electricity (that is, it submits a demand function), and then the good is sold at the single price determined by the lowest winning bid. In this format, bidders can submit bids that ensure that any deviation from a (tacit or explicit) collusive agreement is severely punished: each bidder bids very high prices for smaller quantities than its collusively agreed share. Then, if any bidder attempts to obtain more than its agreed share (leaving other firms with less than their agreed shares), all bidders will have to pay these very high prices. However, if everyone sticks to their agreed shares, then these very high prices will never need to be paid. As a result, deviation from the collusive agreement is unprofitable.[1]

The electricity regulator in the United Kingdom believes the market in which distribution companies purchase electricity from generating companies has fallen prey to exactly this kind of "implicit collusion" (Office of Gas and Electricity Markets, 1999, pp. 173–174). "Far from being the success story trumpeted around the world, the story of the U.K. generation market and the development of competition has been something of a disaster," reported *Power U.K.* (1999; see also

[1] Since, with many units, the lowest winning bid in a uniform-price auction is typically not importantly different from the highest losing bid, this auction is analogous to an ascending auction (in which every winner pays the runner-up's willingness-to-pay). The "threats" that support collusion in a uniform-price auction are likewise analogous to the implicit threats supporting collusion in an ascending auction. Collusion in a uniform-price auction is harder if supply is uncertain, since this reduces the number of points on the bid schedule that are inframarginal and can be used as threats (Klemperer and Meyer, 1989; Back and Zender, 1993, 1999).

von der Fehr and Harbord, 1998; Newbery, 1998; Wolfram, 1998, 1999). In addition, a frequently repeated auction market such as that for electricity is particularly vulnerable to collusion, because the repeated interaction among bidders expands the set of signaling and punishment strategies available to them and allows them to learn to cooperate (Klemperer, 2002).

Much of the kind of behavior discussed so far is hard to challenge legally. Indeed, trying to outlaw it all would require cumbersome rules that would restrict bidders' flexibility and might generate inefficiencies, without being fully effective. It would be much better to solve these problems with better auction designs.

Entry Deterrence and Predation

The second major area of concern of practical auction design is to attract bidders, since an auction with too few bidders risks being unprofitable for the auctioneer (Bulow and Klemperer, 1996) and potentially inefficient. Ascending auctions are often particularly poor in this respect, since they can allow some bidders to deter the entry, or depress the bidding, of rivals.

In an ascending auction, there is a strong presumption that the firm that values winning the most will be the eventual winner, because even if it is outbid at an early stage, it can eventually top any opposition. As a result, other firms have little incentive to enter the bidding and may not do so if they have even modest costs of bidding.

Consider, for example, Glaxo's 1995 takeover of the Wellcome drugs company. After Glaxo's first bid of 9 billion pounds, Zeneca expressed willingness to offer about 10 billion pounds if it could be sure of winning, while Roche considered an offer of 11 billion pounds. But certain synergies made Wellcome worth a little more to Glaxo than to the other firms, and the costs of bidding were tens of millions of pounds. Eventually, neither Roche nor Zeneca actually entered the bidding, and Wellcome was sold at the original bid of 9 billion pounds, literally a billion or two less than its shareholders might have received. Wellcome's own chief executive admitted "there was money left on the table" (Wighton, 1995a, b).

While ascending auctions are particularly vulnerable to lack of entry, other auction forms can result in similar problems if the costs of entry and the asymmetries between bidders are too large.

The 1991 U.K. sale of television franchises by a sealed-bid auction is a dramatic example. While the regions in the South and Southeast, Southwest, East, Wales and West, Northeast and Yorkshire all sold in the range of 9.36 to 15.88 pounds per head of population, the only—and therefore winning—bid for the Midlands region was made by the incumbent firm and was just one-twentieth of one penny (!) per head of population. Much the same happened in Scotland, where the only bidder for the Central region generously bid one-seventh of one penny per capita. What had happened was that bidders were required to provide very detailed

region-specific programming plans. In each of these two regions, the only bidder figured out that no one else had developed such a plan.[2]

Another issue that can depress bidding in some ascending auctions is the "winner's curse." This problem applies when bidders have the same, or close to the same, actual value for a prize, but they have different information about that actual value (what auction theorists call the "common values" case). The winner's curse reflects the danger that the winner of an auction is likely to be the party who has most greatly overestimated the value of the prize. Knowing about the winner's curse will cause everyone to bid cautiously. But weaker firms must be especially cautious, since they must recognize that they are only likely to win when they have overestimated the value by even more than usual. Therefore, an advantaged firm can be less cautious, since beating very cautious opponents need not imply one has overestimated the prize's value. Because the winner's curse affects weak firms much more than strong ones, and because the effect is self-reinforcing, the advantaged bidder wins most of the time. And because its rivals bid extremely cautiously, it also generally pays a low price when it does win (Klemperer, 1998).

The bidding on the Los Angeles license in the 1995 U.S. auction for mobile-phone broadband licenses illustrates this problem. While the license's value was hard to estimate, it was probably worth similar amounts to several bidders. But Pacific Telephone, which already operated the local fixed-line telephone business in California, had distinct advantages from its database on potential local customers, its well-known brand-name and its familiarity with doing business in California. The auction was an ascending one. The result was that the bidding stopped at a very low price. In the end, the Los Angeles license yielded only $26 per capita. In Chicago, by contrast, the main local fixed-line provider was ineligible to compete, and it was not obvious who would win, so the auction yielded $31 per capita even though Chicago was thought less valuable than Los Angeles because of its lower household incomes, lower expected population growth and more dispersed population (Klemperer, 1998; Bulow and Klemperer, 2002). For formal econometric evidence for the FCC auctions more broadly, see Klemperer and Pagnozzi (2002).

Of course, the "winner's curse" problem exacerbates the problem that weaker bidders may not bother to participate in an ascending auction. GTE and Bell Atlantic made deals that made them ineligible to bid for the Los Angeles license, and MCI failed to enter this auction at all. Similarly, takeover battles are essentially ascending auctions, and there is empirical evidence that a firm that makes a takeover bid has a lower risk of facing a rival bidder if the firm has a larger shareholding or "toehold" in the target company (Betton and Eckbo, 2000).

Because outcomes in an ascending auction can be dramatically influenced by a seemingly modest advantage, developing such an advantage can be an effective predatory strategy. An apparent example was the 1999 attempt by BSkyB (Rupert Murdoch's satellite television company) to acquire Manchester United (England's

[2] While I have advised the U.K. government on several auctions, I have never had anything to do with television licenses!

most successful soccer club). The problem was the advantage this would give BSkyB in the auction of football television rights. Since Manchester United receives 7 percent of the Premier League's television revenues, BSkyB would have received 7 percent of the price of the league's broadcasting rights, whoever won them. So BSkyB would have had an incentive to bid more aggressively in an ascending auction to push up the price of the rights, and knowing this, other potential bidders would have faced a worse "winner's curse" and backed off. BSkyB might have ended up with a lock over the television rights, with damaging effects on the television market more generally. Largely for this reason, the U.K. government blocked the acquisition.[3]

A strong bidder also has an incentive to create a reputation for aggressiveness that reinforces its advantage. For example, when Glaxo was bidding for Wellcome, it made it clear that it "would almost certainly top a rival bid" (Wighton, 1995b). Similarly, before bidding for the California phone license, Pacific Telephone announced in the *Wall Street Journal* that "if somebody takes California away from us, they'll never make any money" (Cauley and Carnevale, 1994, p. A4). Pacific Telephone also hired one of the world's most prominent auction theorists to give seminars to the rest of the industry to explain the winner's curse argument that justifies this statement, and it reinforced the point in full-page ads that ran in the newspapers of the cities where its major competitors were headquartered (Koselka, 1995, p. 63). It also made organizational changes that demonstrated its commitment to winning the Los Angeles license.

Predation may be particularly easy in repeated ascending auctions, such as in a series of spectrum auctions. A bidder who buys assets that are complementary to assets for sale in a future auction or who simply bids very aggressively in early auctions can develop a reputation for aggressiveness (Bikhchandani, 1988). Potential rivals in future auctions will be less willing to participate and will bid less aggressively if they do participate (Klemperer, 2002).

Finally, because an ascending auction often effectively blocks the entry of "weaker" bidders, it encourages "stronger" bidders to bid jointly or to collude; after all, they know that no one else can enter the auction to steal the collusive rents they create. In the disastrous November 2000 Swiss sale of four third-generation mobile-phone licenses, there was considerable initial interest from potential bidders. But weaker bidders were put off by the auction form—at least one company hired bidding consultants and then gave up after learning that the ascending-bidding rules would give the company very little chance against stronger rivals. Moreover, the government permitted last-minute joint-bidding agreements—essentially officially sanctioned collusion. In the week before the auction, the field shrank from nine bidders to just four bidders for the four licenses! Since no bidder was allowed

[3] Although the term "toehold effect," coined by Bulow, Huang and Klemperer (1999) and Klemperer (1998) in the related context of takeover battles (see above), entered the popular press, and these papers were cited by the U.K. Monopolies and Mergers Commission (1999) report, which effectively decided the issue, neither I nor my coauthors had any involvement in this case.

to take more than one license, the sale price was determined by the reserve price, which was just one-thirtieth of the U.K. and German per capita revenues and one-fiftieth of what the Swiss had once hoped for!

Other Pitfalls

Reserve Prices

Many of the disasters above were greatly aggravated by failure to set a proper reserve price (the minimum amount the winner is required to pay). Take the previous example. It was ridiculous for the Swiss government to set its reserve at just one-thirtieth of the per capita revenue raised by the German and U.K. governments for similar properties. Since the government's own spokesman predicted just five days prior to the auction that twenty times the reserve price would be raised, what was the government playing at?

Inadequate reserve prices also increase the incentives for predation and may encourage collusion that would not otherwise have been in all bidders' interests. A stronger bidder in an ascending auction has a choice between either tacitly colluding to end the auction quickly at a low price or forcing the price up to drive out weaker bidders. The lower the reserve price at which the auction can be concluded, the more attractive is the first option. This factor may have been an important contributor to several of the fiascoes we have discussed.

Political Problems

Serious reserve prices are often opposed not only by industry groups, but also by government officials for whom a very embarrassing outcome is that the reserve price is not met, the object is not sold, and the auction is seen as a "failure."

Similarly, standard (first-price) sealed-bid auctions—in which the bidders simultaneously make "best and final" offers, and the winner pays the price he bid—can sometimes be very embarrassing for bidders, as BSCH (Spain's biggest bank) found out when Brazil privatized the Sao Paulo state bank Banespa. When the bids were opened, BSCH's managers were horrified to learn that their bid of over 7 billion reals ($3.6 billion) was more than three times the runner-up's bid and that they were therefore paying 5 billion reals ($2.5 billion) more than was needed to win. In other auctions, meanwhile, losers who have just narrowly underbid the winners have found it equally hard to explain themselves to their bosses and shareholders. So firms, or at least their managers, can oppose first-price auctions.

On the other hand, a *second-price* sealed-bid auction—in which the winner pays the runner-up's bid—can be embarrassing for the auctioneer if the winner's actual bid is revealed to be far more than the runner-up's, even if the auction design was both efficient and maximized expected revenue. McMillan (1994) reports a second-price New Zealand auction in which the winner bid NZ $7 million but paid the runner-up's bid of NZ $5,000. New Zealand should have set a minimum reserve price that the winner had to pay, but even if that had been politically possible, the

winner would probably have bid more than it had to pay, so this might have been an economically but not politically sensible auction.

Loopholes

In some cases, the auction rules may leave gaping loopholes for behavior to game the auction. In 2000, Turkey auctioned two telecom licenses sequentially, with an additional twist that set the reserve price for the second license equal to the selling price of the first. One firm then bid far more for the first license than it could possibly be worth if the firm had to compete in the telecom market with a rival holding the second license. But the firm had rightly figured that no rival would be willing to bid that high for the second license, which therefore remained unsold, leaving the firm without a rival operating the second license!

As another example, McMillan (1994) reports an Australian auction for satellite-television licenses in which two bidders each made large numbers of different sealed bids on the same objects and then, after considerable delays, defaulted on those bids they did not like after the fact—since the government had neglected to impose any penalties for default. More recently, the U.S. spectrum auctions have been plagued by bidders "winning" licenses and subsequently defaulting on their commitments, often after long delays. (Spectrum auctions in India also recently fell into the same trap.) If default costs are small, then bidders are bidding for *options* on prizes rather than the prizes themselves. Furthermore, if smaller, underfinanced firms can avoid commitments through bankruptcy, then an auction actually favors these bidders over better-financed competitors who cannot default.

Credibility of the Rules

It may not be credible for the auctioneer to punish a bidder violating the auction rules when just one bidder needs to be eliminated to end an auction, because excluding the offending bidder would end the auction immediately, and it might be hard to impose fines large enough to have a serious deterrent effect. Fines of hundreds of millions or even billions of dollars might have been required to deter improper behavior in some of the European third-generation mobile-phone license auctions. In the Netherlands sale, for example, six bidders competed for five licenses in an ascending auction in which bidders were permitted to win just one license each. One bidder, Telfort, sent a letter to another, Versatel, threatening legal action for damages if Versatel continued to bid! Telfort claimed that Versatel "believes that its bids will always be surpassed by [others' . . . so it] must be that Versatel is attempting to either raise its competitors' costs or to get access to their . . . networks." Many observers felt Telfort's threats against Versatel were outrageous. However, the government took no action—not even an investigation. As a result, Versatel quit the auction, and the sale raised less than 30 percent of what the Dutch government had forecast based on the results of the United Kingdom's similar auction just three months earlier.

Ascending auctions are particularly vulnerable to rule breaking by the bidders,

since they necessarily pass through a stage where there is just one or a few excess bidders, and the ascending structure allows a cheat time to assess the success of its strategy (Klemperer, 2001b, 2002). Sealed-bid auctions, by contrast, may be more vulnerable to rule changing by the auctioneer. For example, excuses for not accepting a winning bid can often be found if losing bidders are willing to bid higher. The famous RJR-Nabisco sale went through several supposedly final sealed-bid auctions (Burrough and Helyar, 1990). But if, after a sealed-bid auction, the auctioneer can reopen the auction to higher offers, the auction is really an ascending-bid auction and needs to be recognized as such. In fact, genuine sealed-bid auctions may be difficult to run in takeover battles, especially since a director who turns down a higher bid for his company after running a "sealed-bid auction" may be vulnerable to shareholder lawsuits.

Sealed-bid auctions can also be especially hard to commit to if the auctioneer has any association with a bidder, as, for example, would have been the case in the U.K. football television rights auction discussed earlier if BSkyB (a bidder) had taken over Manchester United (an influential member of the football league, which was the auctioneer).

Committing to future behavior may be a particular problem for governments. For example, it may be difficult to auction a license if the regulatory regime may change, but binding future governments (or even the current government) to a particular regulatory regime may prove difficult.

The credibility of reserve prices is of special importance. If a reserve price is not a genuine commitment not to sell an object if it does not reach its reserve, then it has no meaning, and bidders will treat it as such. For example, returning to the Turkish tale of woe, the government is now considering new arrangements to sell the second license, but at what cost to the credibility of its future auctions?[4]

Market Structure

In some auctions, for example, of mobile-phone licenses, the structure of the industry that will be created cannot be ignored by the auction designer. It is tempting simply to "let the market decide" the industry structure by auctioning many small packages of spectrum, which individual firms can aggregate into larger licenses. But the outcome of an auction is driven by bidders' profits, not by the welfare of consumers or society as a whole.

The most obvious possible distortion is that since firms' joint profits in a market are generally greater if fewer competitors are in the market, it is worth more to any group of firms to prevent entry of an additional firm than the additional firm is willing to pay to enter. As a result, too few firms may win a share of spectrum, and these winners may each win too much, in just the same way as a "hands-off" policy

[4] Reauctioning with a lower reserve price after a delay may sometimes be sensible, to allow further entry if there are high costs of entering the auction (Burguet and Sakovics, 1996; McAfee and McMillan, 1988), but in this case the auctioneer should make clear in advance what will happen if the reserve is not met.

to merger control will tend to create an overly concentrated industry. The Turkish fiasco discussed earlier was a spectacular example of how an auction can be biased toward generating a monopoly.[5]

But this outcome is not the only socially suboptimal possibility. A firm with a large demand may prefer to reduce its demand to end the auction at a low price, rather than raise the price to drive out its rivals, even when the latter course would be socially more efficient (Ausubel and Cramton, 1998). There can also be too many winners if firms collude to divide the spoils at a low price. In the Austrian third-generation mobile spectrum sale, for example, six firms competed for twelve identical lots in an ascending auction and, not surprisingly, seemed to agree to divide the market so each firm won two lots each at not much more than the very low reserve price. Perhaps six winners was the efficient outcome. But we certainly cannot tell from the behavior in the auction. It was rumored that the bidding lasted only long enough to create some public perception of genuine competition and to reduce the risk of the government changing the rules.

Thus, it may sometimes be wiser to predetermine the number of winners by auctioning off fewer larger licenses, but limiting bidders to one license apiece, rather than to auction many licenses and to allow bidders to buy as many as they wish.

When is Auction Design Less Important?

The fact that collusion, entry deterrence and, more generally, buyer market power is the key to auction problems suggests that auction design may not matter very much when there is a large number of potential bidders for whom entry to the auction is easy. For example, though much ink has been spilt on the subject of government security sales, auction design may not matter much for either price or efficiency in this case. Indeed, the U.S. Treasury's recent experiments with different kinds of auctions yielded inconclusive results (Simon, 1994; Malvey, Archibald and Flynn, 1996; Nyborg and Sundaresan, 1996; Reinhart and Belzar, 1996; Ausubel and Cramton, 1998), and the broader empirical literature is also inconclusive. Of course, even small differences in auction performance can be significant when such large amounts of money are involved, and collusion has been an issue in some government security sales, so further research is still warranted.[6]

Solutions

Making the Ascending Auction More Robust

Much of our discussion has emphasized the vulnerability of ascending auctions to collusion and predatory behavior. However, ascending auctions have several

[5] Similarly, the recent July 2001 Greek second-generation spectrum auction led to a more concentrated telecom market than seems likely to be socially efficient.

[6] These views are personal. I have advised U.K. government agencies on the related issue of the sale of gold. See Klemperer (1999b) for more discussion.

virtues, as well. An ascending auction is particularly likely to allocate the prizes to the bidders who value them the most, since a bidder with a higher value always has the opportunity to rebid to top a lower-value bidder who may initially have bid more aggressively.[7] Moreover, if there are complementarities between the objects for sale, a multiunit ascending auction makes it more likely that bidders will win efficient bundles than in a pure sealed-bid auction in which they can learn nothing about their opponents' intentions. Allowing bidders to learn about others' valuations during the auction can also make the bidders more comfortable with their own assessments and less cautious, and it often raises the auctioneer's revenues if information is "affiliated" in the sense of Milgrom and Weber (1982).

A number of methods to make the ascending auction more robust are clear enough. For example, bidders can be forced to bid "round" numbers, the exact increments can be prespecified, and bids can be made anonymous. These steps make it harder to use bids to signal other buyers. Lots can be aggregated into larger packages to make it harder for bidders to divide the spoils, and keeping secret the number of bidders remaining in the auction also makes collusion harder (Cramton and Schwartz, 2000; Salant, 2000). Ausubel's (1998) suggested modification of the ascending auction mitigates the incentive of bidders to reduce their demands to end the auction quickly at a low price. Sometimes it is possible to pay bidders to enter an auction; for example, "white knights" can be offered options to enter a takeover battle against an advantaged bidder.

But while these measures can be useful, they do not eliminate the risks of collusion or of too few bidders. An alternative is to choose a different type of auction.

Using Sealed-Bid Auctions

In a standard sealed-bid auction (or "first-price" sealed-bid auction), each bidder simultaneously makes a single "best and final" offer. As a result, firms are unable to retaliate against bidders who fail to cooperate with them, so collusion is much harder than in an ascending auction. Tacit collusion is particularly difficult since firms are unable to use the bidding to signal. True, both signaling and retaliation are possible in a series of sealed-bid auctions, but collusion is still usually harder than in a series of ascending auctions.

From the perspective of encouraging more entry, the merit of a sealed-bid auction is that the outcome is much less certain than in an ascending auction. An

[7] This applies in many "common values" and "private values" settings (Maskin, 1992), but is not necessarily the same as maximizing efficiency. When bidders are firms, it ignores consumer welfare (which is likely to favor a more widely dispersed ownership than firms would choose), and, of course, it ignores government revenue. We assume governments (as well as other auctioneers) care about revenue because of the substantial deadweight losses (perhaps 33 cents per dollar raised) of raising government funds through alternative methods (Ballard, Shoven and Whalley, 1985). Resale is not a perfect substitute for an efficient initial allocation, because even costless resale cannot usually ensure an efficient outcome in the presence of incomplete information (Myerson and Satterthwaite, 1983; Cramton, Gibbons and Klemperer, 1987).

advantaged bidder will probably win a sealed-bid auction, but it must make its single final offer in the face of uncertainty about its rivals' bids, and because it wants to get a bargain, its sealed-bid will not be the maximum it could be pushed to in an ascending auction. So "weaker" bidders have at least some chance of victory, even when they would surely lose an ascending auction (Vickrey, 1961, appendix III). It follows that potential entrants are likely to be more willing to enter a sealed-bid auction than an ascending auction.

A sealed-bid auction might even encourage bidders who enter only to resell, further increasing the competitiveness of the auction. Such bidders seem less likely to enter an ascending auction, since it is generally more difficult to profit from reselling to firms one has beaten in an ascending auction.

Because sealed-bid auctions are more attractive to entrants, they may also discourage consortia from forming. If the strong firms form a consortium, they may simply attract other firms into the bidding in the hope of beating the consortium. So strong firms are more likely to bid independently in a sealed-bid auction, making this auction much more competitive.

Consistent with all this, there is some evidence from timber sales that sealed-bid auctions attract more bidders than ascending auctions do and that this makes sealed-bid auctions considerably more profitable for the seller, and this seems to be believed in this industry (Mead and Schneipp, 1989; Rothkopf and Engelbrecht-Wiggans, 1993), even though conditional on the number of bidders, sealed-bid auctions seem only slightly more profitable than ascending auctions (Hansen, 1986).

Furthermore, in the "common values" case that bidders have similar actual values for a prize, the "winner's curse" problem for a weaker bidder is far less severe in a sealed-bid auction. Winning an ascending auction means the weaker bidder is paying a price that the stronger rival is unwilling to match—which should make the weaker bidder very nervous. But the weaker player has a chance of winning a sealed-bid auction at a price the stronger rival *would* be willing to match, but didn't. Since beating the stronger player isn't necessarily bad news in a sealed-bid auction, the weaker player can bid more aggressively. So auction prices will be higher, even for a given number of bidders (Klemperer, 1998; Bulow, Huang and Klemperer, 1999).[8]

But while sealed-bid auctions have many advantages, they are not without flaws. Mainly, by giving some chance of victory to weaker bidders, sealed-bid auctions are less likely than ascending auctions to lead to efficient outcomes. Moreover, in standard sealed-bid auctions in which winners pay their own bids, bidders need to have good information about the distribution of their rivals' values to bid intelligently (Persico, 2000). By contrast, in an ascending or uniform-price auction the

[8] In Milgrom and Weber's (1982) model, sealed-bid auctions are less profitable than ascending auctions if signals are "affiliated." But they assume symmetric bidders, and the effect does not seem large in practice (Riley and Li, 1997). Sealed-bid auctions are generally more profitable if bidders are risk averse or budget constrained (Klemperer, 2000a).

best strategy of a bidder who knows its own value is just to bid up to that value, and winners' payments are determined by the bids of nonwinners. So "pay-your-bid" sealed-bid auctions may discourage potential bidders who have only small amounts to trade and for whom the costs of obtaining market information might not be worth paying. For example, in March 2001, the U.K. electricity regulator replaced the problematic uniform-price auction we described earlier by an exchange market followed by a "pay-your-bid" sealed-bid auction, which makes collusion harder, because bids can no longer be used as costless threats. But a major concern is that the new trading arrangements may deter potential entrants from investing the sunk costs necessary to enter the electricity market.[9]

However, the entry problem in many-unit auctions is much less serious if small bidders can buy from larger intermediaries who can aggregate smaller bidders' demands and bid in their place, as, for example, occurs in auctions of Treasury bills. And the entry problem is also alleviated if smaller bidders are permitted to make "noncompetitive bids," that is, to state demands for fixed quantities for which they pay the average winning price, as is also the case in some Treasury bill auctions.

The Anglo-Dutch Auction

A solution to the dilemma of choosing between the ascending (often called "English") and sealed-bid (or "Dutch") forms is to combine the two into a hybrid, the "Anglo-Dutch," which often captures the best features of both and was first described and proposed in Klemperer (1998).

For simplicity, assume a single object is to be auctioned. In an Anglo-Dutch auction, the auctioneer begins by running an ascending auction in which price is raised continuously until all but two bidders have dropped out. The two remaining bidders are then each required to make a final sealed-bid offer that is not lower than the current asking price, and the winner pays the winning bid. The process is much like the way houses are often sold, although, unlike in many house sales, the procedure the auctioneer will follow in an Anglo-Dutch auction is clearly specified in advance.

Another auction with similar features—and probably similar motivations to the Anglo-Dutch—is W.R. Hambrecht's *OpenBook* auction for corporate bonds. The early bidding is public and ascending, but bidders can make final sealed bids in the last hour. Although all bidders are permitted to make final bids, higher bidders in the first stages are given an advantage that is evidently large enough to induce serious bidding early on (Hall, 2001, p. 71).

The process also has some similarity to auctions on eBay (by far the world's most successful e-commerce auctioneer), which are ascending auctions, but with a fixed ending time so that many bidders often bid only in the last few seconds in essentially sealed-bid style. eBay attracts far more bidders than its rival, Yahoo, which runs a

[9] Also, the new arrangements may not fully resolve the collusion problem anyway since the market is so frequently repeated (Klemperer, 1999b).

standard ascending auction with a traditional "going, going, gone" procedure that does not close the auction until there have been no bids for 10 minutes.

The main value of the Anglo-Dutch procedure arises when one bidder (for example, the incumbent operator of a license that is to be reauctioned) is thought to be stronger than potential rivals. Potential rivals might be unwilling to enter a pure ascending-bid auction against the strong bidder, who would be perceived to be a sure winner. But the sealed bid at the final stage induces some uncertainty about which of the two finalists will win, and entrants are attracted by the knowledge that they have a chance to make it to this final stage. So the price may easily be higher even by the end of the first ascending stage of the Anglo-Dutch auction than if a pure ascending auction were used.

The Anglo-Dutch should capture the other advantages of the sealed-bid auction discussed in the previous section. Collusion will be discouraged because the final sealed-bid round allows firms to renege on any deals without fear of retaliation and because the Anglo-Dutch auction eliminates the stage of the ascending auction when just one excess bidder remains, at which point the rules against collusion and predation may not be credible.

Consortium formation will also be discouraged. Imagine there are two strong bidders for an item. In an ascending auction they are unlikely to be challenged if they form a consortium, so they have an incentive to do so. But in an Anglo-Dutch auction, forming the consortium would open up an opportunity for new entrants who would now have a chance to make it to the final sealed-bid stage. So the strong firms are much less likely to bid jointly.

But the Anglo-Dutch should also capture much of the benefit of an ascending auction. It will be more likely to sell to the highest valuer than a pure sealed-bid auction, both because it directly reduces the numbers allowed into the sealed-bid stage and also because the two finalists can learn something about each other's and the remaining bidders' perceptions of the object's value from behavior during the ascending stage.

When the Anglo-Dutch auction is extended to contexts in which individual bidders are permitted to win multiple units and there are complementarities between the objects, the ascending stage makes it more likely that bidders will win efficient bundles than in a pure sealed-bid auction.

Finally, I conjecture that the ascending stages of the Anglo-Dutch auction may extract most of the information that would be revealed by a pure ascending auction, raising revenues if bidders' information is "affiliated," while the sealed-bid stage may do almost as well as a pure sealed-bid auction in capturing extra revenues due to the effects of bidders' risk aversion, budget constraints and asymmetries. This suggests the Anglo-Dutch auction may outperform ascending and sealed-bid auctions even if it attracts no additional bidders.

In short, the Anglo-Dutch auction often combines the best of both the ascending and the sealed-bid worlds.

Antitrust

Effective antitrust is critical to fighting collusion and predation in auctions. But antitrust enforcement in the context of auctions seems much lighter than in "ordinary" economic markets.

The U.S. Department of Justice has pursued some auction signaling cases, but the legal status of many of the kinds of behavior discussed in this article remains ambiguous, and collusion in takeover battles for companies is legal in the United States.

European antitrust has been even weaker, as evidenced by T-Mobil's willingness to confirm explicitly the signaling behavior described earlier. True, when apparently similar behavior was observed in the more recent German third-generation spectrum auction, firms refused to confirm officially that they were signaling to rivals to end the auction. Even so, the *Financial Times* reported that "[o]ne operator has privately admitted to altering the last digit of its bid in a semi-serious attempt to signal to other participants that it was willing to accept [fewer lots to end the auction]" (Roberts and Ward, 2000, p. 21). This kind of signaling behavior could perhaps be challenged as an abuse of "joint dominance" under European law. But European regulators have showed no interest in pursuing such matters.

Firms are also permitted to make explicit statements about auctions that would surely be unacceptable if made about a "normal" economic market. For example, before the Austrian third-generation spectrum auction, Telekom Austria, the largest incumbent and presumably the strongest among the six bidders, said it "would be satisfied with just two of the 12 blocks of frequency on offer" and "if the [5 other bidders] behaved similarly it should be possible to get the frequencies on sensible terms," but "it would bid for a third frequency block if one of its rivals did" (Crossland, 2000). It seems inconceivable that a dominant firm in a "normal" market would be allowed to make the equivalent offer and threat that it "would be satisfied with a market share of just one-sixth" and "if the other five firms also stick to one-sixth of the market each, it should be possible to sell at high prices," but "it would compete aggressively for a larger share, if any of its rivals aimed for more than one-sixth."[10]

Just as damaging has been the European authorities' acceptance of joint-bidding agreements that are, in effect, open collusion. Combinations that are arranged very close to the auction date (as in the example of Switzerland discussed earlier) should be particularly discouraged since they give no time for entrants to emerge to threaten the new coalition. One view is that auction participants should

[10] Similarly, during the German third-generation spectrum auction, MobilCom told a newspaper that "should [Debitel] fail to secure a license [it could] become a 'virtual network operator' using MobilCom's network while saving on the cost of the license" (Benoit, 2000, p. 28). This translates roughly to a firm in a "normal" market saying it "would supply a rival should it choose to exit the market," but MobilCom's remarks went unpunished.

generally be restricted to entities that exist when the auction is first announced, although exceptions would clearly be necessary.

The antitrust agencies' response to predation in auction markets has also been feeble. Dominant bidders such as Glaxo and Pacific Telephone in the examples above are apparently allowed to make open threats that they will punish new entrants. For example, Glaxo's letting it be known that it "would almost certainly top a rival bid," would roughly translate to an incumbent firm in a "normal" economic market saying it "would almost certainly undercut any new entrant's price."[11]

Regulators should take such threats seriously and treat auction markets more like "ordinary" economic markets.

Tailoring Auction Design to the Context

Good auction design is *not* "one size fits all." It must be sensitive to the details of the context. A good example of this lesson—and of our other principles—is afforded by the recent European third-generation (UMTS) mobile-phone license auctions.

The United Kingdom, which ran the first of these auctions, originally planned to sell just *four* licenses.[12] In this case, the presence of exactly four incumbent operators who had the advantages of existing brand names and networks suggested that an ascending auction might deter new firms from bidding strongly in the auction or even from entering at all. So the government planned an Anglo-Dutch auction. An ascending stage would have continued until just five bidders remained, after which the five survivors would have made sealed bids, required to be no lower than the current price level, for the four licenses.[13] The design performed extremely well in laboratory experiments in both efficiency and revenue generation.

But when it became possible to sell *five* licenses, an ascending auction made more sense. Because no bidder was permitted to win more than one license, at least one license had to be sold to a new entrant. This would be a sufficient carrot to

[11] Similarly, Pacific Telephone's remark that "if somebody takes California away from us, they'll never make any money" seems to correspond to threatening that "if anyone tries to compete with us, we'll cut the price until they lose money." Further, Pacific Telephone's hiring of an auction theorist to explain the winner's curse to competitors might correspond to hiring an industrial economist to explain the theory of the difficulties of entering new markets to potential entrants.

[12] I was the principal auction theorist advising the U.K. government's Radiocommunications Agency, which designed and ran the recent U.K. mobile-phone license auction. Ken Binmore had a leading role and supervised experiments testing the proposed designs. Other academic advisors included Tilman Borgers, Jeremy Bulow, Philippe Jehiel and Joe Swierzbinski.

[13] It was proposed that all four winners would pay the fourth-highest sealed bid. Since the licenses were not quite identical, a final simultaneous ascending stage would have followed to allocate them more efficiently among the winners. The sealed-bid stage could be run using an ascending mechanism that would hide the actual bids even from the auctioneer, if this would reduce political problems. See Klemperer (1998, 2001b, 2002), Radiocommunications Agency (1998a, b) and Binmore and Klemperer (2002) for more details.

attract several new entrants in the U.K. context in which it was very unclear which new entrant(s) might be successful.[14] Because licenses could not be divided, bidders could not collude to divide the market without resort to side payments. As a result, the problems of collusion and entry deterrence were minimal, and a version of an ascending auction was therefore used for efficiency reasons. The auction was widely judged a success; nine new entrants bid strongly against the incumbents, creating intense competition and record-breaking revenues of 22.5 billion pounds.

The Netherlands' sale came next. Their key blunder was to follow the actual British design when they had an equal number (five) of incumbents and licenses. It was not hard to predict (indeed, prior to the auction, an early draft of this paper, quoted in the Dutch press and Maasland, 2000, *did* predict) that very few entrants would show up. Netherlands antitrust policy was as dysfunctional as the auction design, allowing the strongest potential entrants to make deals with incumbent operators. In the end, just one weak new entrant (Versatel) competed with the incumbents. As we have already discussed, with just one excess bidder in an ascending auction, it was unsurprising when the weak bidder quit early amid allegations of predation, at less than 30 percent of the per capita U.K. prices. Six months later, the Dutch parliament began an investigation into the auction process.

A version of the Anglo-Dutch design would probably have worked better in the Netherlands context. There are reasons to believe Versatel would have bid higher in the sealed-bid stage than the price at which it quit the ascending auction. In addition, the fear of this would have made the incumbents bid higher. Furthermore, the "hope and dream" that a sealed-bid stage gives weaker bidders might have attracted more bidders and discouraged the formation of the joint-bidding consortia.

The Italian government thought it had learned from the Netherlands fiasco. It also chose roughly the U.K. design, but stipulated that if there were no more "serious" bidders (as defined by prequalification conditions) than licenses, then the number of licenses could, and probably would, be reduced. At first glance, this seemed a clever way to avoid an uncompetitive auction, but (as I and others argued) the approach was fundamentally flawed. First, it is putting the cart before the horse to create an unnecessarily concentrated mobile-phone market to make an auction look good. Second, our earlier discussion demonstrates that a rule that allows the possibility that there will be just one more bidder than license does *not* guarantee a competitive ascending auction! Also, it was clear that the number of likely entrants into an ascending auction was much smaller than it had been for the United Kingdom, in large part because weaker potential entrants had figured out

[14] In large part, this was because the United Kingdom ran the first third-generation auction. Going to market first was a deliberate strategy of the auction team, and the sustained marketing campaign was also important. The U.K. auction attracted 13 bidders who then learnt about others' strengths, and none of the eight subsequent auctions had more than seven bidders.

from the earlier auctions that they were weaker and that they therefore had little chance of winning such an auction. In the event, just six bidders competed for five licenses, and the auction ended amid allegations of collusion after less than two days of bidding with per capita revenues below 40 percent of the U.K. level, about half the amount the government was expecting. Again, an Anglo-Dutch or pure sealed-bid design would probably have performed better.

Klemperer (2001b, 2002) discusses the 2000–2001 European spectrum auctions in much more detail.

Conclusion

Much of what we have said about auction design is no more than an application of standard antitrust theory. The key issues in both fields are collusion and entry. The signaling and punishment strategies that support collusion in auctions are familiar from "ordinary" industrial markets, as are firms' verbal encouragement to collude and the predatory threats they make. Our point that even modest bidding costs may be a serious deterrent to potential bidders is analogous to the industrial-organization point that the contestability of a market is nonrobust to even small sunk costs of entry. We also argued that because an ascending auction is more likely than a sealed-bid auction to be won by the strongest firm, the ascending auction may therefore be less attractive to bidders and may therefore be less profitable than a sealed-bid auction; this is just an example of the standard industrial organization argument that a market that is in principle more competitive (for example, "Bertrand" rather than "Cournot") is less attractive to enter and so may in fact be less competitive. A particular feature of auction markets is that "winner's curse" effects may mean that sealed-bid and Anglo-Dutch auctions not only attract more firms than ascending auctions, but may also lead to better outcomes for the auctioneer for a given number of firms. But there is no justification for the current feebleness of antitrust policy in auction markets: regulators should treat them much more like "ordinary" economic markets.

However, none of our examples of auction failures should be taken as an argument against auctions in general. Most auctions work extremely well. Occasionally—for example, when there are too few potential bidders or large costs of supplying necessary information to bidders—a form of structured negotiations may be better, but an auction is usually more attractive to potential buyers, who are crucial to a sale's success (Bulow and Klemperer, 1996). Even relatively unsuccessful auctions, such as the Netherlands and Italian spectrum auctions, were probably more successful than the "beauty contest" administrative hearings used to allocate third-generation spectrum in several other European countries. For example, the Spanish beauty contest yielded just 13 euros per head of population, but generated considerable political and legal controversy and a widespread perception that the outcome was both unfair and inefficient, all problems that are typical of such procedures (Binmore and Klemperer, 2002; Klemperer, 2000b). The difficulties

with the French beauty contest mean that France has not only missed its government's originally planned date for allocation of the spectrum (already by a year at the time of writing), but also missed European Union deadlines.

In conclusion, the most important features of an auction are its robustness against collusion and its attractiveness to potential bidders. Failure to attend to these issues can lead to disaster. Furthermore, anyone setting up an auction would be foolish to follow past successful designs blindly; auction design is *not* "one size fits all." While the sealed-bid auction performs well in some contexts, and the Anglo-Dutch auction is ideal in other contexts, the ascending auction has also frequently been used very successfully. In the practical design of auctions, local circumstances matter, and the devil is in the details.

■ *I was the principal auction theorist advising the U.K. government's Radiocommunications Agency, which designed and ran the recent U.K. mobile-phone license auction described here, and have advised several other U.K. government agencies, but the views expressed in this paper are mine alone. Although some observers thought some of the behavior described above warranted investigation, I do not intend to suggest that any of it violates any applicable rules or laws. I am very grateful to many colleagues, including Sushil Bikhchandani, Nils-Henrik von der Fehr, Tim Harford, Emiel Maasland, Margaret Meyer, Mike Rothkopf, David Salant, Rebecca Stone, Timothy Taylor, Chuck Thomas, Tommaso Valletti, Michael Waldman, Mark Williams and especially my coauthors Jeremy Bulow and Marco Pagnozzi, for helpful advice.*

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EXHIBIT GS-33

COMPASS LEXECON

PRELIMINARY REPORT OF DENNIS CARLTON REGARDING IMPACT OF NEW GTLDS ON CONSUMER WELFARE

March 2009

I. INTRODUCTION

A. QUALIFICATIONS

1. I am the Katherine Dusak Miller Professor of Economics at the University of Chicago Booth School of Business. I received my A.B. in Applied Mathematics and Economics from Harvard University and my M.S. in Operations Research and Ph.D. in Economics from the Massachusetts Institute of Technology. I have served on the faculties of the Law School and the Department of Economics at The University of Chicago and the Department of Economics at the Massachusetts Institute of Technology.

2. I specialize in the economics of industrial organization, which is the study of individual markets and includes the study of antitrust and regulatory issues. I am co-author of the book Modern Industrial Organization, a leading text in the field of industrial organization, and I also have published numerous articles in academic journals and books. In addition, I am Co-Editor of the Journal of Law and Economics, a leading journal that publishes research applying economic analysis to industrial organization and legal matters, and serve, or have served, as an editor of a variety of scholarly journals.

3. In addition to my academic experience, I am a Senior Managing Director of Compass Lexecon, a consulting firm that specializes in the application of economics to legal and regulatory issues. From October 2006 through January 2008, I served as Deputy Assistant Attorney General for Economic Analysis, Antitrust Division, U.S. Department of Justice, the most senior position in the Antitrust Division held by an

economist. I also served as a Commissioner of the Antitrust Modernization Commission, created by the U.S. Congress in 2002 to evaluate U.S. antitrust laws. I have provided expert testimony before various U.S., state and federal courts, the U.S. Congress, a variety of state and federal regulatory agencies and foreign tribunals and have served as a consultant to the Department of Justice, the Federal Trade Commission and other government agencies. My curriculum vita is attached as Appendix I to this report.

4. I have been asked by ICANN to analyze from an economic perspective ICANN's anticipated introduction of new generic top level domain names (gTLDs), and to identify and address the benefits and costs associated with ICANN's proposal. In doing so I evaluate various concerns that have been raised by the Antitrust Division of the U.S. Departments of Justice (DOJ), the National Telecommunications Information Agency (NTIA) of the U.S. Department of Commerce, and comments of third parties submitted to ICANN in response to its proposal.[1] I also indicate where further studies would be informative in addressing the relevant issues.

B. OVERVIEW AND SUMMARY

5. I conclude that ICANN's proposed framework for introducing new TLDs is likely to improve consumer welfare by facilitating entry and creating new competition to the major gTLDs such as *.com, .net*, and *.org*. Like other actions that remove artificial restrictions on entry, the likely effect of ICANN's proposal is to increase output, lower

1. See letters from Deborah A. Garza to Meredith A. Baker dated December 3, 2008 ("DOJ letter') and from Meredith A. Baker to Peter Dengate-Thrush dated December 18, 2008 ("NTIA letter") The NTIA letter also requests information about the effect of new gTLDs on the stability and security of the Domain Name System, which are not addressed in this report. (http://www.ntia.doc.gov/reportsarchive_2007_2008.html)

price and increase innovation. This conclusion is based on the fundamental principles that competition promotes consumer welfare and restrictions on entry impede competition.

6. DOJ, NTIA and a variety of other parties have expressed concerns that the introduction of new gTLDs could harm consumer welfare by creating confusion among consumers and imposing costs of trademark holders by necessitating inefficient "defensive" registration of domain names on new gTLDs. While entry generally promotes consumer welfare, proper account also must be taken for property rights that protect firms' investments in establishing a reputation and brand name. If such property rights are not protected, rivals have an incentive to "free ride" on the reputation created by rivals by imitating trademarks or adopting very similar marks thereby potentially creating consumer confusion.

7. This possibility, and the harm to consumer welfare that results, is recognized by existing trademark law and in economic analyses of intellectual property. But to the extent that the introduction of new gTLDs gives rise to intellectual property concerns, they can be addressed through existing legal mechanisms and appropriately-designed ICANN procedures for protecting intellectual property. It would not be sensible, from an economic perspective, to block entry of gTLDs to prevent potential trademark concerns. Indeed, the relatively small number of registrations achieved by new gTLDs such as *.info* and *.biz* introduced in recent years suggests that the need for defensive registrations in new gTLDs is limited. The likely adverse effects such a strategy would have on consumer welfare would likely be greater than any potential harm, especially since appropriate steps can be taken if needed to address concerns regarding intellectual property rights.

8. DOJ and NTIA further suggest that action on ICANN's proposal should be delayed until ICANN completes the economic study it authorized in 2006 to address whether the domain registration market is one economic market or whether each TLD operates as a separate market. While this remains an interesting question deserving of analysis, evaluation of the impact of ICANN's gTLD proposal on consumer welfare does not depend on the answer to this question. Indeed, even if new gTLDs do not compete with *.com* and the other major TLDs for existing registrants, it is likely that consumers would nonetheless realize significant benefits from new gTLDs due to increased competition for new registrants and increased innovation that would likely be fostered by entry.

II. BACKGROUND ON ICANN'S PROPOSAL

A. ECONOMICS OF THE DOMAIN NAME SYSTEM

9. Despite the introduction of several new gTLDs in recent years, Internet activity today continues to be dominated by a small number of registries. For example, the *.com* TLD today has more than 80 million registered domain names while *.net* and *.org* respectively have roughly 12 million and 7 million active domain names.[2] While several new gTLDs have been introduced in recent years, these have achieved only limited success in attracting registrants and Internet activity. For example, *.info* and *.biz*, both introduced in 2001, have attracted roughly 5 million and 2 million domain names respectively.[3]

2. ICANN Registry Operator Monthly Reports October 2008. (http://www.icann.org/en/tlds/monthly-reports/)
3. Id.

10. Currently, all agreements between ICANN and the registries operating unsponsored gTLDs include price maximums and limits on permissible future price increases.[4] Registrars operate under contracts with registries and charge rates to registrants that are not regulated by ICANN. Registrars can contract with multiple registries and typically offer a variety of additional services to registrants such as web site hosting and design.

11. Registrants that subscribe to a particular Internet domain name face costs when switching registries because the TLD is a component of the domain name which, by definition, cannot be ported across registries. That is, if the registrant that operates the website *cars.com* wants to switch to the *.net* registry, then it must adopt *cars.net* (if available) or adopt another *.net* domain name. Switching costs faced by registrants may create incentives for registries and registrars to act opportunistically by raising prices. However, ex ante competition to attract new registrants, as well as harm to the reputation of the registry and/or registrar limits their ability to engage in such conduct.

12. An increase in the number of gTLDs increases the number of alternatives available to consumers, and thus offers the potential for increased competition, reduced prices, and increased output. The availability of new gTLDs also offers increased opportunities for registries and registrars to develop innovative services or business

4. See, e.g., Section 7.3 of *.com* Registry Agreement between ICANN and Verisign, dated March 1, 2006. Unsponsored gTLDs (.com, .biz, .info, .name, .net., org, .pro) have price caps; all sponsored gTLDs (.aero, .asia, .cat, .coop, .jobs, .mobi, .museum, .tel, .travel), which in most cases are smaller than the unsponsored gTLDs, have no price caps. These caps are established in contracts between ICANN and registry operators, such as Verisign (which operates the *.com* and *.net* registries). ICANN operates under a Memorandum of Understanding with the U.S. Department of Commerce.

models and circumstances provide significant opportunities for increases in consumer welfare.

B. ICANN'S PROPOSED PROCEDURES FOR DEPLOYING NEW GTLDS

13. ICANN has proposed a framework for authorizing new gTLDs. ICANN's draft Guidebook for applicants details the various phases of the ICANN's review process and the requirements that need to be met for approval.[5] ICANN will evaluate both the technical and financial capabilities of the applicant, the effect of the proposed gTLD on consumer confusion, and the effects of the proposed gTLD on Internet stability.[6]

14. If more than one application for similar (or identical) gTLDs passes ICANN's evaluation phase, these applications enter the "string contention" process, in which ICANN determines which application will ultimately be approved. ICANN will first encourage the interested parties to negotiate a solution amongst themselves. If the applicants are unable to negotiate a resolution, they enter a second comparative evaluation phase. If more than one application still remains after this phase, ICANN will employ a tie-break mechanism such as an auction.[7] I understand that ICANN's goal is to establish application procedures that are consistent with consumers' interests and that

5. See ICANN, New gTLD Program: Second Draft Applicant Guidebook, February 18, 2009 ("Draft Guidebook"), (http://icann.org/en/topics/new-gtld-program.htm).
6. Draft Guidebook, p. 2-2.
7. The Second Draft Applicant Guidebook suggests that ICANN will use highest-bid auctions as a tie-break mechanism with the proceeds going to a not-for-profit foundation. DOJ suggests that ICANN use auctions in which bidders are selected on the basis of promising the lowest price. The DOJ suggestion, however, does not address how ICANN should evaluate bidders that offer a low price by offering low-quality service and those that offer higher quality/higher price services. (Draft Guidebook, p. 4-13 to 4-14.

proposed procedures can be further modified based on comments received both before and after the adoption of such rules.[8]

15. Objections to applications can be filed by various parties including existing TLD registries, other applicants, holders of intellectual property rights (such as trademarks) and others.[9] Objections can be made on a limited number of grounds including string confusion, legal rights (e.g. trademark infringement), morality and public order, and community objection.

C. SUMMARY OF CONCERNS ABOUT ICANN'S PROPOSAL TO EXPAND GTLDS.

16. The DOJ and NTIA and some private parties have expressed concerns that the introduction of new gTLDs will harm consumers and/or trademark holders. Broadly summarized, these comments reflect the view that the introduction of new gTLDs will harm registrants (consumers) by creating confusion and by imposing significant costs on registrants from forcing them to establish "defensive" registrations with the new gTLDs that protect their trademarks and existing domain names. Comments by the DOJ and several other parties also claim that the introduction of new gTLDs is unlikely to result in increased competition that would lower prices or improve service to registrants.

17. For example, the Association of National Advertisers states that new gTLDs will generate higher "costs of brand management and create new opportunities for others to infringe, phish, and engage in other deceptive practices. As a result, brand

8. See Cover letter from ICANN President and CEO accompanying Draft Guidebook.
9. A party that objects to an application must pay a dispute filing fee, which is expected to be between $1,000 and $5,000. At that time, the applicant has 30 days to respond (and pay the same fee). Both parties will then submit advanced payment to cover the dispute resolution proceedings, with payment refunded to the prevailing party (Draft Guidebook, p. 1-24 to 1-25).

owners and consumers will be net losers."[10] Similarly, the U.S. Chamber of Commerce concludes that, "the proposed gTLD program […] will compel businesses to invest millions of dollars in defensive domain registrations and litigation […]"[11]

18. The DOJ concludes "the need of many registrants to purchase domains in many or most gTLDs allows each gTLD registry operator to impose costs on registrants that purchase domains simply because a gTLD exists. […] In light of these findings, we believe that the introduction of new gTLDs under the RFP could impose substantial additional domain registration costs on many consumers and that many new gTLD registry operators may have market power over registrants."[12]

19. In addition, both the NTIA and DOJ also express concerns regarding ICANN's proposed application and review process itself. Due to concerns that even new gTLDs have market power over its registrants, both DOJ and NTIA recommend ICANN use competitive bidding in assigning new TLDs, with applicants submitting bids that specify maximum prices and permissible price increases.[13] The DOJ and NTIA further recommend that, in instances in which competitive bidding may not be effective, ICANN incorporate provisions directly into their agreement with new registries, such as price restrictions or requirements of long-term contracts with users, to prevent the exercise of

10. ANA letter, p. 1. (http://forum.icann.org/lists/gtld-guide/mail2.html) "Phishing" is "a computing scam where the perpetrators try to get sensitive personal information by sending users to fake, but legitimate looking websites." (Source: http://onlinebusiness.about.com/od/onlinebusinessglossary/g/ phishing.htm accessed on February 17, 2008)
11. U.S. Chamber of Commerce letter, p.1. (http://forum.icann.org/lists/gtld-guide/index.html)
12. DOJ letter, p. 3.
13. DOJ letter, p.7 and NTIA letter, p.2.

market power. Finally, the DOJ suggests that ICANN require periodic competitive bidding for renewal of registry agreements.[14]

III. CONSUMERS ARE LIKELY TO BENEFIT FROM THE INTRODUCTION OF NEW GTLDS.

20. The comments by NTIA and DOJ appropriately focus on the impact of new gTLDs on consumer welfare, but I believe come to the wrong conclusion.[15] This section shows that, putting to one side the concerns about consumer confusion which are addressed in the next section, ICANN's plan to introduce new gTLDs is likely to benefit consumers by facilitating entry which would be expected to mitigate market power associated with *.com* and other major TLDs and increase innovation. As a result, the proposal by DOJ and NTIA to delay, and even preclude, deployment of new gTLDs, is likely inconsistent with consumer interests. I conclude that such output restrictions are unnecessary and that the concerns motivating these restrictions can be addressed in better ways, as I describe below.

A. POLICIES THAT FOSTER ENTRY HELP ADDRESS CONCERNS ABOUT MARKET POWER ASSOCIATED WITH *.COM*, AND OTHER MAJOR TLDS

21. DOJ has expressed its concern that *.com* and other gTLDs possess market power.[16] To the extent they do, however, ICANN's proposal to expand the number of TLDs available would serve to limit any such concern. As the Horizontal Merger Guidelines note, entry has the potential to "counteract the competitive effects of concern."[17] More generally, entry is recognized to play a central role in maintaining

14. DOJ letter, p.7 and NTIA letter, p.2.
15. DOJ letter, p. 2, "…ICANN's general approach to new gTLDs should be revised to give greater consideration to consumer interests. ICANN should more carefully weigh potential consumer harms against potential consumer benefits…"
16. DOJ letter, p. 3.
17. Horizontal Merger Guidelines of the U.S. Department of Justice and Federal Trade

competitive markets.[18] Hence, to the extent that *.com* and other TLDs have any market power today, expansion of the number of TLDs would help dissipate it in the future.

22. DOJ claims that "… the creation of additional gTLDs is unlikely to constrain the exercise of market power by existing TLDs…"[19] The DOJ, however, seems to focus on the effect of new TLDs on existing registrants, not on their impact on competition for new registrants. The DOJ, for example, speculates that "the network effects that make *.com* registrations so valuable to consumers will be difficult for other TLDs to overcome."[20] However, any market power associated with *.com* will attract entrants with strategies built around bringing new registrants to the new gTLDs. Restricting the opportunity for entrants to compete for such profits necessarily has the effect of preserving profits associated with *.com*.

23. Both economic theory and empirical evidence indicate the elimination of entry barriers is likely to have a number of beneficial effects on consumer welfare, including lower prices, expanded output, and increased innovation. The most direct benefit of entry is that the increased set of alternatives available to consumers increases the elasticity of demand faced by firms creating an incentive to reduce their price. Consumer welfare is enhanced because these lower prices are associated with greater output. An empirical analysis of the effect of entry of new gTLDs, such as *.info* and *.biz*, on output and pricing would likely contribute to our understanding of the effects of entry on consumer welfare. The data necessary to perform such a study are not maintained by ICANN.

Commission, p. 25.
18. See Carlton, Modern Industrial Organization, 4th ed., pp. 77-82.
19. DOJ letter, p. 1.
20. DOJ letter, p. 2.

24. The DOJ suggests that new gTLDs will not provide substantial competition for *.com* and other existing TLDs, stressing the ubiquity of *.com* and the fact that that existing registrants face significant costs of switching to another TLD. Even if this is the case, this logic does not extend to competition between *.com* and new gTLDs to attract new registrants. The increase in the number of alternatives available to new registrants provides an incentive for registries for both new and existing gTLDs to reduce prices and improve service quality. Note that this benefit holds even if *.com* pricing continues to be regulated through price caps because competition has the potential for inducing registries of regulated TLDs to reduce prices below these caps. Furthermore, even if entry of new gTLDs did not affect the prices charged by .com and other gTLDs, entry would still be likely to increase consumer welfare. The fact that a registrant selects a new gTLD instead of an existing one reveals that it is better off due to the expansion in the number of available alternatives. That is, the expansion in the number of available alternatives alone is likely to increase consumer welfare.

25. Removing entry barriers is also likely to foster innovation. In the absence of competition from new gTLDs, registries and registrars that serve *.com* and other major TLDs face limited incentives to develop new technologies and/or improved services that may help attract new customers. However, absent restriction on new gTLDs, potential new entrants will be motivated to develop new technologies and methods as a way to overcome *.com*'s first mover advantage. This, in turn, increases the incentives to innovate faced by registrars of *.com* and other incumbent registries.[21]

21. See Carlton and Perloff, Modern Industrial Organization, 4th ed. p. 564.

26. A variety of innovations are likely to be facilitated by expansion of the number of gTLDs. For example:

- A gTLD dedicated to serving the financial services industry might require registrants to provide secure transactions. The certification provided in the gTLD name thus provides valuable information to consumers who desire secure financial transactions over the Internet.
- A new gTLD may offer International Domain Names so that a URL (e.g., http://www.google.com) can be presented in the language of the region, facilitating the delivery by registrars in multi-language services.
- New gTLDs are expected to focus efforts at serving high targeted markets, such as the customers and suppliers of a given firm while others, perhaps, will focus on serving a variety of registrants in a given geographic area.[22]

27. As this suggests, many of the benefits of new gTLDs can be realized even if the new gTLD would not compete today with existing TLDs. For example, expansion in the number of gTLDs that fostered increased innovation or simply expanded aggregate Internet registrations and utilization would generate improvements in consumer welfare even if the new gTLDs operated in antitrust markets that are distinct from *.com.* Of course, potential consumer confusion could be reduced to a minimum by having only a single gTLD (*.com*), but it is unlikely that this would be in consumers' interest.

28. DOJ has expresses concern that "some new gTLDs envisioned by the RFP likely would have market power…"[23] However, even if true, this fact alone does not

22. Connecting.NYC Inc. letter to ICANN (http://forum.icann.org/lists/gtld-guide/index.html).
23. DOJ letter, p.1.

provide a basis for restricting entry. Even if new gTLDs possessed some market power, allowing their entry would still enhance consumer welfare, just as entry which results in the creation of a duopoly from a monopoly enhances consumer welfare even though both duopolists typically will have market power. Similarly, it is inconceivable that anyone would find it desirable to restrict entry into an industry with product differentiation because such products may have some market power.

B. NEW GTLDS ARE LIKELY TO BENEFIT CONSUMERS EVEN IF THEY DO NOT COMPETE DIRECTLY WITH *.COM*.

29. New gTLDs also can enhance consumer welfare by providing information to Internet users that facilitates navigation of the Internet, even if the new gTLDs have limited substitutability with *.com* (and thus function in separate antitrust markets). This is due to the likelihood that new gTLDs will be designed to serve consumer needs that *.com* does not meet well. For example, because domain names contain information content that is of value to consumers, some new gTLDs may facilitate consumers' Internet navigation and search by more rapidly directly them to websites with the desired content. For example, company-specific TLDs (e.g., *.GeneralMotors*) may facilitate the ability of General Motors' customers to obtain product information as well as the interaction of suppliers and dealers with General Motors. Similarly, new generic TLDs, like .cars, may facilitate the ability of consumers to obtain both generic information about cars as well as the ability to access the websites of car manufacturers, suppliers, and other car consumers that use this gTLD to host their websites.

IV. CONCERNS EXPRESSED ABOUT NEW GTLDS DO NOT SUPPORT RESTRICTIONS ON ENTRY.

30. As noted above, DOJ and others argue that trademark holders will perceive the need to register domain names with new gTLD registries solely for defensive purposes, in order to avoid costs associated with improper use by others of the registrant's trade name.[24] That is, DOJ and others argue that entry should be restricted because such competition may increase the costs associated with defending trademarks. This section shows that while costs associated with defending trademarks are real, other mechanisms are available to address these concerns and that these alternatives preserve the benefits of increased competition resulting from entry.

A. THE ECONOMIC RATIONALE FOR TRADEMARK PROTECTION DOES NOT JUSTIFY RESTRICTING ENTRY OF NEW GTLDS.

31. Domain names help reduce the costs of searching for information available on the Internet and registrants select domain names to help attract consumers to their sites. Thus, registrants face concerns that other similarly-named sites may create confusion, raise search costs faced by consumers, and harm the registrant's ability to attract traffic.

32. As this suggests, the economic function of domain names is related to the economic function of trademarks, which also protect the trademark holder's intellectual property by preventing confusion created by rivals' efforts to free ride on the trademark holder's reputation. Similarly, registrants have a significant interest in protecting their domain names from imitation and free riding by others that attempt to utilize a trade name that is protected or that is confusingly similar to a protected trademark.

24. DOJ letter, p. 5.

33. In analyzing the economic function of trademarks, William Landes and Richard Posner explain that:

> …a trademark is a word, symbol, or other signifier used to distinguish a good or service produced by one firm from the goods or services of other firms. To perform its naming function a trademark or brand name...must not be duplicated. To allow another maker of decaffeinated coffee to sell its coffee under the name "Sanka" would destroy the benefit of the name…If the law does not prevent it, free riding may destroy the information capital embodied in a trademark, and the prospect of free riding may therefore eliminate the incentive to develop a valuable trademark in the first place.[25]

34. "Generic" terms, however, generally cannot be trademarked.[26] As defined by Landes and Posner, "[a] generic name or term is by definition the name not of a brand but of an entire product: 'airplane' and 'computer' are examples."[27] The lack of legal protection for generic terms is consistent with principles of economic efficiency because granting trademarks for such terms to one firm can raise search costs faced by consumers and hinder competition from other firms. Granting legal protection for generic terms also serves no purpose in protecting incentives for firms to invest in creating a reputation and information capital in the term. As Landes and Posner explain:

> … if a single firm is given the exclusive right to use the word or words that identify an entire product, as distinct from an individual brand of the product, competition with other firms that make the same product will be impaired. Thus, if a particular manufacturer of personal computers could not use the terms "personal computer" or "PC" in its advertising or labeling because another firm had the exclusive rights to these terms, it might have to describe its product as "a machine capable of doing word

25. W. Landes and R. Posner, The Economic Structure of Intellectual Property Law, Belknap Press of Harvard University Press (2003), pp. 166-168.
26. Landes and Posner, Chapter 7, p. 190. There are exceptions to this general statement. For example, a term can be generic in connection with some goods (and thus not be protected) but can be trademarked for its use in connection with other goods. For example, the word "apple" is generic when applied to fruit but can be trademarked when applied to computers.
27. Landes and Posner, pp. 190-91.

> processing and high-speed calculations and other data manipulations, using a central processing unit," etc…Because it is harder to recall long than short phrases, a lengthy description may well convey less usable information about the firm's product than a single word or a short phrase, so search costs will rise.[28]

35. Internet domain names can be based both on trademarks (e.g., *GeneralMotors.com*) and generic terms (*cars.com*), and the new gTLDs that would be permitted under ICANN's proposal also may include both trademarks (.*GeneralMotors*) and generic terms (.*cars*). Economic evaluation of ICANN's proposal raises distinct issues for gTLDs that use generic terms and trademarks and reflects the competing interest of protecting intellectual property of trademark holders and promoting the unrestricted use of generic terms.

36. Trademark protection extends to domain names so, for example, only General Motors has the ability to use and/or prevent others from using domain names such as *GeneralMotors.com* and, similarly, register .*GeneralMotors* as a gTLD.[29] Congress enacted the Anti-Cybersquatting Consumer Protection Act in 1999 to clarify the role of trademarks in domain names and to prevent "cybersquatting," (i.e., attempts by firms to acquire domain names, including those involving trademarks, for the purpose of reselling them to trademark holders). ICANN also has established mechanisms for resolving domain name disputes that arise in the existing gTLDs; for example, in 1999 it established the its Uniform Dispute Resolution Policy in 1999 which set procedures for resolving disputes over domain names.[30] As discussed further below, the economic literature recognizes that frivolous registrations and challenges can be further limited by

28. Landes and Posner, p. 175.
29. Anti-Cybersquatting Consumer Protection Act, November 1999.
30. Under these procedures, an objector files a complaint with an ICANN-approved dispute resolution service provider which follows ICANN-specified policies and procedures for addressing the complaint.

establishing "loser pays" procedures in which the loser of a challenge to a domain name pays the legal fees of the prevailing party.

37. Nonetheless, as various comments on ICANN's gTLD proposal emphasize, trademark holders still expend effort to monitor unauthorized use of their marks and to enforce their property rights. Many trademark holders are concerned that the introduction of new gTLDs will require additional costs related to monitoring and enforcing the use of these trademarks.[31] At the same time, however, it is important to note that registrants that use generic terms in domain names also have a private interest to restrict competition by limiting the use of these terms by rivals in domain names and gTLDs, although there is limited potential benefit in terms of reduced monitoring and enforcement costs in such circumstances from limiting the use of generic terms.

38. Indeed, a significant potential benefit of the introduction of new gTLDs would be to facilitate expansion in the use of generic terms in domain names. As discussed above, the use of such terms can promote consumer welfare by reducing search costs faced by Internet users. For example, the establishment of *.cars* as a gTLD is likely to facilitate the ability of Internet users to identify information related to automobiles and is likely to help registrants in attracting Internet visitors.

B. REQUIRING PROOF OF COMPETITIVE BENEFITS BEFORE AUTHORIZING ENTRY IS LIKELY TO HARM CONSUMER WELFARE

39. Parties that have commented on ICANN's proposal, including DOJ and NITA, suggest that due to the presence of potential costs to trademark holders and others posed by new gTLDs, the competitive benefits of new gTLDs should be proven before

31. See, e.g., comments submitted by Microsoft and US Telecom to ICANN, December 15, 2008 (http://forum.icann.org/lists/gtld-guide/).

ICANN authorizes their use.[32] For example, NTIA states that "[i]t is unclear that the threshold question of whether the potential consumer benefits outweigh the potential costs has been adequately addressed and determined."[33] This approach is inconsistent with the widely-held view, described above, that the entry benefits consumers by expanding output and lowering price.

40. Restricting ICANN's ability to expand the number of gTLDs is economically efficient only if costs from new gTLDs, including increased consumer confusion and/or higher costs of monitoring and enforcing trademarks, exceeds the potential benefits to consumers from new gTLDs, which include lower prices for domain names, increased output, and increased innovation. As noted above, many of these benefits of new gTLDs and domains established on those gTLDs can be realized even if the new gTLDs do not compete with existing TLDs.

41. Requiring entrants to justify entry on cost/benefit basis, however, is likely to result in significant consumer harm because the competitive benefit of new business methods or technologies facilitated by entry can be very hard to predict *a priori*. Economic literature shows that innovations are a principal source of the growth in GNP and consumer welfare over time. Most notably, Robert Solow, who was awarded the 1987 Nobel Prize in Economics for his work on the sources of economic growth, noted in his Nobel Prize lecture that "the rate of growth…depends entirely on the rate of technological process."[34] Following in this tradition, in their well-known book,

32. See, e.g., DOJ letter, p. 2, NTIA letter, p. 1 and comment submitted by AT&T to ICANN on December 15, 2008 (http://forum.icann.org/lists/gtld-guide/).
33. NTIA letter, p. 1.
34. Robert M. Solow, Nobel Prize Lecture, December 8, 1987.

Innovation and Growth in the Global Economy, Gene Grossman and Elhanan Helpman describe innovation as "the engine of long-run growth."[35]

42. Economic literature also stresses that innovations and new products generate large increases in consumer welfare, while regulatory policies that limit or delay entry and the spread of innovation can substantially reduce welfare. As part of his extensive research on the consumer welfare gains generated by new goods, Jerry Hausman has found that "the introduction of cellular telephone services has led to gains in consumer welfare which now exceed $25 billion per year," and that the consumer welfare cost of the regulatory delay of this introduction was close to $100 billion.[36] In their volume "The Economics of New Goods," Tim Bresnahan and Robert Gordon review the economic literature and conclude, "[c]learly, new goods are at the heart of economic progress."[37] In his 2002 paper on consumer welfare gains resulting from the introduction of the minivan, Amil Petrin notes that "…large improvements in consumers' standard of living arise from competition as firms cannibalize each other's profits by seeking new goods that give them some temporary market power."[38]

43. As this suggests, restrictions on entry are likely to promote consumer welfare under only limited circumstances that are not apparent here. The imposition of such restrictions, however, is likely to benefit existing market participants by limiting competition from firms offering innovative services and new business models. Actions

35. Gene Grossman and Elhanan Helpman, 1993, *Innovation and Growth in the Global Economy*, p. 18.
36. Jerry Hausman, 1998, "New Products and Price Indices," NBER Website, http://www.nber.org/reporter/fall98/hausman_fall98.html.
37. Timothy Bresnahan and Robert Gordon, 1997, *The Economics of New Goods, p. 1.*
38. Amil Petrin, 2002, "Quantifying the Benefits of New Products: The Case of the Minivan," *Journal of Political Economy*, p. 705.

that protect any market power that *.com* and other gTLDs may possess are unlikely to benefit consumers.

44. At the same time, DOJ and others have presented no evidence about the likely costs to trademark holders from the need to defensively register domain names with new gTLDs. The relatively modest number of registrations achieved by new gTLDs introduced in recent years (relative to *.com*) suggests that concerns about the need for defensive registrations may be exaggerated.

45. As noted above, since their introduction in 2001, *.info* has attracted 5 million registrants and *.biz* has attracted 2 million, far below the roughly 80 million registrants using *.com*.[39] While some of the registrations for domain names under the new gTLDs may have been made for defensive purposes, the limited number of registrations for new gTLDs indicates that the vast majority of *.com* registrants did not find a compelling reason to undertake defensive registrations on the new gTLDs. While various parties commenting to ICANN cite the limited demand for the recently introduced gTLDs, they fail to note that these same facts undercut their claim that new gTLDs will create the need for a large number of defensive registrations.[40]

C. NO NEW ECONOMIC OR LEGAL ISSUES ARE CREATED BY THE INTRODUCTION OF NEW GTLDS.

46. As parties commenting on ICANN's proposal stress, firms undertake significant efforts to monitor and enforce trademarks and legal rules that facilitate such activities promote economic efficiency. Restrictions on the authorization of new gTLDs

39. ICANN Registry Operator Monthly Reports, October 2008.
40. See, e.g., comment submitted by the U.S. Chamber of Commerce and US Telecom on December 15, 2008,

promote economic efficiency only if they prevent substantial new enforcement costs. However, the deployment of new gTLDs does not appear to raise any such issues.

47. More specifically, issues relating to enforcing and monitoring trademarks that arise with new gTLDs also arise under the existing domain name system. For example, consider GM's attempt to protect its domain name *GeneralMotors.com*. There are already numerous alternative names it maintains and monitors, including *GMcars.com*, *Chevrolet.com*, *Chevy.com*, etc. It is unclear how the introduction of a new gTLD – say, *.cars* designed for sites related to car– would further increase the required effort and associated costs of monitoring use of GM marks. The introduction of GM trademarks in the *.cars* gTLD raises the same concern as in other gTLDs and thus appears to raise no new issues relating to the use of trademarks in domain names.

48. A variety of existing legal mechanisms are designed to protect the use of trademarks in domain names and to limit the use of domain names that result in consumer confusion. The development of improved institutional mechanisms to enforce such rules can deter the need for defensive registrations and reduce concerns of the type raised by DOJ, NTIA and other parties without the cost to consumer welfare of preventing new entry and the potential innovation it promises.

49. For example, the economic literature shows that frivolous requests for gTLDs and/or frivolous challenges of new names can be deterred by requiring the party that loses a challenge to bear the legal cost of both parties. Under such "loser pays" rules, a non-trademark holder that attempted to obtain domain name or gTLD based on a trademark would need to pay the legal fees of the trademark holder and related administrative fees if the trademark holder successfully challenges the domain name or gTLD. Such a rule would deter frivolous attempts by non-trademark holders to obtain

domain names that are based on trademark terms or are confusingly similar to such terms as well as the need for defensive registrations.[41]

IV. EVALUATION OF ICANN'S PROPOSAL DOES NOT REQUIRE DETAILED STUDY OF SCOPE OF COMPETITION AMONG TLDS.

50. Both the DOJ and NTIA recommend that ICANN should postpone the introduction of new gTLDs until it studies the scope of competition among TLDs along the lines that ICANN proposed in 2006.[42] At that time, ICANN proposed to analyze, among other things: whether each TLD functions as a distinct economic market; the effects of switching costs involved in moving from one TLD to another; and the effect of the existing TLD structure on the pricing by entrants.

51. While the issues that ICANN proposed to analyze in 2006 are of economic interest, analysis of these questions is not necessary for the evaluation of ICANN's proposal. As discussed above, the concerns about consumer confusion and the need for defensive registrations raised by DOJ, NTIA and others arise whether existing TLDs constitute distinct antitrust markets or whether they are appropriately considered to be part of a broader market. Nor do the concerns raised by DOJ, NTIA and others depend critically on the extent of switching costs or the effect of the existing TLD structure on entrants' pricing. The DOJ and NTIA do not explain why the information from ICANN's proposed 2006 study is necessary for evaluation of its proposed mechanism for introducing new gTLDs and, as I have explained, I can see no reason that it is.

41. J. Hughes and E. Snyder, "Litigation and Settlement Under the English and American Rules: Theory and Evidence," 38 J. Law and Econ. 225 (1995).
42. See DOJ letter, p. 6 and NTIA letter, p. 1.

V. CONCLUSION

52. The benefits of free entry are well-recognized and the introduction of new gTLDs is likely to benefit consumers by subjecting *.com* and other gTLDs to increased competition, widening choice available to consumers, and facilitating innovation. At the same time, claims that the introduction of new gTLDs will necessitate widespread defensive registrations appear to be exaggerated and are inconsistent with the oft-noted observation that there have been a limited number of registrations on gTLDs introduced in recent years. Existing legal framework and ICANN-established procedures provide mechanisms for protecting trademarks and addressing concerns about consumer confusion. If necessary, various additional mechanisms could be created by ICANN to protect against abuse of existing trademarks.

53. Together, these factors imply that consumer welfare is likely to be harmed if the deployment of gTLDs is restricted or delayed by requiring ICANN or others to provide an affirmative justification to permit entry. Placing such a burden on ICANN or other parties is inconsistent with the general approach to antitrust policy in a wide variety of industries.

APPENDIX I

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EDUCATION

Ph.D., MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts: Economics, 1975.

M.S., MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts: Operations Research, 1974.

A.B., HARVARD UNIVERSITY (Summa cum laude): Applied Math and Economics, 1972.

EMPLOYMENT

COMPASS LEXECON (formerly Lexecon), Chicago, Illinois (2008 – present) Senior Managing Director; LEXECON INC., (1977 – 2006), President 1997 – 2001, Senior Managing Director 2003 - 2006

UNIVERSITY OF CHICAGO, Graduate School of Business, Katherine Dusak Miller Professor of Economics (2008 – present); Professor of Economics (1984 – 2008); Law School, Professor of Economics (1980 – 1984); Department of Economics, Assistant Professor (1979 – 1980); Associate Professor (1976 – 1979).

U.S. DEPARTMENT OF JUSTICE, Washington, District of Columbia (2006 – 2008) Deputy Assistant Attorney General for Economic Analysis, Antitrust Division

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts, Department of Economics (1975 – 1976) Instructor in Economics

OTHER PROFESSIONAL EXPERIENCE

HARVARD UNIVERSITY, Public Policy Summer Course in Economics (1977), Professor

BELL TELEPHONE LABORATORIES (Summers 1976, 1977)

JOINT CENTER FOR URBAN STUDIES OF M.I.T. AND HARVARD UNIVERSITY, Cambridge, Massachusetts (1974 - 1975)

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FIELDS OF SPECIALIZATION

Theoretical and Applied Microeconomics
Industrial Organization

ACADEMIC HONORS AND FELLOWSHIPS

Keynote Speaker, Japanese Symposium on Competition, sponsored by Japan Fair Trade Commission, 2009
Recipient of Inaugural Robert F. Lanzilotti Prize, awarded by the International Industrial Organization Society for Best Paper in Antitrust Economics, 2008
Keynote Address to Israel Antitrust Conference, 2008
Lewis Bernstein Memorial Antitrust Lecture, Washington, D.C., 2006
Distinguished Visitor, University of Melbourne, April 2005
Milton Handler Lecture, New York, 2004
Keynote Address to the International Competition Network, Mexico, 2004
Alexander Brody Distinguished Lecture, Yeshiva University, 2000
Ph.D. Thesis chosen to appear in the Garland Series of Outstanding Dissertations in Economics
Recipient of the 1977 P.W.S. Andrews Memorial Prize Essay, best essay in the field of Industrial Organization by a scholar under the age of thirty
National Science Foundation Grant, 1977 - 1985
Recipient of Post-doctoral Grant from the Lincoln Foundation, 1975
National Science Foundation Fellowship, 1972 - 1975
Phi Beta Kappa, 1971
John Harvard Award, 1970
Detur Book Prize, 1969
Edwards Whitacker Award, 1969
M.I.T., National Scholar Award, 1968

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

Co-editor, Journal of Law and Economics, 1980 - present
Visiting Committee, MIT, Department of Economics, 1995 - present
Member, Advisory Board, Economics Research Network, 1996 - present
Member, Advisory Board of Antitrust and Regulation Abstracts, Social Science Research Network, 1998 - present
Advisory Board, Massachusetts Institute of Technology, Department of Economics, 1999 - present
Co-Editor, Competition Policy International (CPI), 2004 – present
Advisory Board, Journal of Competition Law and Economics 2004- present
Deputy Assistant Attorney General for Economic Analysis, Antitrust Division, U.S. Department of Justice, 2006 - 2008
Presidential Appointment to the Antitrust Modernization Commission, March 17, 2004 - 2007

Invited Panelist at Public Hearing on the Retail Banking Sector Inquiry: Payment Cards, before the European Commission in Brussels, Belgium, July 17, 2006.
Consultant on Merger Guidelines to the FTC, 2003
Professor, George Mason Institute for Judges, October 2001
Chairman, FTC Round Table on Empirical Industrial Organization (September 11, 2001)
Participant in the Round Table on the Economics of Mergers Between Large ILECS before the Federal Communications Commission, February 5, 1999
Member, Steering Committee, Social Science Research Council, Program in Applied Economics, 1997 - 1999
Participant in roundtable discussions on "The Role of Classical Market Power in Joint Venture Analysis," before the Federal Trade Commission, November 19, 1997 and March 17, 1998.
Participant in meetings with Committee of the Federal Reserve on Payment Systems, June 5, 1997
Associate Editor, Regional Science and Urban Economics, 1987 - 1997
Resident Scholar, Board of Governors of the Federal Reserve System, Summer, 1995
Accreditation Committee, Graduate School of Business, Stanford University, 1995
Associate Editor, The International Journal of Industrial Organization, 1991 - 1995
Editorial Board, Intellectual Property Fraud Reporter, 1990 - 1995
Consultant on Merger Guidelines to the U.S. Department of Justice, 1991 - 1992
Member, Advisory Committee to the Bureau of the Census, 1987 - 1990
National Bureau of Economic Research, Research Associate
Member, American Economics Association, Econometrics Society

BOOKS

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“Antitrust and Regulation,” (with R. Picker) in N. Rose ed., Economics of Deregulation, NBER, (forthcoming).

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“Product Variety and Demand Uncertainty: Why Mark-ups Vary with Quality,” (with James D. Dana Jr.), Journal of Industrial Economics (2008)

“Regulation, Antitrust, and Trinko,” (With H. Sider), in eds. J. Kwoka and L. White, The Antitrust Revolution, (2008).

“Proposal for a Market-Based Solution to Airport Delays,” (with W. Whalen, K. Heyer and O. Richard), Regulation (2008).

"Should 'Price Squeeze' Be A Recognized Form of Anticompetitive Conduct?," Journal of Competition Law and Economics (2008).

"Safe Harbors for Quantity Discounts and Bundling," (with M. Waldman), George Mason Law Review (2008).

"The Need to Measure the Effect of Merger Policy and How to Do It," Antitrust, (condensed version of subsequent paper), (Summer 2008).

"Why We Need to Measure the Effect of Merger Policy and How to Do It," Competition Policy International (forthcoming, 2009).

"Appropriate Antitrust Policy Towards Single-Firm Conduct: Extraction vs. Extension" (with K. Heyer)," Antitrust, (condensed version of subsequent paper), (Summer 2008).

"Extraction vs. Extension: the Basis for Formulating Antitrust Policy Towards Single-Firm Conduct" (with K. Heyer), Competition Policy International, (Autumn, 2008).

"Assessing the Anticompetitive Effects of Multiproduct Pricing," (with P. Greenlee and M. Waldman), Antitrust Bulletin, (Fall, 2008).

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EXHIBIT GS-34

Exhibit GS-34

VeriSign, Leverage Your .Net Domain Name: DocuSign Promotional Video, *available at* **https://www.verisign.com/en_US/domain-names/net-domain-names/net-domain/index.xhtml**

EXHIBIT GS-35

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Upward Pricing Pressure in Horizontal Merger Analysis: Reply to Epstein and Rubinfeld

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Upward Pricing Pressure in Horizontal Merger Analysis: Reply to Epstein and Rubinfeld

Joseph Farrell and Carl Shapiro

Abstract

We reply here to a comment by Epstein and Rubinfeld to our paper on the antitrust evaluation of horizontal mergers.

KEYWORDS: antitrust, mergers, oligopoly, unilateral effects

Roy Epstein and Dan Rubinfeld (ER) recently commented on our article about using measures of upward pricing pressure, or "UPP," to analyze the price effects of horizontal mergers involving differentiated products.[1]

ER agree with us (and, we believe, with most economists) that it is desirable to diagnose unilateral price effects using simplified methods that are well-grounded in economics and not necessarily based on market definition and market shares. As ER state, "in mergers involving differentiated products, it is sensible to employ methodologies such as UPP that do not require a market definition. Instead, one can ask directly whether prices are likely to increase." Relative to traditional concentration-based methods, therefore, we are in accord.

Within that economic consensus, however, we think that some of ER's comments on UPP and on its relationship with merger simulation reflect misunderstandings. In particular, they overstate the links between UPP and Bertrand competition, and overstate UPP's information requirements relative to merger simulation.

1. The UPP Approach and Bertrand Behavior

UPP analysis does not, as ER assert (p. 9), "rely on the computation of a post-merger Bertrand equilibrium", nor does it lead to such a computation.[2] ER also state (p. 3) that "[t]he UPP methodology…assumes that pre-merger prices in the industry are determined by a Bertrand equilibrium." One can indeed conveniently present UPP in that widely accepted framework (and parts of our article did so). However, its basic logic does not depend on that assumption, although unsurprisingly the quantitative measure will vary if one knows how industry conduct departs from Bertrand.

UPP's *fundamental* assumptions are very mild and general. First, when a firm sells substitute Products 1 and 2, sales of Product 1 cannibalize to some degree the sales and profits of Product 2; UPP assumes that multi-product firms (and specifically the merged firm) recognize such cannibalization as a pecuniary (opportunity) cost of selling incremental units of Product 1. Second, UPP assumes that when a product's marginal cost rises, there is a real risk that its price will rise too (or, more broadly, that the seller will respond in a way that harms customers).[3]

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[1] See Epstein and Rubinfeld (2010) and Farrell and Shapiro (2010a).

[2] Schmalensee (2009) and Farrell and Shapiro (2010b) discuss whether it is more informative to undertake a simplified merger simulation or to calculate UPP.

[3] The rate at which increases in marginal costs are passed-through to higher prices depends upon the curvature of demand. An increase in costs can leave price unchanged if there is a sufficiently large kink in demand at the current price, with demand much more elastic for price increases than

These fundamental assumptions, described in our article (Section 2.A and the beginning of Section 2.F), do not even assume profit maximization, let alone Bertrand equilibrium. For instance, they hold if the firm maximizes any strictly increasing function of profits, revenues, and unit sales. They similarly hold if the firm maximizes long-run profits including its estimate (not visible to the outside analyst) of follow-on profits from incremental sales. They are also entirely consistent with a market in which prices are sticky and adjust only occasionally and only part of the way toward profit-maximizing levels.

How in practice should one *quantify* the incremental cannibalization term—the incremental impact on profits from Product 2 for each additional unit of Product 1 sold? In our view a very natural and practical benchmark is that the number of unit sales of Product 2 cannibalized by an additional sale of Product 1 is given by the diversion ratio, D_{12}, and that the incremental profitability of each of those sales is given by Product 2's absolute gross margin, $P_2 - C_2$. The formula $D_{12}[P_2 - C_2]$ flows immediately from these intuitive and reasonable measures.

That formula is precisely correct if one can quantify the impact of an additional sale of Product 1 on Product 2 profits as if prices other than Product 1's price did not change. Thus Bertrand equilibrium is a sufficient condition for the formula to be precise. But it is not a necessary condition, nor even the only known sufficient condition. For instance, Scheffman and Simons (2010) have recently argued that differentiated-product prices are often sticky, which would provide an alternative sufficient condition.

As our earlier article also briefly discussed, Jaffe and Weyl (2010) have shown how to quantify upward pricing pressure for non-Bertrand modes of oligopoly behavior by making two adjustments to our formula.[4] The first adjustment substitutes a modified diversion ratio that holds fixed Product 2's price but allows for equilibrium price responses by firms other than the owners of Products 1 and 2. In the usual case of accommodating responses by differentiated-product rivals, those responses mitigate the demand lost by Product 1 when its price rises, and make it less likely that those consumers who do depart will choose those other products; thus this modified diversion ratio will exceed D_{12}. The second adjustment recognizes that when Product 2's price no longer

for price decreases. Scheffman and Simons (2010) challenge the assumption that higher costs generally lead to higher prices, arguing that substantial kinks at existing prices are common in differentiated-product oligopolies. Werden (2010) criticizes Scheffman and Simons' argument and argues that their claims are not supported overall by the empirical evidence.

[4] Our article (p. 16, footnote 33) cited an earlier version of this article as Weyl (2010a).

responds to changes in Product 1's price, as it would have done pre-merger, that affects the incentive to raise the price of Product 1; in the usual case, this lowers upward pricing pressure. Thus, in the usual case these two adjustments work in countervailing directions, and it seems to us a reasonable practical approach, less heroic than many in alternative methods of merger analysis, to use $D_{12}[P_2 - C_2]$ to gauge incremental profit cannibalization. That practical implementation of the robust core logic of UPP is indeed inspired by, and precise in the case of, Bertrand competition; but, as explained above, the basic UPP approach does not assume Bertrand competition, let alone require calculation of a Bertrand equilibrium.

2. UPP Analysis is Not a Form of Merger Simulation

ER claim (p. 2) to "show explicitly that UPP in fact is a special case of merger simulation." We do not think ER show that, nor that it is the case.

A. Different Outputs

Merger simulation in differentiated-product industries typically does "rely on the computation of a post-merger Bertrand equilibrium" to predict post-merger prices.[5] By contrast, UPP does not predict post-merger prices, but only predicts the *sign* of changes in price. The two methodologies thus have different outputs, with UPP's much less detailed.

Of course, the less detailed prediction can readily be derived from the more detailed. ER note two respects in which this is the case.

First, ER note that if there is upward pricing pressure for both products, merger simulation will predict price increases for both products for a merger generating the default level of efficiencies. We agree: indeed, that is the content of Proposition 1 in our paper.

Second, ER describe the calculation of critical marginal-cost efficiencies, which goes back at least to Farrell and Shapiro (1990) for the Cournot model and to Werden (1996) for Bertrand,[6] and which is closely related to UPP. ER suggest that this is part of merger simulation, and they are of course correct that one can

[5] Because merger simulation normally involves estimating a demand system, it also predicts quantities, although it is common in our experience for only the prices to be reported.

[6] These articles consider the minimum level of marginal-cost efficiencies necessary for a horizontal merger to have no adverse effect on consumer welfare. Williamson (1968) studied the critical level of constant-unit-cost efficiencies for a merger to have no effect on total welfare, but this does depend on non-local demand information.

derive that information from the output of a merger simulation that allows for such efficiencies.

In our experience, however, neither the sign of price changes nor the critical-efficiencies exercise is what antitrust economists generally mean by "merger simulation."[7] And, as we discuss next, if these are the desired outputs, a typical merger simulation is a far more elaborate exercise than is needed to produce those outputs.

B. Different Inputs

Unsurprisingly in view of their different outputs, UPP and merger simulation rely on different input data. ER correctly note that the data required for UPP can be derived from that required for merger simulation, but of course that one-way statement is very far from equivalence of the data requirements. ER miss this point when they state (p. 2): "The main innovation in UPP is framing the analysis in terms of diversion ratios, while merger simulation models are conventionally calibrated using own and cross-price elasticities. But this is often more a matter of form rather than substance because diversion ratios and elasticities measure essentially the same thing."

Certainly one can derive the diversion ratio using the ratio of a cross-price elasticity to an own-price elasticity, as in ER's equation (2). But even if measuring a ratio of two elasticities and a ratio of quantities were "essentially the same thing" as measuring one number,[8] that misses two big differences in information (or assumption) requirements between UPP and merger simulation. First, while those inputs suffice for the diversion ratio, merger simulation requires far more. And second, there are other significant ways to estimate the diversion ratio.

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[7] For instance, while Werden (1996) stressed that the critical-efficiencies calculation is robust to demand specification, Werden et al. (1999) stressed that "merger simulation" seeks to predict post-merger variables and depends sensitively on demand curvature. These results have been explored further in the merger simulation literature (see for instance Froeb et al. 2005; Slade 2009), and prior to ER we have seen no usage suggesting (for instance) that the robust critical-efficiencies calculation disproves concerns that "merger simulation" is sensitive in this way.

[8] ER analogize (p. 5) the difference as "measuring temperature in Fahrenheit or Celsius," but it could be more like measuring temperature by estimating a wind-chill factor and gauging wind speed. Such a roundabout method may not be practical, and even when feasible is prone to additional measurement error.

1. Information Requirements for Full Merger Simulation

Merger simulation requires estimating—or being willing to assume—not only first derivatives (own and cross) at pre-merger equilibrium, but also the behavior of demand away from pre-merger equilibrium. A condensed form of this additional information requirement is that even local pass-through rates depend (as we have known at least since Bulow and Pfleiderer (1983)) on second as well as first derivatives. As Froeb et al. (2005) noted, the "shape" of the demand curve is often not independently estimated but rather assumed by the econometrician's choice of functional form to estimate. Merger simulation also typically requires strong supply-side assumptions, not only about conduct (such as Bertrand equilibrium) but also about cost structure.

ER (p. 5) "stress that knowledge as to the magnitude of the diversion ratio often comes from the specification and estimation of a demand system." But it often does not. And even where it does, it comes from only a little of the relatively grand exercise of specifying and estimating a full demand system.

Returning to the focus on critical efficiencies, ER note (p. 6) that "UPP has requirements that are essentially the same as the requirements of standard merger simulation when the goal is to identify "price neutral" efficiencies." But as noted above, that is not the usual goal of a merger simulation.

2. Other Ways to Learn About the Diversion Ratio

ER acknowledge (p. 8) that "there may be situations in which it is possible to measure diversion ratios directly." In our antitrust experience, these situations are common. For example, historical or documentary evidence from win/loss reports, discount approval processes, or customer switching patterns, can be highly informative about the diversion ratio, but yet may be uninformative about either own or cross-elasticities, and is often available when one cannot promptly and reliably estimate the entire demand system—especially with the (second-order and non-local) precision needed for merger simulation.

Describing one such approach, ER comment (p. 8) that "A plausible assumption in many instances is that diversion is proportional to current market shares." As we discussed in our paper,[9] market shares can indeed be a useful starting point for estimating diversion ratios, when combined with an estimate of market-wide recapture: specifically, if "each product's market share is reflective

[9] See also the 1992 *Horizontal Merger Guidelines*, Federal Trade Commission and Department of Justice (1992), section 2.211. The Guidelines were revised in August 2010.

of not only its relative appeal as a first choice to consumers… but also its relative appeal as a second choice"[10] then $D_{12} \approx Rs_2/[1-s_1]$.[11]

3. Conclusion

ER state (p. 3): "…we show that UPP offers an alternative way to generate approximations to the parameters used in a merger simulation model." This is certainly not how we conceive of UPP. We would say UPP is a simple and very robust method of determining whether a merger with a default level of efficiencies is likely to lead to higher prices.

ER conclude (p. 9) by stating: "Conceptually, UPP is a special case of merger simulation. Both UPP and the more general merger simulation approach rely on the computation of a post-merger Bertrand equilibrium with differentiated products and merger-specific efficiencies." As explained above, this statement is not correct: the UPP approach does not rely on the computation of a post-merger Bertrand equilibrium. Perhaps this misunderstanding explains why ER consider UPP analysis as a "special case of merger simulation." We do not.

By their nature, comments and replies often focus on points of difference rather than points of agreement. Taking a broader view, we agree with ER that both UPP analysis and merger simulation can be very useful tools for analyzing the unilateral price effects of mergers; and both tools draw on some of the same economic logic. For the reasons above, however, we do not agree that they are essentially the same tool. Far less information is needed to determine whether there is upward pricing pressure than to conduct merger simulation. This is not magic: UPP requires less information because it is less ambitious. We see UPP analysis as a useful half-way house between using diversion ratios to gauge whether the merging products are close substitutes, and performing full-fledged merger simulation.

[10] 1992 *Horizontal Merger Guidelines* section 2.211.

[11] ER continue (p. 8), "When that assumption fails to hold the UPP diagnostic is likely to generate misleading results." [footnote omitted] We presume that this simply means that assuming diversion ratios to be proportional to market shares could give misleading results if that assumption is wrong.

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EXHIBIT GS-36

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Special Access Rates for Price Cap Local Exchange Carriers	)	WC Docket No. 05-25
	)	
	)	
AT&T Corp. Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services	)	RM-10593
	)	
	)	

ORDER AND NOTICE OF PROPOSED RULEMAKING

Adopted: January 19, 2005 **Released: January 31, 2005**

Comment Date: [60 Days after publication in the Federal Register]
Reply Comment Date: [90 Days after publication in the Federal Register]

By the Commission:

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I. INTRODUCTION

1. In this Notice of Proposed Rulemaking (NPRM), we commence a broad examination of the regulatory framework to apply to price cap local exchange carriers' (LECs) interstate special access services after June 30, 2005. In conducting this examination, we seek comment on the special access regulatory regime that should follow the expiration of the CALLS plan,[1] including whether to maintain or modify the Commission's pricing flexibility rules for special access services.[2]

2. On May 31, 2000, the Commission adopted the five-year CALLS plan that set forth, *inter alia*, the interstate access charge regime for special access services for price cap carriers.[3] The Commission found that the special access rates for each year of the plan were reasonable.[4] The CALLS plan was intended to run until June 30, 2005, but will continue after this date until the Commission adopts a subsequent plan. In this NPRM we seek comment on what steps the Commission should take to ensure that rates for special access services remain just and reasonable after the expiration of the CALLS plan.

3. Although we typically do not examine a single interstate access charges basket (*e.g.*, special access) separate from the other baskets (*e.g.*, common line, switched access, transport), we find that the increased importance of special access services relative to other access services warrants the initiation of a rulemaking proceeding specific to interstate special access charges. Notably, business customers, commercial mobile radio service (CMRS) providers, interexchange carriers (IXCs), and competitive LECs all use special access services as a key input in many of their respective service offerings.

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[1] *See Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 99-249, 96-45, Sixth Report and Order in CC Docket Nos. 96-262 and 94-1, Report and Order in CC Docket No. 99-249, Eleventh Report and Order in CC Docket No. 96-45, 15 FCC Rcd 12962 (2000) (*CALLS Order*), *aff'd in part, rev'd in part, and remanded in part*, *Texas Office of Public Util. Counsel v. FCC*, 265 F.3d 313 (5th Cir. 2001), *cert. denied, Nat'l Ass'n of State Util. Consumer Advocates v. FCC*, 535 U.S. 986 (2002), *on remand, Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 99-249, 96-45, Order on Remand, 18 FCC Rcd 14976 (2003). *See also Cost Review Proceeding for Residential and Single-Line Business Subscriber Line Charge (SLC) Caps*, CC Docket Nos. 96-262, 94-1, Order, 17 FCC Rcd 10868 (2002), *aff'd, Nat'l Ass'n of State Util. Consumer Advocates v. FCC*, 372 F.3d 454 (D.C. Cir. June 29, 2004).

[2] *See* 47 C.F.R. §§ 69.701 *et seq*.; *Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 98-63, 98-157, Fifth Report and Order and Further Notice of Proposed Rulemaking, 14 FCC Rcd 14221, 14224-25, 14232-33, 14234-35, 14257-310, paras. 1-4, 19, 24-26, 67-175 (1999) (*Pricing Flexibility Order*), *aff'd WorldCom v. FCC*, 238 F.3d 449 (D.C. Cir. 2001).

[3] *See CALLS Order*, 15 FCC Rcd at 13014-39, paras. 129-184. CALLS stands for the Coalition for Affordable Local and Long Distance Service and consisted of AT&T, Bell Atlantic, BellSouth, GTE, SBC, and Sprint. *Id*. at 12964, para. 1.

[4] *See id.*, 15 FCC Rcd at 12978-79, para. 41; *see also* 47 U.S.C. § 201(b) ("All charges . . . for and in connection with [interstate or foreign] communication service, shall be just and reasonable, and any such charge . . . that is unjust or unreasonable is hereby declared to be unlawful . . .").

Moreover, from 1991 (the first year of federal price cap regulation) to 2003, annual revenues from Bell Operating Company (BOC) interstate special access services increased from $2.5 billion to $13.5, and BOC special access revenues as a percentage of all BOC interstate operating revenues increased from 12.8 percent to 45.4 percent.[5] The Commission commenced a comprehensive rulemaking proceeding in 2001 to reform intercarrier compensation, including an examination of the appropriate rate levels and rate structures for, *inter alia*, interstate switched access services.[6] In 2004, numerous industry groups and other interested parties submitted intercarrier compensation reform proposals in that proceeding,[7] and we will issue a further notice seeking comment on those proposals in the near future.

4. To ensure that our examination of the special access charge rules is sufficiently broad to establish the appropriate regulatory regime post-CALLS, we seek comment not only on traditional price cap issues, but also on the Commission's special access pricing flexibility rules. In 1999, the Commission established certain criteria under which price cap carriers may obtain the authority to provide special access services using more flexible contract tariffs, rather than standard, one-size fits all price cap tariffs.[8] The Commission found that, using collocation by competitive carriers as predictive evidence of irreversible market entry, price cap LECs that meet certain evidentiary triggers may obtain pricing flexibility relief from our price cap rules.[9]

5. As part of our review of the pricing flexibility rules, which were adopted, in part, based on the Commission's predictive judgment, we will examine whether the available marketplace data support maintaining, modifying, or repealing these rules. We note that we are committed to re-examine periodically rules that were adopted on the basis of predictive judgments to evaluate whether those judgments are, in fact, corroborated by marketplace developments.[10] Because we are undertaking an examination of the appropriate post-CALLS special access regime, we deem it appropriate at this time also to seek comment on whether actual marketplace developments support the predictive judgments that underlie the special access pricing flexibility rules.[11] We note that parties have already provided

[5] *See* ARMIS 43-01, Table 1, Cost and Revenue, Rows 1090, 1290, columns h, s.

[6] *See Developing a Unified Intercarrier Compensation Regime*, CC Docket No. 01-92, Notice of Proposed Rulemaking, 16 FCC Rcd 9610 (2001) (*Intercarrier Compensation NPRM*).

[7] *See, e.g.*, Regulatory Reform Proposal of the Intercarrier Compensation Forum, October 5, 2004 (ICF Proposal), attached to Letter from Gary M. Epstein and Richard R. Cameron, Counsel for the Intercarrier Compensation Forum, to Marlene H. Dortch, Sec'y, Federal Communications Commission, CC Docket No. 01-92, Tab A (filed Oct. 5, 2004).

[8] *See* 47 C.F.R. §§ 69.701 *et seq*.; *Pricing Flexibility Order*, 14 FCC Rcd at 14257-312, paras. 67-178; *see also infra* section II.B.

[9] *Pricing Flexibility Order*, 14 FCC Rcd at 14261-81, 14288-302, paras. 77-107, 121-56; *see also infra* section II.B.

[10] *See, e.g.*, *Aeronautical Radio, Inc. v. FCC*, 928 F.2d 428, 445 (D.C. Cir. 1991) (deferring to the Commission's predictive judgment "with the *caveat*, however, that, should the Commission's predictions . . . prove erroneous, the Commission will need to reconsider its [decision] in accordance with its continuing obligation to practice reasoned decisionmaking" [sic]) (emphasis in original); *Cellnet Communications, Inc. v. FCC*, 149 F.3d 429, 442 (6th Cir. 1998) (deferring to the Commission's predictions about the level of competition, but stating that, if the predictions do not materialize, the Commission "will of course need to reconsider its [decision] in accordance with its continuing obligation to practice reasoned decision-making").

[11] Although we choose to examine marketplace developments, we reject AT&T's contention that we are required to do so at this time. *AT&T Corp. Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, RM-10593, Petition for Rulemaking at 6-7, 35-36 (filed Oct. 15, 2002) (*AT&T Petition for Rulemaking*). Congress has not "provided a timetable or other indication of the speed with which it expects the agency to proceed" on rulemaking requests. *See Telecommunications Research Action Center v. FCC*, 750 F.2d 70, 80 (D.C. Cir. 1984).

conflicting data and analysis on this issue in response to the *AT&T Petition for Rulemaking*.[12] We seek additional data, as detailed below,[13] and we incorporate the record already compiled in response to that petition into this proceeding.

6. Because we incorporate that record and address the AT&T petition here, we also respond to AT&T's request for interim relief. AT&T claims that, despite the BOCs satisfying the pricing flexibility triggers in many markets and the Commission's prediction that this would serve as indicia of competitive market entry, competitive entry has not occurred.[14] It contends, moreover, that the BOCs have used pricing flexibility to maintain or raise rates, not to lower rates in response to predicted competitive entry.[15] It thus asserts that the BOCs' special access rates are at supracompetitive levels.[16] To remedy these alleged problems, AT&T requests that we initiate a rulemaking.[17] It also asks that we reinitialize Phase II pricing flexibility special access rates at an 11.25 percent rate of return, and impose a temporary moratorium on further pricing flexibility applications.[18] As we explain *infra* in section III.C, we deny AT&T's request to re-initialize special access rates and to impose a moratorium on consideration of further pricing flexibility applications. We also seek comment on whether we should adopt any interim requirements in the event that the Commission is unable to conclude this NPRM in time for any adopted rule changes to be implemented in the 2005 annual tariff filings.

II. BACKGROUND

7. To recover the costs of providing interstate access services, price cap LECs charge IXCs, competitive LECs, CMRS providers, and end users for access services in accordance with our Part 61 and Part 69 access charge rules.[19] There are two basic categories of access services: special access services and switched access services. Special access services do not use local switches; instead they employ dedicated facilities that run directly between the end user and the IXC's point of presence (POP) or between two discrete end user locations.[20] Switched access services, on the other hand, use local exchange switches to route originating and terminating interstate toll calls.[21]

8. Charges for special access services generally are divided into channel termination charges and channel mileage charges. Channel termination charges recover the costs of facilities between the customer's premises and the LEC end office and the costs of facilities between the IXC POP and the LEC serving wire center.[22] Channel mileage charges recover the costs of facilities (also known as interoffice facilities) between the serving wire center and the LEC end office serving the end user. The special

[12] *See infra* section II.C.

[13] *See infra* section III.B.

[14] *AT&T Petition for Rulemaking* at 2, 6-7, 11-13, 20, 25-32.

[15] *Id.* at 11-13.

[16] *Id.* at 1-6, 20, 34-35.

[17] *Id.* at 1, 5-7.

[18] *Id.* at 6, 39-40.

[19] 47 C.F.R. Parts 61 (access charge rate levels), 69 (access charge rate structures).

[20] A POP is the physical point where an IXC connects its network with the LEC network.

[21] *See Pricing Flexibility Order*, 14 FCC Rcd at 14226, para. 8.

[22] "Serving wire center means the telephone company central office designated by the telephone company to serve the geographic area in which the interexchange carrier or other person's point of demarcation is located." 47 C.F.R. § 69.2(rr).

access rates for price cap incumbent LECs are currently subject to two pricing regimes – price caps and pricing flexibility.[23]

A. Price Cap Regulation

1. History

9. Through the end of 1990, interstate access charges were governed by "rate-of-return" regulation, under which incumbent LECs calculated their access rates using projected costs and projected demand for access services.[24] An incumbent LEC was limited to recovering its costs plus a prescribed return on investment. It also was potentially obligated to provide refunds if its interstate rate of return exceeded the authorized level. Thus, a rate of return regulatory structure bases a firm's allowable rates directly on the firm's reported costs and was thus subject to criticisms that it removed the incentive to reduce costs and improve productive efficiency.[25]

10. Consequently, in 1991 the Commission implemented a system of price cap regulation that altered the manner in which the largest incumbent LECs (often referred to today as price cap LECs) established their interstate access charges.[26] The Commission's price cap plan for LECs was intended to avoid the perverse incentives of rate-of-return regulation in part by divorcing the annual rate adjustments from the performance of each individual LEC, and in part by adjusting the cap based on actual industry productivity experience.[27]

11. In contrast to rate-of-return regulation, which limits the *profits* an incumbent LEC may earn, price cap regulation focuses primarily on the *prices* that an incumbent LEC may charge and the *revenues* it may generate from interstate access services. The access charges of price cap LECs originally were set at levels based on the rates that existed at the time they entered price caps. Their rates have, however, been limited over the course of price cap regulation by price indices that are adjusted annually pursuant to formulae set forth in our Part 61 rules. The price cap formula traditionally included a productivity factor (the "X-factor") that represented the extent to which the overall LEC productivity growth rate could be expected to exceed the productivity growth rate of the economy as a whole. Price cap carriers whose interstate access charges are set by these pricing rules are permitted to earn returns significantly higher, or potentially lower, than the prescribed rate of return that incumbent LECs are allowed to earn under rate-of-return rules. Price cap regulation encourages incumbent LECs to improve their efficiency by harnessing profit-making incentives to reduce costs, invest efficiently in new plant and facilities, and develop and deploy innovative service offerings, while setting price ceilings at reasonable levels.[28] In the

[23] *See Pricing Flexibility Order*, 14 FCC Rcd at 14227, para. 10.

[24] Since 1981, the Commission has allowed certain smaller incumbent LECs to base their access rates on historic, rather than projected, cost and demand. *See* 47 C.F.R. § 61.39.

[25] *See CALLS Order*, 15 FCC Rcd at 12968, paras. 13, 15.

[26] The Commission required price cap regulation for the BOCs and GTE, and permitted other LECs to elect price cap regulation voluntarily, provided that all their affiliates also convert to price cap regulation and that they withdraw from the pools administered by the National Exchange Carrier Association (NECA). *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Second Report and Order, 5 FCC Rcd 6786, 6818-20, paras. 257-59 (1990) (*LEC Price Cap Order*), *aff'd Nat'l Rural Telecom Ass'n v. FCC*, 988 F.2d 174 (D.C. Cir. 1993). Most rural and small LECs elected to remain subject to rate-of-return regulation.

[27] *See CALLS Order*, 15 FCC Rcd at 12968, para. 14.

[28] The price cap regulations also give incumbent LECs greater flexibility in determining the amount of revenues that may be recovered from a given access service. The price cap rules group services together into different baskets, service categories, and service subcategories. The rules then identify the total permitted revenues for each basket or category of services. Within these baskets or categories, incumbent LECs are given some discretion to determine

(continued....)

short run, the behavior of individual companies has no effect on the prices they are permitted to charge, and they are able to keep any additional profits resulting from reduced costs. This creates an incentive to cut costs and to produce efficiently. In this way, price caps act as a transitional regulatory scheme until the advent of actual competition makes price cap regulation unnecessary.[29]

12. Although price cap regulation diminished the direct link between changes in allocated accounting costs and change in prices, it did not sever the connection between accounting costs and prices entirely. Rather, because the rates to which the price cap formulae were originally applied resulted from rate-of-return regulation, overall price cap LEC interstate revenue levels continued generally to reflect the accounting and cost allocation rules used to develop access charges.[30] Moreover, earnings remain relevant to price cap regulation on several respects. First, price cap indices may be adjusted upward if a price cap carrier earns returns below a specified level in a given year (referred to as a "low-end" adjustment).[31] Second, a price cap LEC may petition the Commission to set its rates above the levels permitted by the price cap indices based on a showing that the authorized rate levels will produce earnings that are so low as to be confiscatory (referred to as an "above-cap filing").[32] Third, in the past, all or some price cap LECs were required to "share," or return to ratepayers, earnings above specified levels. This sharing requirement was eliminated in 1997.[33]

13. With the passage of the Telecommunications Act of 1996 (1996 Act),[34] the Commission determined that it was necessary to undertake substantial access charge reform.[35] In 1997 in the *Access Charge Reform Order*, for example, the Commission instituted reforms that changed the manner in which price cap LECs recover access costs by aligning the rate structure more closely with the manner in which costs are incurred.[36] The Commission stated, moreover, that it would rely on competition as the primary method for bringing about cost-based access charges.[37] It anticipated creating, in a later stage of access

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the portion of revenue that may be recovered from specific services. Subject to certain restrictions, this flexibility allows incumbent LECs to alter the rate level associated with a given service. *CALLS Order*, 15 FCC Rcd at 12968-69, para. 16 n.15.

[29] *See id.*, 15 FCC Rcd at 12968-69, para. 16 (citing *Price Cap Performance Review for Local Exchange Carriers*, Second Further Notice of Proposed Rulemaking in CC Docket No. 94-1, Further Notice of Proposed Rulemaking in CC Docket No. 93-124, and Second Further Notice of Proposed Rulemaking in CC Docket No. 93-197, 11 FCC Rcd 858, 862, paras. 5-6 (1995) (*Price Cap Second FNPRM*)).

[30] *See id.*, 15 FCC Rcd at 12968, para. 17.

[31] *See id*. In 1999, the low-end adjustment was eliminated for those LECs that receive and exercise pricing flexibility. *See infra* section II.B.

[32] *See CALLS Order*, 15 FCC Rcd at 12968, para. 17.

[33] *See id.* (citing *Price Cap Performance Review for Local Exchange Carriers*, Fourth Report and Order in CC Docket No. 94-1 and Second Report and Order in CC Docket No. 96-262, 12 FCC Rcd 16642, 16991, 16700-03, paras. 127, 148-55 (1997) (*1997 Price Cap Review Order*), *aff'd in part, rev'd in part*, *United States Telecom Ass'n v. FCC*, 188 F.3d 521 (D.C. Cir. 1999)).

[34] Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996). The 1996 Act amended the Communications Act of 1934, 47 U.S.C. § 151 *et seq*. We refer to these Acts collectively as the "Communications Act."

[35] *See CALLS Order*, 15 FCC Rcd at 12969-70, para. 18.

[36] *Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 91-213, 95-72, First Report and Order, 12 FCC Rcd 15982, 16007-34, paras. 67-122 (1997) (*Access Charge Reform Order*), *aff'd Southwestern Bell Tel. Co. v. FCC*, 153 F.3d 523 (8th Cir. 1998).

[37] *Access Charge Reform Order*, 12 FCC Rcd at 16001-02, para.44.

reform, a mechanism whereby it would lessen, and eventually eliminate, rate regulation as competition developed.[38] To the extent that competition did not fully achieve the goal of moving access rates toward costs, the Commission reserved the right to adjust rates in the future to bring them into line with forward-looking costs.[39] To assist in that effort, the Commission said it would require price cap LECs to start forward-looking cost studies no later than February 8, 2001 for all services then remaining under price caps.[40]

2. The CALLS Plan

14. Subsequently, in 2000, after a comprehensive examination of the interstate access charge and universal service regulatory regimes for price cap carriers, the Commission adopted the industry-proposed CALLS plan.[41] This plan represents a five-year interim regime designed to phase out implicit subsidies and (as it pertains to access charges) to move towards a more market-based approach to ratesetting.[42] In adopting the CALLS plan, the Commission offered price cap carriers the choice of completing the forward-looking cost studies required by the *Access Charge Reform Order* or voluntarily making the rate reductions required under the five-year CALLS plan.[43] The Commission permitted carriers to defer the planned forward-looking cost studies in favor of the CALLS plan because it found the plan to be "a transitional plan that move[d] the marketplace closer to economically rational competition, and it [would] enable [the Commission], once such competition develops, to adjust our rules in light of relevant marketplace developments."[44] All price cap carriers opted for the CALLS plan.[45]

15. The CALLS plan separated special access services into their own basket and applied a separate X-factor to the special access basket.[46] The X-factor under the CALLS plan, unlike under prior price cap regimes, is not a productivity factor. Rather, it represents "a transitional mechanism . . . to lower rates for a specified period of time for special access."[47] The special access X-factor was 3.0 percent in 2000 and 6.5 percent in 2001, 2002, and 2003. In addition to the X-factor, access charges under CALLS are adjusted for inflation as measured by the Gross Domestic Product-Price Index (GDP-PI).[48] For the final year of the CALLS plan (July 1, 2004 – June 30, 2005), the special access X-factor is set equal to inflation, thereby freezing rate levels.[49] Thus, absent the implementation of a new price cap regime post-CALLS, price cap LECs' special access rates will remain frozen at 2003 levels (unless any

[38] *Id.*, 12 FCC Rcd at 16003, paras. 48-49.

[39] *Id.*, 12 FCC Rcd at 16002-03, para. 47.

[40] *Id.*, 12 FCC Rcd at 16003, para. 48; *see CALLS Order*, 15 FCC Rcd at 12970, para. 20.

[41] *CALLS Order*, 15 FCC Rcd 12962.

[42] *See id.,* 15 FCC Rcd at 12965, 12977-79, paras. 4, 36-42.

[43] *Id.*, 15 FCC Rcd at 12974, 12983-86, paras. 29, 56-62.

[44] *Id.*, 15 FCC Rcd at 12977, para. 36.

[45] *See Petition for Forbearance of Iowa Telecommunications Services, Inc. d/b/a Iowa Telecom Pursuant to 47 U.S.C. § 160(c) from the Deadline for Price Cap Carriers to Elect Access Rates Based on the CALLS Order or a Forward Looking Cost Study*, CC Docket No. 01-131, Order, 17 FCC Rcd 24319, 24320, at para. 3 (2002).

[46] *CALLS Order*, 15 FCC Rcd at 12974-75, 13033-34, paras. 30, 172. The CALLS plan also retained the low-end adjustment for price cap LECs. *Id*. at 13038, para. 182.

[47] *Id.*, 15 FCC Rcd at 13028, para. 160.

[48] *Id.*, 15 FCC Rcd at 13038, para. 183.

[49] *Id.*, 15 FCC Rcd at 13025, para. 149. Because rates are both reduced by and increased by the inflation rate, they are effectively frozen. *See infra* para. 30.

exogenous cost adjustments are necessary).[50] The Commission hoped that, by the end of the five-year CALLS plan, competition would exist to such a degree that deregulation of access charges for price cap LECs would be the next logical step.[51]

B. Pricing Flexibility

16. Pursuant to the pro-competitive, deregulatory mandates of the 1996 Act, in 1996 the Commission began exploring whether and how to remove price cap LECs' access services from price cap and tariff regulation once they are subject to substantial competition.[52] Three years later, in 1999, the Commission adopted the *Pricing Flexibility Order* to ensure that the Commission's interstate access charge regulations did not unduly interfere with the operation of interstate access markets as competition developed in those markets.[53] The Commission developed competitive triggers designed to measure the extent to which competitors had made irreversible, sunk investment in collocation and transport facilities.[54] Price cap carriers that satisfy those triggers may obtain the pricing flexibility to offer special access services at unregulated rates through generally available and individually negotiated tariffs (*i.e.*, contract tariffs).[55]

17. Pricing flexibility permits the LEC to enter into more individualized relationships with its special access customers. Pricing flexibility may be obtained by price cap LECs in two separate phases, each on a Metropolitan Statistical Area (MSA) basis. Under Phase I relief, a price cap carrier may offer volume and term discounts and contract tariffs for interstate special access services unconstrained by the Commission's Part 61 rate level rules and Part 69 rate structure rules.[56] To protect those customers that may lack competitive alternatives, however, the price cap LEC must continue to offer its generally available, price cap constrained (*i.e.*, subject to both Part 61 and Part 69) tariff rates for these services.[57] Under Phase II relief, a price cap carrier may file individualized special access contract tariffs, subject only to continuing to make available generalized special access tariff offerings.[58] Neither the contract

[50] 47 C.F.R. § 61.45(b)(1)(iv) ("Starting in the 2004 annual filing, X shall be equal to GDP-PI for the special access basket.").

[51] *CALLS Order*, 15 FCC Rcd at 12977, para. 35.

[52] *See Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 91-213, 96-263, Notice of Proposed Rulemaking, Third Report and Order, and Notice of Inquiry, 11 FCC Rcd 21354, 21357-58, 21363, paras. 1, 15 (1996) (*Access Charge NPRM, Order, and NOI*).

[53] *Pricing Flexibility Order*, 14 FCC Rcd at 14224, para. 1.

[54] *Id.*, 14 FCC Rcd at 14261, paras. 77-83.

[55] *Id.*, 14 FCC Rcd 14287-94, 14301-02, paras. 122-33, 153-55. Although the Commission developed pricing flexibility triggers for both special access and switched access services, we address only special access services in this NPRM.

[56] To obtain Phase I relief for interstate special access services other than channel terminations between a LEC end office and an end user's customer premises, a price cap LEC must demonstrate that unaffiliated competitors have collocated in at least 15 percent of the LEC's wire centers within an MSA or collocated in wire centers accounting for 30 percent of the LEC's revenues from these services within the MSA. To obtain Phase I pricing flexibility for channel terminations between a LEC end office and a customer premises, the LEC must demonstrate that unaffiliated competitors have collocated in at least 50 percent of the LEC's wire centers within an MSA or collocated in wire centers accounting for 65 percent of the LEC's revenues from these services within the MSA. 47 C.F.R. §§ 69.709, 69.711; *Pricing Flexibility Order*, 14 FCC Rcd at 14235-36, 14273-77, paras. 24, 93-99.

[57] *Pricing Flexibility Order*, 14 FCC Rcd at 14235-36, para. 24.

[58] To obtain Phase II relief for special access services other than channel terminations to end users, the trigger thresholds are unaffiliated collocation in 50 percent of the LEC's wire centers or in wire centers accounting for 65 percent of the LEC's revenues from these services within the MSA. For channel terminations to end users, the

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tariffs nor the general offerings are constrained by our Part 61 or our Part 69 rules.[59] A LEC that obtains and exercises pricing flexibility (Phase I or II) for any MSA is precluded, at the holding company level, from applying for a low-end adjustment.[60]

18. The Commission adopted pricing flexibility to provide regulatory relief for special access services coincident with the development of competition for these services.[61] It determined that, "because regulation is not an exact science," it could not time the grant of pricing flexibility relief to coincide precisely with the introduction of interstate special access alternatives for every end user.[62] The Commission further determined that, in light of the showing necessary to satisfy the triggers, the costs of delaying regulatory relief outweighed the risks of granting relief too soon.[63] In particular, the Commission found that the triggers would accurately predict the existence of competitive pressures that would discipline interstate special access rates.[64] It thus explained that "[t]he pricing flexibility framework . . . is designed to grant greater flexibility to price cap LECs as competition develops, while ensuring that: (1) price cap LECs do not use pricing flexibility to deter efficient entry or engage in exclusionary pricing behavior; and (2) price cap LECs do not increase rates to unreasonable levels for customers that lack competitive alternatives."[65] On February 2, 2001, the D.C. Circuit upheld the *Pricing Flexibility Order*, finding that the Commission made a reasonable policy determination and sufficiently explained its basis for doing so.[66]

C. AT&T's Petition for Rulemaking

19. On October 15, 2002, AT&T Corp. filed a petition for rulemaking essentially requesting that the Commission revoke the pricing flexibility rules and revisit the CALLS plan as it pertains to the rates that price cap LECs, and the BOCs in particular, charge for special access services.[67] AT&T claims that the pricing flexibility triggers fail to predict price-constraining competitive entry and, rather, that significant competitive entry has not occurred.[68] It further contends that, based on Automated Reporting Management Information System (ARMIS) data, the BOCs' interstate special access revenues more than tripled, from $3.4 billion to $12.0 billion, between 1996 and 2001 and that their returns on special access services were between 21 and 49 percent in 2001.[69] Further, AT&T states that, in every MSA for which

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Phase II thresholds are unaffiliated collocation in 65 percent of the LEC's wire centers or in wire centers accounting for 85 percent of the LEC's revenues for these services. 47 C.F.R. §§ 69.709, 69.711; *Pricing Flexibility Order*, 14 FCC Rcd at 14235, 14298-300, paras. 25, 146-52.

[59] *Pricing Flexibility Order*, 14 FCC Rcd at 14235, 14301-02, paras. 25, 153-55.

[60] *Id.*, 14 FCC Rcd at 14304-07, paras. 162-68.

[61] *Id.*, 14 FCC Rcd 14224-25, 14271-72, 14297-98, paras. 2, 90, 144.

[62] *Id.*, 14 FCC Rcd at 14297-98, para. 144.

[63] *Id*.

[64] *Id*.

[65] *Id.*, 14 FCC Rcd at 14225, para. 3.

[66] *WorldCom v. FCC*, 238 F.3d 449, 452 (D.C. Cir. 2001).

[67] *AT&T Petition for Rulemaking* at 1, 6, 39-40. Competitive LECs and telecommunications users generally support the *AT&T Petition for Rulemaking*. *See, e.g.*, Ad Hoc Telecommunications Users Committee Comments at 1-7; American Petroleum Institute Comments at 1-5; AT&T Wireless Comments at 1-7; PacTec Comments at 1-6; WorldCom Comments at 1-14.

[68] *AT&T Petition for Rulemaking* at 2, 6-7, 11-13, 20, 25-32.

[69] *Id.* at 3-4, 8-9, 14.

pricing flexibility was granted, BOC special access rates either remained flat or increased.[70] Thus, AT&T contends both that the predictive judgment at the core of the *Pricing Flexibility Order* has not been confirmed by marketplace developments, and that BOC special access rates are at supracompetitive levels that are unjust and unreasonable in violation of section 201 of the Communications Act.[71] Because the predictive judgment has proven wrong, AT&T asserts, the Commission is compelled to revisit its pricing flexibility rules in a rulemaking proceeding.[72] During the pendency of this rulemaking, AT&T requests that we grant interim relief (1) reducing the rates for all special access charges subject to Phase II pricing flexibility to the rates that an 11.25 percent rate of return would generate, and (2) imposing a pricing flexibility moratorium.[73]

20. Price cap LECs generally oppose the *AT&T Petition for Rulemaking*. They claim that their special access rates are reasonable and therefore lawful, that there is robust competition in the special access market, that the collocation-based triggers are an accurate metric for competition, and that the data relied upon by AT&T are unreliable in the context used by AT&T.[74] SBC notes that AT&T only provided (and could only provide) data from a single year (2001) that post-dates the initial implementation of Phase II pricing flexibility in 2001,[75] and SBC and Verizon claim that ARMIS data are not designed to evaluate the reasonableness of rates.[76] The BOCs contend, moreover, that special access revenues per line declined between 1996 and 2001.[77]

21. On November 6, 2003, AT&T filed a petition for mandamus with the D.C. Circuit, requesting the court to direct the Commission to act on its rulemaking petition and to grant the interim relief sought.[78] On March 23, 2004, the court on its own motion referred the mandamus petition to a merits panel.[79] On July 1, 2004, the Commission submitted its brief to the court.[80] The court heard oral argument on the mandamus petition on October 21, 2004. Subsequently, the court held the matter in abeyance, requiring that the Commission provide it with a status report on December 1, 2004, and on

[70] *Id.* at 11-13.

[71] *Id.* at 1-6, 20, 34-35.

[72] *Id.* at 6-7, 35-36.

[73] *Id.* at 6, 39-40. AT&T also requests that we exempt special access purchasers that take advantage of this relief (if granted) from any early termination liabilities. *Id*. at 6, 40.

[74] *See, e.g.*, SBC Opposition at 10-13, 19, 22-24; Verizon Opposition at 9-10, 13-14, 17, 21.

[75] SBC Opposition at 16.

[76] *Id.* at 22; Verizon Opposition at 21.

[77] *E.g.*, SBC Opposition at 23-24, Declaration of Alfred E. Kahn and William E. Taylor at 15. We note that the Declaration of Alfred E. Kahn and William E. Taylor was attached separately to the BellSouth Opposition, the Qwest Opposition, the SBC Opposition, and the Verizon Opposition. We therefore refer to it as the "Kahn/Taylor Decl.," without reference to a particular party, throughout the remainder of this NPRM.

[78] A*T&T Corp., et al.*, D.C. Circuit Case No. 03-1397, Petition for a Writ of Mandamus (filed Nov. 6, 2003). The following parties jointly submitted the mandamus petition with AT&T: AT&T Wireless, The CompTel/ASCENT Alliance, eCommerce and Telecommunications Users Group, and The Information Technology Association of America.

[79] *AT&T Corp., et al.*, D.C. Circuit Case No. 03-1397, Order (March 23, 2004).

[80] *AT&T Corp., et al.*, D.C. Circuit Case No. 03-1397, Brief for Federal Communications Commission (filed July 1, 2004).

February 1, 2005.[81] The Commission provided the court with the required status report on December 1, 2004.[82]

III. DISCUSSION

22. Given the importance of special access services to carriers and customers alike, we commence this proceeding to seek comment on the interstate special access regime that we should put in place post-CALLS. To ensure that our examination is complete, we also seek comment on whether, as part of that regime, we should maintain, modify, or repeal the Commission's pricing flexibility rules. Finally, because this proceeding likely will not be completed in time for a new special access regime to be implemented in the 2005 annual access tariff filings, we seek comment on whether interim relief may be warranted and, if so, under what circumstances.

23. As a threshold matter, we request that any party that comments on the appropriate post-CALLS special access regulatory regime and/or that proposes the Commission alter in any way the existing pricing flexibility rules include in its comments specific language that would codify its proposed special access regulatory regime and/or its proposed pricing flexibility rule change(s).[83]

A. Interstate Special Access Rates of Price Cap LECs Post-CALLS

24. The first step in establishing the post-CALLS special access rate regulatory regime is to determine the type of rate regulation, if any, that should apply. We tentatively conclude that we should continue to regulate special access rates under a price cap regime and that the price cap regime should continue to include pricing flexibility rules that apply where competitive market forces constrain special access rates. This approach will allow the market to determine rates where competitive market forces exist, while protecting special access consumers from unreasonable rates where competition is lacking. Such a regime, we tentatively conclude, would result in just and reasonable rates as required under section 201 of the Communications Act.[84] We seek comment on these tentative conclusions.

25. Consistent with these tentative conclusions, in this section we discuss the major issues with respect to implementing a price cap method to regulate special access rates and seek comment on how to resolve these issues. In section III.B, *infra*, we discuss and seek comment on the appropriate pricing flexibility aspects of a price cap regime.

1. Changes in the Special Access Market

26. Special access services have significant economies of scale and scope. Most of the cost of providing a special access line is in the support structure, *i.e.*, the trenches, manholes, poles, and conduits, the rights-of-way, and the access to buildings, not in the fiber strand or copper wires that share the support

[81] *AT&T Corp., et al.*, D.C. Circuit Case No. 03-1397, Order (Oct. 25, 2004) (holding the matter in abeyance and requiring the Commission submit a status report on Dec. 1, 2004); *AT&T Corp., et al.*, D.C. Circuit Case No. 03-1397, Order (Dec. 8, 2004) (continuing to hold the matter in abeyance and requiring the Commission to submit a second status report on Feb. 1, 2005).

[82] *AT&T Corp., et al.*, D.C. Circuit Case No. 03-1397, Status Report of Federal Communications Commission (filed Dec. 1, 2004).

[83] For example, in support of the CALLS proposal, the CALLS members submitted specific proposed rule changes. *See, e.g.*, *Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 99-245, 96-45, Memorandum in Support of the Coalition for Affordable Local and Long Distance Service Plan at App. B (filed Aug. 20, 1999). Parties should likewise submit their proposed specific rule changes as part of their comments in this proceeding.

[84] *See* 47 U.S.C. § 201(b).

structure, rights, and access.[85] Structure, rights, and access costs vary little with respect to the number of fiber strands or copper wires, thereby producing economies of scale. Price cap LECs can, moreover, increase capacity on many special access routes at a relatively low incremental cost (relative to the total cost of trenching and placing poles, manholes, conduit, fiber, and copper, and securing rights and access) by adding or upgrading terminating electronics.[86]

27. The first full year of the CALLS plan and the first year that price cap LECs exercised significant pricing flexibility was 2001.[87] ARMIS data show that, in the 2001-2003 period, BOC special access operating revenues, operating expenses, accounting rates of return, and the number of special access lines increased annually (*i.e.*, compound annual growth rates over the period) by approximately 12, 7, 17, and 18 percent, respectively.[88] BOC special access average investment decreased at a compounded annual rate of less than one percent over the same period.[89] The overall (*i.e.*, not compounded annually) BOC interstate special access accounting rates of return were approximately 38, 40, and 44 percent in 2001, 2002, and 2003, respectively.[90]

28. In the period 1992-2000, a period that precedes the CALLS plan and significant pricing flexibility, BOC interstate special access operating revenues, operating expenses, average investment, accounting rates of return, and special access lines increased at a compounded annual rate of

[85] *See AT&T Petition for Rulemaking* at 29; Kahn/Taylor Decl. at 10-11.

[86] *See AT&T Petition for Rulemaking* at 29.

[87] *See supra* sections II.A.2 (CALLS), II.B (pricing flexibility).

[88] The compound annual growth rates for operating revenues, operating expenses, and rate of return were calculated using ARMIS data reported for interstate special access services (entered as of September 29, 2004). The underlying operating revenues and operating expenses data are from ARMIS 43-01, Table I, Cost and Revenue, rows 1090, 1190, cols. s. Net return is divided by average net investment to calculate annual rates of return for which the compound annual growth rate is calculated. The underlying net return and average net investment data are from ARMIS 43-01, Table 1, Cost and Revenue, rows 1910, 1915, col. s. We calculated the compound annual growth rate for special access analog and digital lines collectively using ARMIS data reported for interstate and state special access services. These special access lines are expressed in voice grade equivalents in the ARMIS reports. The underlying special access analog and digital line data are in ARMIS, 43-08, Table III, Access Lines in Service by Customer, row 910, cols. fj and fk. The ARMIS report does not identify separately the number of interstate and the number of state special access lines. The compound annual growth rate for state and interstate special access lines should be similar to the growth rate for interstate special access lines alone, because state special access revenues alone represent a relatively small fraction of combined state and interstate special access service revenues. Specifically, BOC interstate special access operating revenues were approximately $13.5 billion in 2003. *See* ARMIS 43-01, Table I, Cost and Revenue, row 1090, col. s. Of this amount, approximately $12.9 billion, or 96 percent, is reported as network access service revenue for special access services. *See* ARMIS 43-01, Table I, Cost and Revenue, row 1020, col. s. Although ARMIS does not report a figure for the state jurisdiction that is directly comparable to special access operating revenues, it does report that, in 2003, approximately $1.6 billion revenues for state network access service revenues-special access. *See* ARMIS 43-04, Table I, Separations and Access Data, row 4012, col c. The state network access service revenue-special access is approximately 11 percent of the total for state and interstate network access service revenue-special access. The state share of the total of state and the interstate special access lines should be similar. Moreover, use of the compound annual growth rate for state and interstate special access lines collectively to estimate the growth rate for interstate special access lines alone is reasonable because there is no evidence that state special access lines are growing at a significantly different rates than are interstate special access lines.

[89] The compound annual growth rate for average net investment is calculated from ARMIS data reported for interstate special access services. *See* ARMIS 43-01, Table I, Cost and Revenue, row 1910, col. s.

[90] The annual rates of return were calculated using ARMIS data reported for interstate special access services. Specifically, we divided the net return by average net investment to calculate the rates of return. *See* ARMIS 43-01, Table 1, Cost and Revenue, rows 1910, 1915, col. s.

approximately 16, 12, 11, 11, and 32 percent, respectively.[91] The overall (non-compounded) BOC special access accounting rates of return varied over this period from a low of approximately 7 percent in 1995 to a high of approximately 28 percent in 2000.[92]

29. These accounting data suggest that the BOCs have realized special access scale economies throughout the entire period of price cap regulation, including before and after the CALLS plan and pricing flexibility were implemented. That is, special access line demand increased at a significantly higher rate than did operating expenses and investment throughout these periods, suggesting that the BOCs realized scale economies in both periods. We note that some parties contend that the accounting rates of return derived from ARMIS data are meaningless.[93] Here, we use ARMIS data for the limited purpose of examining the relationship between demand growth and growth in expenses and investment. To the extent the accounting rules have remained the same over the period analyzed, the analysis of growth rates and scale economies should not be significantly affected by the cost allocation issues these parties raise. We invite parties to comment on the relevance of these data and the relationship between demand growth and growth in expenses and investment in the special access market. To demonstrate the possible impact of cost allocations during the price cap period of regulation, including before and after the CALLS plan and pricing flexibility were implemented, we invite parties (1) to remove from the BOCs' interstate special access operating expenses and average investment data reported in ARMIS any expenses and investments that are not directly assignable; and (2) to calculate the compound annual growth rates for BOC interstate special access operating expenses and average investment using these adjusted data. To the extent parties have concerns about the consideration of ARMIS data for purposes of evaluating the degree to which special access rates and therefore earnings exceed a reasonable level, we solicit comment on that issue below.[94]

2. Developing a Special Access Price Cap Regime

30. The core component of price cap regulation is the Price Cap Index (PCI). As the Commission explained in the *LEC Price Cap Order*, the PCI is designed to limit the prices LECs charge for service.[95] The PCI provides a benchmark of LEC cost changes that encourages price cap LECs to become more productive and innovative by permitting them to retain reasonably higher earnings.[96] The PCI has three basic components: (1) a measure of inflation, *i.e.*, the Gross Domestic Product (chain weighted) Price Index (GDP-PI);[97] (2) a productivity factor or "X-Factor," that represents the amount by

[91] *See supra* notes 88-89. We begin our analysis with 1992, rather than 1991, data because ARMIS does not contain line count data for 1990; thus, the compound annual growth rate cannot be calculated from these data in 1991.

[92] *See supra* note 90.

[93] *See, e.g.,* SBC Opposition at 19-23; Kahn/Taylor Decl. at 6-9 (claiming that accounting rates of return for services such as interstate special access services are meaningless because these returns reflect arbitrary allocations of fixed costs between regulated and non-regulated services, between interstate and intrastate jurisdictions, and among interstate services).

[94] *See infra* section III.A.4.

[95] *LEC Price Cap Order*, 5 FCC Rcd at 6792, para. 47. To ascertain compliance with the PCI, LEC rate levels within each basket are measured through the use of an Annual Price Index (API). The API is the weighted sum of the percentage change in LEC prices. The API weights the rate for each rate element in the basket based on the quantity of each element sold in a historical base year. The historical base year is the calendar year that immediately precedes the annual tariff filing on July 1. A price cap LEC's rates are in compliance with the cap for a basket if the API is less than or equal to the PCI.

[96] *Id.*, 5 FCC Rcd at 6787, 6792, paras. 2-3, 47.

[97] *CALLS Order*, 15 FCC Rcd at 13038-39, paras. 183-84.

which LECs can be expected to outperform economy-wide productivity gains;[98] and (3) adjustments to account for "exogenous" cost changes that are outside the LEC's control and not otherwise reflected in the PCI.[99] While we seek comment on whether and, if so, how to develop a new special access price cap, we focus our inquiry below on productivity and growth issues and on developing service categories and subcategories. Parties may comment on whether we should include inflation and exogenous cost adjustments in a new special access price cap regime. We tentatively conclude, however, that, except as otherwise discussed herein, we should retain the same method of revising the PCI to reflect inflation and exogenous cost adjustments that presently apply to special access services.

a. Productivity Factor or X-Factor

31. The X-factor adopted in the *LEC Price Cap Order* consisted of a component based on historical LEC productivity, and an additional productivity obligation of 0.5 percent that represented a consumer productivity dividend (CPD) by which the first LEC productivity gains were assigned to customers in the form of lower rates.[100]

32. Initially, price cap LECs were required to share a portion of their earnings in excess of specified rates of return with their access customers by temporarily reducing the price cap ceiling in a subsequent period.[101] In 1990, the Commission prescribed two X-factors: (1) a minimum 3.3 percent X-factor, and (2) an optional 4.3 percent X-factor.[102] Price cap LECs that selected the higher X-factor were allowed to retain larger shares of their earnings.[103] In the *1995 Price Cap Review Order*, the Commission increased the minimum X-factor to 4.0 percent and replaced the single optional X-factor with two optional X-factors, 4.7 and 5.3 percent.[104] Subsequently, in the *1997 Price Cap Review Order*, the Commission eliminated all requirements to share earnings and prescribed a 6.5 percent X-factor,[105] based primarily on a staff study of the historical LEC total factor productivity growth rate (TFP study).[106] The D.C. Circuit reversed and remanded the *1997 Price Cap Review Order* for further explanation of the Commission's decision to adopt a 6.5 percent X-factor.[107]

33. The Commission subsequently commenced a rulemaking proceeding seeking comment on alternative bases for prescribing an X-factor. In the *1999 Price Cap FNPRM*, released after the CALLS

[98] *LEC Price Cap Order*, 5 FCC Rcd at 6795-6801, paras. 74-119.

[99] *Id.*, 5 FCC Rcd at 6792, 6807-10, paras. 48, 166-90. Exogenous costs are incurred due to administrative, legislative, or judicial action beyond the LEC's control. *See id*. at 6807, para. 166.

[100] *Id.*, 5 FCC Rcd at 6795-6801, paras. 74-119.

[101] *Id.*, 5 FCC Rcd at 6801-02, paras. 122-26.

[102] *Id*.

[103] *Id*.

[104] *Price Cap Performance Review for Local Exchange Carriers*, First Report and Order in CC Docket No. 94-1, 10 FCC Rcd 8961, 9055, para. 214 (1995) (*1995 Price Cap Review Order*), *aff'd Bell Atlantic Tel. Cos. v. FCC*, 79 F.3d 1195 (D.C. Cir. 1996), *recon. denied Price Cap Performance Review for Local Exchange Carriers*, CC Docket No. 94-1, Order on Reconsideration, 14 FCC Rcd 1684 (1999). These X-factors included a 0.5 percent CPD.

[105] *1997 Price Cap Review Order*, 12 FCC Rcd at 16645, para. 1.

[106] *Id.*, 12 FCC Rcd at 16772-93, App. D. The 1997 staff TFP study calculated the historical productivity growth difference between LECs and the national economy for the period 1986 through 1995. Specifically, it first calculated for each year the difference between LEC TFP change and the national economy TFP change. The study then calculated for each year an input price difference between the change in LEC input prices and nation-wide input prices. The two calculations were summed for each year.

[107] *United States Telecom Ass'n v. FCC*, 188 F.3d 521, 530 (D.C. Cir. 1999).

coalition filed its access charge proposal, the Commission noted that the CALLS proposal would eliminate the need to adjust the X-factor retrospectively in response to the court's remand, or to calculate an X-factor on a going-forward basis.[108] In response to the *1999 Price Cap FNPRM*, commenters proposed X-factors ranging from 3.71 percent to 11.2 percent.[109]

34. In the *CALLS Order*, the Commission changed the X-factor from a productivity-based factor to a transitional mechanism that reduced switched access rates to a specific target and lowered special access rates for a specified period of time.[110] As noted above, the special access X-factor was set at 3.0 percent in 2000, 6.5 percent for the next three years, and equal to the GDP-PI thereafter, essentially freezing the special access PCI (after accounting for exogenous cost adjustments).[111]

35. In recent years, the BOCs have earned special access accounting rates of return substantially in excess of the prescribed 11.25 rate of return that applies to rate of return LECs. The BOCs' collective average special access accounting rates of return over the last six years (1998-2003) have been 18, 23, 28, 38, 40, and 44 percent, respectively. We seek comment on whether a rate of return in excess of the Commission's prescribed rate of return for rate-of-return LECs is a valid benchmark for determining the need for an X-factor, or an X-factor that is higher than the factor under the CALLS plan or the pre-CALLS price cap regime.[112] If it is appropriate for us to examine an X-factor in light of these rates of return, we seek comment on whether we should re-impose a productivity-based X-factor as a method of reducing the special access PCI.

36. We ask parties to submit studies quantifying an appropriate X-factor for special access services. In a previous order, the Commission eliminated the requirement that LECs report the expense matrix data used in calculating the X-factor.[113] The Commission recognized, however, the need for certain information provided by the expense matrix and expected companies to keep such data available and be prepared to provide the data upon request.[114] We now request that price cap LECs submit their expense matrix data from 1994 to 2004 (or 2003, if 2004 data are not yet available). These data should correspond exactly to the expense matrix data previously required under Part 32 of the Commission's rules.[115]

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[108] *Price Cap Performance Review for Local Exchange Carriers*, CC Docket Nos. 94-1, 96-262, Further Notice of Proposed Rulemaking, 14 FCC Rcd 19717, 19718, para. 4 (1999) (*1999 Price Cap FNPRM*).

[109] *CALLS Order*, 15 FCC Rcd at 13020, para. 139 (citing USTA Reply at 13 and AT&T Comments at 12-15, respectively).

[110] *Id.*, 15 FCC Rcd at 13020-21, para. 140.

[111] *Id.*, 15 FCC Rcd at 13025, para. 149.

[112] *See infra* section III.A.4 (discussing the 11.25 rate of return at greater length).

[113] *Comprehensive Review of the Accounting Requirements and ARMIS Reporting Requirements for Incumbent Local Exchange Carriers: Phase I,* CC Docket No. 99-253, Report and Order, 15 FCC Rcd 8690, 8694, para. 7 (2000) (*Phase I Accounting Streamlining Order*).

[114] *Id.* These continuing obligations for the LECs to maintain expense matrix data and to provide them to the Commission upon request were approved by the Office of Management and Budget (OMB) on June 19, 2000. *See Notice of Office of Management and Budget Action*, OMB No. 3060-0370 (June 19, 2000). The expense matrix assists in calculation of a productivity offset because it separates labor and material expense, and labor and material prices do not necessarily move together.

[115] 47 C.F.R. § 32.5999(f) (1999). The relevant expense categories include (1) Salaries and Wages, (2) Benefits, (3) Rents, (4) Other Expenses, and (5) Clearances. This rule was eliminated in the 2000 *Phase I Accounting Streamlining Order*.

37. Prior to CALLS, the Commission used a single X-factor for every basket of services.[116] The special access PCI formula did not, therefore, have a unique X-factor. In the *CALLS Order*, however, the Commission adopted specific special access X-factors.[117] In this proceeding, we are examining a price cap method of regulating rates solely for special access services.[118] Given that we propose to address special access services independent of switched access services, we seek comment on whether it is necessary to estimate and apply to special access services an X-factor that is unique to these services. Assuming that this is necessary, we seek comment on whether it is possible to calculate accurately such an X-factor. If it is only possible to measure productivity accurately for the entire firm, or for some broader category of services than special access services, we invite commenters to address the reasonableness of applying this broader X-factor to special access services alone. We seek comment on the consequences of using in the special access PCI a productivity factor that is based on a broad-based productivity study such as the staff's TFP study.

b. Growth factor

38. In addition to applying an X-factor that adjusts rates to account for overall LEC productivity gains, the Commission has sometimes applied a growth or "g" factor to account for LEC average cost decreases attributable to demand growth. The X-factor and "g" factor are related price cap tools, but they differ both operationally and conceptually. The X-factor generally is based on a multi-year, multi-company study of total factor productivity. We have applied a uniform X-factor for a multi-year period to all price cap carriers and price cap services. A "g" factor, in contrast, varies by LEC, year, and service because it relies on each individual LEC's prior year's demand growth rate for a specific service element or basket.[119] An X-factor may, however, also account for demand growth reflected in scale economies. If we adopt a "g" factor, we would need, therefore, to ensure that the X-factor does not also count demand growth-related efficiencies.

39. In the *LEC Price Cap Order*, the Commission adopted a price cap formula for the common line basket that included a "g" factor. There, because per-minute traffic growth was not directly indicative of per-line cost increases, the Commission developed "g" to represent per-minute growth per access line.[120] The Commission found that including "g" would give all of the benefits of MOU demand growth to IXCs, while excluding "g" would give all of the benefits of MOU demand growth to LECs.[121] As a compromise, the Commission incorporated g/2 into the PCI formula because it found that both IXCs and LECs contribute to demand growth.[122] The Commission did not at that time attempt to measure the relative contributions to demand growth made by IXCs and LECs.[123]

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[116] *See CALLS Order*, 15 FCC Rcd at 13021, para. 141.

[117] *Id.*, 15 FCC Rcd at 13033-34, para. 172.

[118] If, for example, we adopt a bill-and-keep compensation system for switched calls in the intercarrier compensation proceeding, switched access rates and therefore a method of regulating these rates may not be necessary. *See Intercarrier Compensation NPRM*, *supra* note 6, 16 FCC Rcd at 9644-45, para. 97.

[119] *See infra* section III.A.3 (discussing rate baskets).

[120] *LEC Price Cap Order*, 5 FCC Rcd at 6793-95, paras. 55-73. The "g" factor for the common line basket was developed to reflect that carrier common line (CCL) rates are imposed on a minute of use (MOU) basis even though common line costs do not vary with MOU. *Id*. The "g" factor is defined as "the ratio of minutes of use per access line during the base period, to minutes of use per access line during the previous period, minus 1." *See* 47 C.F.R. § 61.45(c)(1).

[121] *LEC Price Cap Order*, 5 FCC Rcd at 6793-95, paras. 55-73.

[122] *Id*.

[123] *Id*.

40. If we adopt new special access price cap regulation for LECs, it may also be appropriate to include a factor in the special access PCI formula similar to the "g" factor currently in the common line formula. The ARMIS data suggest that special access line demand growth does not produce a proportional increase in special access costs.[124] In such a circumstance, use of a special access PCI formula that does not include a growth factor may produce unreasonable rates. We therefore invite parties to comment on whether a special access PCI formula should include a growth factor similar to the "g" factor in the common line PCI formula. We also seek comment on how to define a special access line growth factor. For example, should this factor be based on the change in DS-1 equivalent capacity, changes in DS-3 equivalent capacity, or some basis other than capacity equivalents? We seek comment on whether the demand growth benefits reflected in a "g" factor should be shared between the LECs and the special access customers. Finally, parties advocating for a "g" factor should comment on how to avoid including demand growth-related efficiencies in both the "g" factor and the X-factor.

c. Earnings Sharing

41. In the *LEC Price Cap Order*, the Commission established three earnings sharing zones based on specific rates of return.[125] In the first zone, price cap LECs were allowed to retain all of their earnings up to the first rate of return ceiling, 12.25 or 13.25 percent, depending on whether the LEC elected a 3.3 or 4.3 percent productivity factor.[126] In the second zone, price cap LECs were allowed to retain 50 percent and return to ratepayers 50 percent of their earnings between the first ceiling and the second ceiling, 16.25 or 17.25 percent, again depending on whether the LEC elected a 3.3 or 4.3 percent productivity factor.[127] In the third zone, price cap LECs were required to return 100 percent of any earnings above the second ceiling.[128]

42. In the *1995 Price Cap Review Order*, the Commission modified the initial sharing requirements. LECs that elected a productivity factor of 5.3 percent were allowed to retain 100 percent of their earnings.[129] They were not, however, allowed to make a low-end adjustment to their PCIs if their earnings fell below 10.25 percent.[130] LECs that did not elect the highest productivity factor were subject to sharing requirements based on rate of return levels: They were allowed to retain all of their earnings up to a rate of return ceiling of 12.25 percent, if they elected either a 4.0 or 4.7 percent productivity factor.[131] They were required to share 50 percent of their earnings between the first ceiling and a second ceiling, 13.25 or 16.25 percent, depending on whether the LEC elected a 4.0 or 4.7 percent productivity factor.[132] They were required to return 100 percent of any earnings above the second ceiling.[133] These LECs were allowed to make a low-end adjustment to their PCIs if their earnings fell below 10.25 percent.

43. In the *1997 Price Cap Review Order*, the Commission eliminated the sharing requirements, finding that sharing severely blunts the incentives of price cap regulation by reducing the rewards for

[124] *See supra* section III.A.1.

[125] *LEC Price Cap Order*, 5 FCC Rcd at 6801-02, paras. 122-26.

[126] *Id.*, 5 FCC Rcd at 6801-02, paras. 123, 126.

[127] *Id.*, 5 FCC Rcd at 6801-02, paras. 124, 126.

[128] *Id.*, 5 FCC Rcd at 6801-02, paras. 125-26.

[129] *1995 Price Cap Review Order*, 10 FCC Rcd at 8970-71, paras. 19-20.

[130] *Id*.

[131] *Id*.

[132] *Id*.

[133] *Id*.

LEC efficiency gains.[134] The Commission also found that eliminating sharing requirements removed the last vestige of rate of return regulation that had created incentives to shift costs between services to evade sharing in the interstate jurisdiction.[135]

44. We tentatively conclude, for the same reasons that the Commission eliminated sharing, that we should not now require LECs to share earnings if we decide to adopt a price cap plan for special access services. We seek comment on this tentative conclusion.

d. Low-End Adjustment

45. In the *LEC Price Cap Order*, the Commission adopted a low-end adjustment mechanism applicable to LECs earning below 10.25 percent – more than 100 basis points below the 11.25 carrier prescribed rate of return.[136] This mechanism ensured that the price cap plan did not subject any LEC to such low earnings over a prolonged period of time so as to grossly impair the LEC's ability to attract capital and to provide services.[137] The low-end adjustment to the PCI formula permits price cap LECs that earn a rate of return less than 10.25 percent in a given year temporarily to increase their PCIs in the next year to a level that would allow them to earn 10.25 percent.[138]

46. In the *1995 Price Cap Review Order*, as mentioned above, the Commission eliminated the low end adjustment for price cap LECs that elected the highest X-factor and therefore were not required to share any of their earnings.[139] In the *Pricing Flexibility Order*, the Commission eliminated the low end adjustment mechanism for price cap LECs that qualify for and elect to exercise either Phase I or Phase II pricing flexibility.[140] The Commission retained the low-end adjustment for carriers that have not qualified for and elected to exercise either Phase I or Phase II pricing flexibility to protect these LECs from events beyond their control that would affect earnings to an extraordinary degree.[141]

47. For the same reason, we tentatively conclude that, if we adopt a price cap plan for special access services, we should retain a low-end adjustment mechanism for LECs that have not implemented pricing flexibility. We seek comment on this tentative conclusion. We further seek comment on the nature of a low-end adjustment for special access services only. We request that parties identify the relationship between the low-end adjustment level and any new authorized rate of return we develop in this proceeding.[142] For example, should the low-end adjustment continue to be 100 basis points below the authorized rate of return?

3. Rate Structure – Interstate Special Access Baskets and Bands

48. A price cap basket is a broad grouping of services, such as special access services. Prices for services in the basket are limited by the PCI for the basket. Placing services together in the same basket

[134] *1997 Price Cap Review Order*, 12 FCC Rcd at 16700, para. 148.

[135] *Id*.

[136] *LEC Price Cap Order*, 5 FCC Rcd at 6806-07, paras. 164-65.

[137] *Id.*, 5 FCC Rcd at 6804, para. 147.

[138] *Id.*, 5 FCC Rcd at 6802, para. 127.

[139] *1995 Price Cap Review Order*, 10 FCC Rcd at 8971, para. 20.

[140] *Pricing Flexibility Order*, 14 FCC Rcd at 14304, para. 162.

[141] *CALLS Order*, 15 FCC Rcd at 13037-38, para. 181-82.

[142] *See infra* section III.A.4.

limits LEC pricing flexibility and incentives to shift costs.[143] Within the special access service basket, services currently are grouped into service categories and subcategories.[144] Similar services are grouped together into service categories within a single basket to act as a substantial bar on the LEC's ability to engage in anticompetitive behavior.[145]

49. The rules adopted by the Commission in the *LEC Price Cap Order* established upper and lower pricing bands for each separate category or subcategory.[146] Originally, the pricing bands for most of the service categories were set at five percent above and below the Service Band Index (SBI).[147] In the *1995 Price Cap Performance Review Order*, the Commission increased the lower pricing band to 15 percent for services subject to zone density pricing.[148] Subsequently, the Commission eliminated the lower service band indices, concluding that this would lead to lower prices and encourage LECs to charge rates that reflect the underlying costs of providing exchange access services.[149] It found that the PCI and upper pricing bands adequately control predatory pricing and that greater downward pricing flexibility would benefit consumers both directly through lower prices and indirectly by encouraging only efficient entry.[150]

50. We seek comment on what categories and subcategories we should establish in a special access services basket if we adopt a price cap method to regulate special access prices. Should we retain without modification the existing special access categories and subcategories? If not, parties should identify the specific categories and subcategories of special access services that they contend we should adopt. We ask parties to discuss the advantages and disadvantages of having a special access basket with relatively few categories or subcategories compared to one with many.

51. We seek comment on whether to place competitive services and non-competitive services in separate and distinct categories and/or subcategories. Arguably, this would minimize the opportunity for a LEC to offset rate decreases for services for which there are competitive alternatives with rate increases for services for which there are no completive alternatives.[151] For instance, AT&T asserts that DS1 and DS3 channel termination services extending between the LEC end office and the customer premises often are subject to little or no competition.[152] AT&T also claims that competition may not be quite so limited

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[143] *LEC Price Cap Order*, 5 FCC Rcd at 6810-11, paras. 198-203.

[144] The special access basket currently contains the following categories or subcategories:

> (i) Voice grade special access, WATS special access, metallic special access, and telegraph special access services;
> (ii) Audio and video services;
> (iii) High capacity special access, and DDS services, including the following subcategories:
> (A) DS1 special access services; and
> (B) DS3 special access services;
> (iv) Wideband data and wideband analog services.

47 C.F.R. §61.42(e)(3).

[145] *LEC Price Cap Order*, 5 FCC Rcd at 6811, para. 203.

[146] *Id.*, 5 FCC Rcd at 6813-14, paras. 224-26.

[147] *Id*. The SBI is a subindex of the prices for each category or subcategory.

[148] *1995 Price Cap Review Order*, 10 FCC Rcd at 9141, para. 411.

[149] *Access Charge NPRM, Order, and NOI*, 11 FCC Rcd at 21487-88, para. 305.

[150] *Id*.

[151] *See infra* section III.B.1.b.

[152] *AT&T Petition for Rulemaking* at 25-28.

for DS1 and DS3 channel terminations extending between the IXC POP and the LEC serving wire center, and for DS1 and DS3 channel mileage facilities extending between the LEC end office and the LEC serving wiring center.[153] We seek comment on whether we should establish separate categories for DS1 and/or DS3 special access services and subcategories for (1) special access channel terminations between the LEC end office and the customer premises, (2) special access channel terminations between the IXC POP and the LEC serving wire center, or (3) any other special access product market.[154] Should any special access services be combined into a single category or subcategory? We also seek comment on whether we should take the same approach with regard to high capacity services above the DS-3 level (*e.g.*, OCn), or whether these higher capacity services should be placed in a high capacity category without sub-categories for special access channel terminations to customer premises, special access channel terminations to the IXC POP, and other special access facilities?

52. Some price cap LECs indicate that broadband services, *e.g.*, DSL services, account for a significant and growing portion of their special access revenues.[155] These services generally may be subject to competition from high-speed cable modem or other services provided by cable companies and from wireless broadband offerings.[156] We seek comment on whether to establish a separate category or subcategory for broadband services that are subject to some competition or are likely to be subject to competition in the near future. We note that, in the *LEC Price Cap Order*, the Commission excluded packet-switched services from price cap regulation because they were not included in its study of LEC productivity.[157] We seek comment on whether such services should be included in price caps today. If not, what is the proper regulatory treatment of these services?

53. We seek comment on whether to establish separate subcategories for wholesale services and retail services. Arguably, this approach would minimize the extent to which a price cap LEC could manipulate headroom by offsetting rate decreases that apply to services purchased by a wholesale customer (*e.g.*, a rate decrease for a DS3 channel termination service purchased by an IXC) with rate increases that apply to services purchased by an end-user customer (*e.g.*, a rate increase for a retail DSL service purchased by a small business or residential customer.) We seek comment on whether this objective is desirable.

54. We also seek comment on what criteria and data we should examine to determine which services to place in which categories or subcategories. We ask parties to propose categories or subcategories, to explain in detail the bases for their proposed categories or subcategories, and to support their proposals with data and studies. Do competitive or non-competitive services placed in the same

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[153] AT&T Reply at 23-24 ("[Verizon's] channel termination portion of the total price for a single 10-mile two-ended DS-3 access circuit increased by 36%, while the transport component remained unchanged. For DS-1 circuits, Verizon increased channel terminations in some Phase II areas by as much as 24%, while increasing transport by only 4%. . . . For example, while Verizon South's DS3 entrance facility rates in Phase II areas are 13% higher than those in price capped areas, Verizon South's DS3 channel termination rates in Phase II areas are *71%*; higher than in priced cap areas." (emphasis in original)), Reply Declaration of Lee L. Selwyn at 8-10.

[154] *See infra* section III.B.1.b(i) (discussing that, in the *Pricing Flexibility Order*, the Commission adopted different competitive triggers for these services in recognition of the different degrees of competition that existed for these services).

[155] *See* Kahn/Taylor Decl. at 14-15.

[156] *See generally Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, GN Docket No. 04-54, Fourth Report to Congress, FCC 04-208 (rel. Sept. 9, 2004) (concluding that "advanced telecommunications capability is being deployed on a reasonable and timely basis to all Americans," and discussing different types of advanced telecommunications facilities).

[157] *LEC Price Cap Order*, 5 FCC Rcd at 6810, para. 195.

subcategory need to have similar demand or supply elasticities? Should we establish separate categories or subcategories based on special access line densities? For example, channel termination services extending between a LEC end office and a customer premise in areas where there are more than 10,000 special access lines per square mile could be placed in a particular subcategory.

55. Rather than establishing a single special access basket with a number of different categories or subcategories, we could establish more than one special access basket each with one or more categories or subcategories. We seek comment on whether to use a single basket or multiple baskets and the advantages and disadvantages of each approach.

56. For the same reasons that the Commission eliminated the lower pricing bands, we tentatively conclude that there should be no lower band for service categories or subcategories to restrict the price cap LECs' downward pricing flexibility. We seek comment on this tentative conclusion.

57. We seek comment on the upper band value to limit the price cap LECs' upward pricing flexibility for the categories or subcategories. Should we retain five percent as the value? Should we use different values for different categories or subcategories? What criteria and data should we use to determine these values?

58. We consider elsewhere in this NPRM whether to modify pricing flexibility.[158] Likewise, we also seek comment elsewhere regarding how services currently subject to pricing flexibility should be treated in the event that we decide that such services should no longer qualify for pricing flexibility.[159]

4. Initial Special Access Price Cap Rates Post-CALLS

59. We must ensure that the initial rates under a new price cap plan will be just and reasonable.[160] AT&T, in its petition, asserts that current special access rates are too high, based on the rates of return BOCs have earned on their special access services.[161] AT&T also presents evidence purporting to show that current rates for special access services under the existing price cap plan generally are lower than rates established under a grant of pricing flexibility.[162] The BOCs respond that accounting rates of return are meaningless and the Commission expected that rates in some instances would increase when a carrier is granted pricing flexibility.[163] They also present evidence purporting to show that overall special access revenues per line have decreased.[164] As a preliminary matter, we solicit comment as to whether it is necessary for us to reinitialize rates to ensure they are just and reasonable. To the extent we decide to reinitialize rates, we solicit comment as to several alternative approaches.

60. *Rate of Return Benchmark.* We seek comment on whether the Commission's prescribed 11.25 percent rate of return that applies to rate of return LECs is a valid benchmark for determining whether price cap LECs' special access rates are just and reasonable.[165] The 11.25 percent rate of return was established in 1991.[166] The costs of debt and equity financing that are supposed to be reflected in the

[158] *See infra* section III.B.

[159] *See infra* section III.B.4.

[160] *See* 47 U.S.C. § 201(b).

[161] *AT&T Petition for Rulemaking* at 7-11.

[162] *Id.* at 11-13.

[163] Kahn/Taylor Decl. at 6-9; Verizon Comments at 24-25.

[164] Kahn/Taylor Decl. at 15-16.

[165] *See infra* section III.A.2.a.

[166] *LEC Price Cap Order*, 5 FCC Rcd at 6814, 6816, paras. 230, 247.

rate of return change over time and likely have changed significantly since 1991. If parties believe that we should use rate of return as a benchmark for determining the reasonableness of price cap LECs' special access rates, is there a rate of return other than 11.25 percent we should use to make that determination? We invite them to submit studies supporting an alternative rate of return.

61. The aim of price cap regulation is rates that approximate those that a competitive firm would charge, and a competitive firm makes decisions based on economic, not accounting rates of return.[167] We note that the BOCs contend that accounting rates of return do not represent a valid basis for evaluating price cap rates.[168] In particular, our cost allocation rules and factors such as the current separations freeze may undermine the usefulness of examining rates of return derived from ARMIS data.[169] Accordingly, we seek comment generally on whether accounting rates of return are meaningful statistics for evaluating the reasonableness of price cap rates. What factors may affect the relevance of ARMIS data to our examination of special access rates?

62. Even if the overall accounting rate of return has evidentiary value for these purposes, we also seek comment on whether an accounting rate of return for a subset of services, *i.e.*, the special access basket of services, is meaningful to this inquiry. LECs incur costs for many assets and activities that are common to supplying multiple services. The allocation of these common costs to multiple services according to our accounting rules necessarily reflects policy judgments that may not reflect how price cap LECs would allocate common costs if they operated in fully competitive markets. Thus we seek comment on the need to evaluate the special access rate of return in the context of the LECs' overall rates of return. We note that the Commission has never examined accounting rates of return for specific categories of services to determine whether a LEC is required to make an exogenous cost adjustment to share over-earnings or whether a LEC is qualified to make a low-end adjustment to compensate it for under-earnings. Instead, the Commission has determined whether such adjustments should be made based on the LEC's overall interstate access rate of return.[170] We therefore seek comment on what measures or indicators we may use in addition to, or in lieu of, rate of return to determine whether current special access rates are just and reasonable. We invite parties to submit any such measures or indicators they deem appropriate.

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[167] *See* Franklin M. Fisher & John J. McGowan, *On the Misuse of Accounting Rates of Return to Infer Monopoly Profits*, 73 AMERICAN ECON. REV. 82, 83 (1983); Thomas E. Copeland & J. Fred Weston, FINANCIAL THEORY AND CORPORATE POLICY 22-25, 28 (3d ed. 1988) ("An economist uses the word *profits* to mean rates of return in excess of the opportunity cost for funds employed in projects of equal risk. To estimate economic profits, one must know the exact time pattern of *cash flows* provided by a project and the opportunity cost of capital. . . . Therefore the appropriate profits for managers to use when making decisions are the discounted stream of cash flows to shareholders. . . . The main difference between the accounting definition and the economic definition of profit is that the former does not focus on cash flows when they occur, whereas the latter does. . . . Financial managers are frequently misled when they focus on the accounting definition of profit, or earnings per share. The objective of the firm is *not* to maximize earnings per share. The correct objective is to maximize shareholders' wealth, which is the price per share that in turn is equivalent to the discounted cash flows of the firm.") (emphasis in original); *see also infra* note 173.

[168] *See, e.g.,* SBC Opposition at 21-22 ("The cost allocations required under the Commission's cost allocation rules, and Part 36 separations in particular, therefore cannot be used to derive the true economic costs of providing a particular service. . . . Either the ARMIS data provide a distorted, and therefore meaningless, picture of the BOCs' rates of return, or switched access rates are unreasonably low."); *see also supra* note 93 and accompanying text.

[169] *See, e.g.,* SBC Opposition at 21-22; *see also Jurisdictional Separations and Referral to the Federal-State Joint Board*, CC Docket No. 80-286, Report and Order, 16 FCC Rcd 11382 (2001).

[170] *See, e.g.*, *LEC Price Cap Order*, 5 FCC Rcd at 6805, para. 151; *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Order on Reconsideration, 6 FCC Rcd 2637, 2381, at para. 97 (1991) (subsequent history omitted).

63. A potential issue with using the accounting rate of return solely for the special access basket is the recent significant growth in BOC DSL subscribers and revenues. Some BOCs may book the full amount of DSL revenues as special access revenues.[171] At the same time, the incremental cost booked to the special access category for DSL service may not be nearly as large as these DSL revenues. There generally are no incremental DSL-related loop-side structure costs (*e.g.*, costs for trenching, poles, manholes, or conduit), which otherwise account for a large majority of a typical LEC's total network costs, booked to the special access category. We seek comment on the impact of the growth in DSL service revenues, expenses, and investment on price cap LECs' special access rates of return. To what extent does the accounting treatment of DSL revenues, expenses, and investment under the Commission's rules account for the BOCs' recent high special access rates of return? If DSL growth is a significant factor in the high accounting special access rates of return, rather than growth in traditional DS1 or DS3 services, for example, how should we interpret these rates of return?

64. We seek comment on the need for a comprehensive review of detailed cost studies to establish initial rate levels for each special access service. Alternatively, is there a simpler, less burdensome method of setting initial rate levels without having to rely on cost studies? For example, some parties propose that we develop initial rates based on an 11.25 percent rate of return.[172] To do so, we would (1) calculate, for the most recent calendar year, a price cap LEC's special access rate of return, based on ARMIS data; (2) calculate the percentage by which revenues would have had to have been lower to earn an 11.25 percent rate of return; (3) reduce that price cap LEC's current special access rates across the board by that percentage; and (4) use these reduced rates as the initial rates under a new price cap plan. We seek comment on this approach to establishing just and reasonable initial rates, on variants of this approach, and on other approaches that avoid use of cost studies.

65. *Cost Studies*. Parties commenting that we should use detailed cost studies to set initial special access rates under a new price cap plan should also comment on whether such studies should be based on historical accounting costs, *i.e.*, embedded costs, or forward-looking economic costs. As an initial matter, forward-looking costs are generally viewed as more relevant to setting prices in a competitive market. Embedded costs associated with past business decisions generally are irrelevant to a rational profit-maximizing firm operating in a competitive market; only forward-looking costs matter to such a firm with regard to business decisions that it is required to make today.[173] Further, as noted above, in the *Access Charge Reform Order*, the Commission stated its goal that interstate access charges reflect the forward-looking costs of providing those services.[174] The Commission subsequently stated that it envisioned conducting a proceeding as the CALLS plan nears its end to determine whether and to what

[171] Some BOCs apparently offer DSL services exclusively through a separate subsidiary, in which case no DSL revenues, expenses, or investment are booked to the interstate special access category. *See* Kahn/Taylor Decl. at 14-15; BellSouth Comments at 5-6; Qwest Comments at 12.

[172] *See AT&T Rulemaking Petition* at 39; Letter from Colleen Boothby, Counsel for Ad Hoc Telecommunications Users Committee, to Marlene H. Dortch, Sec'y, Federal Communications Commission, RM-10593, Att. (Economics and Technology, Inc., *Competition in Access Markets: Reality or Illusion – A Proposal for Regulating Uncertain Markets*) at 7-8 (filed Aug. 26, 2004).

[173] *See* Alfred E. Kahn, Timothy J. Tardiff, & Dennis L. Weisman, *The Telecommunications Act at Three Years: An Economic Evaluation of Its Implementation by the Federal Communications Commission*, 11 INFO. AND ECON. POLICY 319, 324-25 (1999) ("Among economists, there is widespread agreement in principle that (1) the costs that would be the basis for efficient prices would be forward-looking, rather than historical and (2) the prices set on that basis should emulate the ones that would emerge from local exchange competition, if it were feasible."); Armen A. Alchian & William R. Allen, EXCHANGE AND PRODUCTION 222 (3d ed. 1983) ("Once [an item] is acquired, [its costs are] irrelevant to the setting of price in competitive markets."); N. Gregory Mankiw, PRINCIPLES OF ECONOMICS 291 (1997) ("The irrelevance of sunk costs explains how real businesses make decisions."); Paul A. Samuelson & William D. Nordhaus, ECONOMICS 167, (16th ed. 1998).

[174] *Access Charge Reform Order*, 12 FCC Rcd at 16001-03, 16092-100, paras. 42-49, 258-74.

degree it could deregulate price cap LECs to reflect the existence of competition.[175] We seek comment on whether setting rates based on forward-looking costs, as suggested in the *Access Charge Reform Order* and in the *CALLS Order*, should guide us in selecting a method to set initial rates under a new special access price cap plan. Parties that support the use of historical costs rather than forward-looking costs should comment on and submit calculations showing the magnitude of any difference between the implied depreciation expense in LECs' special access actual realized revenues and regulatory accounting deprecation expense calculated pursuant to the Commission's rules during the price cap years.[176] If the implied depreciation expense significantly exceeds the regulatory accounting depreciation expense, in setting the initial rates would we need to adjust downward the ratebase to avoid the eventual over-recovery of the original cost of the LECs' assets? Further, any party that supports the use of a cost study, forward-looking or historical, to set rates should submit such a study and support its use of that particular type of study.

66. *Use of Comparable Services*. Some special access services are comparable to switched access transport services. For example, a special access channel termination service extending between an IXC POP and a LEC serving wire center is comparable to a switched access entrance facility. We therefore seek comment on whether setting initial special access prices under a new price cap plan at levels equal to current prices for comparable switched access transport prices would result in just and reasonable rates. Parties should address whether this approach is improperly circular, given that some transport rates, *e.g.*, direct trunked transport rates, were presumed reasonable by the Commission in the *First Transport Order* if they were set based on rates for comparable special access services.[177] Such an approach may be feasible for some services, *e.g.*, DS1 or DS3 special access services, but not necessarily for all special access services. Assuming that this approach is reasonable for some subset of special access services, we ask for comment on how to establish initial just and reasonable rates for the remaining special access services. For example, is it reasonable to establish rates for the remaining services by adding to the rate for the comparable switched access transport service the percentage difference or the dollar differences between the current rate for comparable special access service and the current rate for the non-comparable special access service? We request that parties that believe that initial rates, in whole or in part, should be based on rates for comparable switched access transport services submit such studies.

67. *Incentives*. We seek comment on whether, in determining whether special access rates will be just and reasonable, we should consider as a significant factor the risk of reducing price cap LECs' incentives to operate at minimum cost and to innovate under future price cap plans. Specifically, we question the effect of reallocating benefits resulting from LEC efforts to minimize costs and innovate under the existing price cap plan on LEC expectations of future regulatory action. We seek comment on the potential effect of reducing current rates in the first year of a new price cap plan on incumbent LEC incentives to operate efficiently and to innovate.

68. *Periodic Adjustment*. We further seek comment on whether a new price cap plan should include a requirement that rates be adjusted up or down at fixed intervals (*e.g.*, every three or five years) based on the prescribed rate of return, or some other measure of price cap LEC performance. For example, under one variant of such a price cap plan, LECs would not be required to share any earnings in

[175] *CALLS Order*, 15 FCC Rcd at 12977, para. 36.

[176] By implied depreciation we mean total booked revenues less total booked expenses (excluding accounting depreciation expense) less an 11.25 percent rate of return on the rate base, expressed in dollars. The implied depreciation expense reflected in the actual realized revenues may exceed the regulatory accounting depreciation expense if the actual realized rate of return on the ratebase exceeds 11.25 percent.

[177] *Transport Rate Structure and Pricing*, CC Docket No. 91-213, Report and Order and Further Notice of Proposed Rulemaking, 7 FCC Rcd 7006, 7023-38, paras. 33-59 (1992), *aff'd in pertinent part, rev'd in part Competitive Telecommunications Ass'n v. FCC*, 87 F.3d 522 (D.C. Cir. 1996).

excess of the prescribed rate of return, and generally the core elements of the plan (*e.g.*, the productivity factor) would remain constant throughout the specified interval. If a price cap LEC's achieved rate of return (or other performance measure) were greater or lesser than the prescribed rate of return (or other performance benchmark) by a predetermined amount during the interval, then rates would be adjusted down or up at the beginning of the next interval. At the beginning of the latter interval, the adjusted rates would reflect the prescribed rate of return or other performance benchmark. We seek comment on whether to adopt such an adjustment mechanism in a price cap plan. We also seek comment on how such a plan would affect LEC incentives to operate efficiently and to innovate. How would LEC incentives under such a plan differ from the incentive effects of a plan that included an earnings sharing requirement (*i.e.* required LECs to share earnings in excess of the prescribed rate of return by adjusting rates downward in the year immediately following the year in which they over-earned)? Parties supporting this type of adjustment should provide the operational details of their proposed plan, including specifying the length of the interval that should be used under any such plan. We also seek comment on other variants of an approach that would require rate adjustments at fixed intervals to target the prescribed rate of return, or other performance benchmark.

B. Pricing Flexibility

69. In the *Pricing Flexibility Order*, the Commission relied on the harm caused by unnecessary regulation and on its predictive judgment to adopt anticipatorily deregulatory rules.[178] Essentially, the Commission determined that irreversible, sunk investment by competitive carriers in the special access market, as evidenced by the satisfaction of certain collocation and competitive transport facilities deployment triggers, demonstrates sufficient competitive market entry in specific geographic markets to constrain monopoly behavior, including exclusionary conduct, by price cap LECs.[179] That is, while acknowledging that the incumbent carriers might enjoy high market shares at the time pricing flexibility is granted, the Commission concluded that they could not exercise market power where they faced competition from entrants using their own facilities. The Commission relied on the collocation-based triggers rather than performing a market power analysis because market power analyses would be overly burdensome on parties and on the Commission's limited resources.[180]

70. In adopting pricing flexibility, the Commission created a deregulatory regime to enable price cap LECs to respond flexibly to market forces.[181] In particular, pricing flexibility provided price cap LECs with the ability to lower rates in specific markets (*i.e.*, MSAs) in response to competitive pressures in those markets.[182] In the *AT&T Petition for Rulemaking*, and in competitive LEC and user group comments in response thereto, parties have introduced evidence that the price cap LECs have not used this flexibility to lower special access rates in any MSA for which they have received Phase II pricing flexibility. Instead, these parties contend that the price cap LECs have either maintained or raised rates in each of these MSAs.[183]

71. As part of our examination of the proper price cap special access regulatory regime to adopt post-CALLS, therefore, we also examine whether the Commission's pricing flexibility rules have worked as intended and, if not, whether they should be modified or repealed. We thus grant the *AT&T Petition for Rulemaking*, in part, inasmuch as we are initiating a rulemaking proceeding. This inquiry is consistent

[178] *Pricing Flexibility Order*, 14 FCC Rcd at 14301, para. 154.

[179] *See id.*, 14 FCC Rcd at 14225, 14258-59, paras. 3, 69-70.

[180] *Id.*, 14 FCC Rcd at 14258, 14268-69, paras. 69, 84-86.

[181] *See id.*, 14 FCC Rcd at 14257-58, paras. 68.

[182] *See id.*, 14 FCC Rcd at 14257-58, 14260, 14301, paras. 67-69, 72-74, 153-54.

[183] *See*, *e.g.*, *AT&T Petition for Rulemaking* at 11-12; WorldCom Comments at 7-8.

with our ongoing commitment to ensure that our rules, particularly those based on predictive judgments, remain consistent with the public interest as evidenced by empirical data.[184] We note that our questions below are focused on Phase II, not Phase I, pricing flexibility because, once Phase II flexibility is granted, price cap LECs no longer need make available their generally available price cap tariffs.

72. In seeking comment on the specifics of the pricing flexibility rules, we also provide background regarding methods of assessing competition (short of conducting a burdensome market-by-market market power analysis) and on the type of information that would be most useful in evaluating assessments of the levels of competition. As a threshold matter, parties providing information regarding the rates they are charging or paying for special access services should identify whether the rates they identify are from the LEC's price cap tariff, a contract tariff, or a Phase II pricing flexibility tariff. Parties also should identify the percentage of special access services (by market) that are provided or obtained, as the case may be, from each of these three types of tariffs. We further request that parties identify whether the rates are the month-to-month rates or volume and term rates from the relevant tariff. Finally, although this NPRM focuses on special access services, we note that the *Pricing Flexibility Order* treats dedicated transport services (*i.e.*, entrance facilities, direct-trunked transport, and the flat-rated portion of tandem-switched transport) in the same manner as non-channel termination special access services.[185] We, therefore, tentatively conclude that any changes we make to the pricing flexibility rules for non-channel termination special access services shall apply equally to the pricing flexibility rules for dedicated transport. We seek comment on this tentative conclusion.

1. Assessing Competition in the Marketplace

73. There are two basic issues generally relevant to assessing the state of competition in a market (regardless of whether a full market power analysis or a less burdensome analysis is performed). First, if a market is (or is presumed to be) competitive *ex ante*, the level of competition can be assessed by determining whether there have been *substantial* and *sustained* price increases.[186] Second, because the characteristics of different markets vary, an analysis of the level of competition should also include an examination of the cost functions of the industry at issue.[187] In analyzing each issue, both the product or service market (*e.g.*, interstate special access services) and the relevant geographic market (*e.g.*, MSAs) should be well-defined.

a. Substantial and Sustained Price Increase

74. The first step in measuring the level of competition in this proceeding is to determine whether there are substantial and sustained price increases for interstate special access services in well-defined markets.[188] Some parties claim that price cap LECs have increased interstate special access rates in some of the MSAs for which the LECs have received Phase II pricing flexibility.[189] We ask these and other interested parties to provide more recent data that demonstrate whether or not substantial and sustained

[184] *See supra* notes 10 and 11 and accompanying text.

[185] *See Pricing Flexibility Order*, 14 FCC Rcd at 14273-74, 14299, paras. 93-94, 148.

[186] *See* Daniel F. Spulber, REGULATION AND MARKETS 138-58 (1989).

[187] *See* John Sutton, SUNK COSTS AND MARKET STRUCTURE 1-82 (1995).

[188] A substantial price increase need not be a large increase. For example, the Department of Justice and Federal Trade Commission Horizontal Merger Guidelines are designed to determine if a merger will result in "'a small but significant non-transitory' price increase" in the relevant product market. *See* United States Department of Justice and Federal Trade Commission Horizontal Merger Guidelines § 1.11 (revised 1997) (DOJ Merger Guidelines).

[189] *See, e.g.*, *AT&T Petition for Rulemaking* at 21-22; WorldCom Comments at 5.

special access price increases have occurred in Phase II MSAs.[190] Parties submitting such data should show not just the price changes that occurred after Phase II pricing flexibility was granted, but whether the rate changes were substantial (*i.e.*, did or did not result in rates above just and reasonable levels). In order to identify whether there have been substantial increases in special access rates, we ask parties to establish an objective benchmark against which to measure the most recent rate level data. Parties should justify and explain, not merely assert, the usefulness of that benchmark.[191]

75. Parties should then provide a measurement of the sustainability of the rate changes. Sustainability demonstrates whether the firm is, in fact, able to exercise market power. If the firm is unable to maintain a substantial rate increase, for example because another firm enters the market and offers the good or service at a lower rate, then the rate increase is not sustainable and the original firm does not possess market power.

76. We ask parties to comment on whether Phase II pricing flexibility for special access has produced substantial and sustained price increases in those MSAs for which Phase II pricing flexibility was granted. The BOCs maintain that their recent years' special access revenue increases result from high special access demand growth, rather than from high and sustained special access rates.[192] Moreover, the BOCs claim that special access revenue per line evidences a declining trend;[193] however, we do not have sufficient information to evaluate that claim. Information that would be useful to validate these BOC claims would include price cap LECs' calculations of an Average Price Index (API) for all special access services (including those under price cap and those under pricing flexibility); a Service Band Index (SBI) for each special access service category and subcategory; and the revenues associated with the API and SBIs. In the Commission's annual access tariff review process, price cap LECs file APIs, SBIs, and associated revenues for the special access basket. These calculations exclude rates and revenues for special access services provided in MSAs where pricing flexibility has been exercised. In providing such information, price cap LECs should recalculate these figures using the Tariff Review Plan RTE-1 and IND-1 electronic formats, beginning in the year 2000, for all special access services including services removed from price caps under our pricing flexibility rules.[194] This information would be of significant benefit to our analysis.

77. We also invite parties to support claims of substantial and sustained price increases by identifying the product market (*e.g.*, channel terminations between LEC end offices and customer premises), the customer segment (*e.g.*, businesses in large or medium-sized buildings; large companies or small companies), or any other more detailed demarcation of the special access market in which these price increases occur. We thus take this opportunity to invite parties to proffer evidence regarding whether the predictive judgments on which Phase II pricing flexibility was granted are supported by subsequent marketplace developments.

[190] For example, the data relied on by AT&T were from 1996 through 2001. *See AT&T Petition for Rulemaking*, Declaration of Stephen Friedlander, Exhs. 1, 2. Similarly, WorldCom introduced data from 1999 and 2001. *See* WorldCom Reply, Declaration of Michael D. Pelcovits (Pelcovits Decl.) at 12-15.

[191] Parties that critique the benchmark proposed by other parties (for example, in reply comments) should, in addition to the critique, propose an alternative benchmark. Similarly, parties that critique data purporting to show substantial rate increases should explain in detail why the rate increases should not be considered substantial.

[192] *See* Kahn/Taylor Decl. at 15.

[193] *See id*.

[194] Price cap LECs should perform these API and SBI calculations for all special access services, categories, and subcategories in a manner consistent with sections 61.46 and 61.47 of our rules. *See* 47 C.F.R. §§ 61.46, 61.47.

b. Determination of Level of Market Competitiveness

78. In addition to determining the existence of substantial and sustained special access rate increases that are significantly correlated with grant of Phase II pricing flexibility, analysis of whether services are subject to substantial competition considers an analysis of the cost functions on the industry. This may include analyses of the relevant product market, geographic market, demand responsiveness, supply responsiveness, market share, entry barriers, and other pricing behavior in well-specified markets.

79. In the *Pricing Flexibility Order*, the Commission relied on entry barriers and supply responsiveness analyses to develop the competitive triggers. The Commission determined that, if price cap LECs receive pricing flexibility and raise rates excessively, competitors will enter the market.[195] In so doing, competitors will provide additional supply of special access services at (presumably) lower prices than the incumbent.[196] This rationale represents a supply responsiveness assessment of the level of competition. The Commission also determined that if competitors make a significant amount of irreversible, sunk investment (specifically in collocation and transport facilities), this would signify that entry barriers in that market have been overcome.[197] The Commission found it unnecessary to perform additional forms of market competitive analysis, concluding generally that such analyses would be unduly burdensome.[198]

80. We seek comment on whether our pricing flexibility rules reflect a sufficiently robust assessment of the level of interstate special access competition. Parties should address whether actual marketplace developments have validated the supply responsiveness and entry barrier predictive judgments made in the *Pricing Flexibility Order*, and, if not, whether different supply responsiveness and entry barrier assessments are necessary. Parties should also address whether, in assessing our pricing flexibility regime, we should consider additional measures of competition, such as demand responsiveness and the other analytic methods discussed below.

(i) Relevant Product Market

81. For the purposes of re-examining the pricing flexibility rules, we examine the relevant product market.[199] In the *Pricing Flexibility Order*, the Commission identified three categories of product markets for special access services: (1) special access channel terminations between a LEC's end office

[195] *Pricing Flexibility Order*, 14 FCC Rcd at 14297-98, para. 144.

[196] *See id*.

[197] *See id.*, 14 FCC Rcd at 14263-64, paras. 79-80. The Commission did not address whether price cap LECs had enacted a substantial and sustained rate increase because the special access market was then regulated as a monopoly market. Price cap (and rate-of-return) regulation is based on the assumption that the market is a monopoly market. To limit monopoly rents and prevent the societal harms that would result, the Commission attempts to regulate the monopolist in such a manner as to, as best as possible, cause the monopolist to behave as if it were in a competitive market. *See generally* David E. M. Sappington & Dennis L. Weisman, DESIGNING INCENTIVE REGULATION FOR THE TELECOMMUNICATIONS INDUSTRY 1-4 (1996).

[198] *See Pricing Flexibility Order*, 14 FCC Rcd at 14268-73, paras. 84-92.

[199] *See Regulatory Treatment of LEC Provision of Interexchange Services Originating in the LEC's Local Exchange Area*, CC Docket Nos. 96-149, 96-61, Second Report and Order in CC Docket No. 96-149 and Third Report and Order in CC Docket No. 96-61, 12 FCC Rcd 15756, 15782, para. 41 n.119 (1997) (*LEC Classification Order*) ("[I]n defining the relevant product market, one must examine whether a 'small but significant and non-transitory' increase in the price of the relevant product would cause enough buyers to shift their purchases to a second product, so as to make the price increase unprofitable. If so, the two products should be considered in the same product market.") (internal citation omitted).

and customer premises, (2) special access channel terminations between an IXC POP and a LEC service wire center, and (3) other special access facilities.[200]

82. We seek comment on whether these are the relevant product markets. For example, commenters should specifically address whether channel terminations from the LEC end office to the customer premises constitute a separate and distinct product market. Parties argue that alternative competitive LEC channel terminations between an IXC POP and a LEC serving wire center or alternative dedicated transport facilities poorly measure the presence of competition for channel terminations between the LEC office and the customer premise.[201] With regard to the latter, parties argue that a price cap LEC can theoretically be free from all rate regulation applicable to these special access channel terminations when it may, in fact, be the only provider of these special access channel terminations in an MSA where Phase II pricing flexibility has been granted.[202] In the *Pricing Flexibility Order*, the Commission acknowledged the economics of channel terminations between the LEC office and the customer premise make it more costly for new entrants to compete in this product market.[203] For this reason, the Commission adopted higher triggers that incumbent LECs must satisfy in order to obtain Phase II pricing flexibility for special access channel terminations between the LEC office and the customer premise. We ask parties to refresh the record and address whether there have been substantial and sustained rate increases since pricing flexibility was granted for channel terminations between LEC offices and customer premises. We ask parties to address the degree of competition that exists for special access channel termination services, including any available quantification of market developments after Phase II pricing flexibility was granted. Because Phase II pricing flexibility is a statistically significant variable in explaining substantial and sustained special access rates, parties should show that pricing behavior changed significantly when and where Phase II pricing flexibility was granted.

83. We seek comment on whether product markets should be further subdivided by transmission capacity. For example, parties should comment (and provide data supporting their positions) on whether DS-1 special access channel terminations between the customer premises and the LEC end office is in the same product market(s) as DS-3 and OCn channel terminations.

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[200] *See Pricing Flexibility Order*, 14 FCC Rcd at 14234-35, 14273-74, 14278-81, 14299-300, paras. 24-25, 93, 100-07, 148-50.

[201] *See, e.g.*, WorldCom Comments at 8.

[202] *See id*. at 8-9; AT&T Reply at 14.

[203] *Pricing Flexibility Order*, 14 FCC Rcd at 14299-300, para. 150. The Commission explained the need for higher trigger thresholds for these channel terminations as follows:

> [C]hannel terminations between a LEC end office and a customer premises warrant different treatment than other special access and dedicated transport services. . . . We agree that pricing flexibility for channel terminations between a LEC end office and a customer premises requires a higher threshold than flexibility for other dedicated transport and special access services. Entrance facilities, direct-trunked transport, channel mileage, and the flat-rated portion of tandem-switched transport all involve carrying traffic from one point of traffic concentration to another. Thus, entering the market for these services requires less investment per unit of traffic than is required, for example, for channel terminations between an end office and customer premises. Furthermore, investment in entrance facilities enables competitors to provide service to several end users, while channel terminations between an end office and customer premises serve only a single end user. Accordingly, competitors are likely to enter the market for entrance facilities, direct-trunked transport, channel mileage, and the flat-rated portion of tandem-switched transport before they enter the market for channel terminations between a LEC end office and a customer premises. We therefore adopt a higher threshold for granting flexibility for these channel terminations than for other special access and dedicated transport services.

Id. at 14278-79, paras. 101-02 (internal citation omitted).

84. Although we have not previously defined the classes of customers that obtain special access services (such as classifying customers by the annual revenue per building or by the capacity required to serve them), a careful differentiation among customer classes may be important for a thorough level of competition analysis.[204] It may be relevant, for example, whether special access customers, such as CMRS providers, IXCs, or enterprise business customers, constitute one or multiple customer class(es). Parties should support, as much as possible, their proposed relevant customer classes with reliable empirical data.[205]

85. In discussing the relevant product markets, we ask parties to consider not only special access services provided over price cap incumbent LEC networks, but also whether facilities provided over other platforms, *e.g.*, cable, wireless, and satellite, as well as over competitive LEC self-provisioned wireline facilities, could provide the equivalent of price cap LEC special access services. We seek comment on the willingness and ability of users to purchase equivalent special access services as substitutes for a price cap LEC's special access services. In this regard, we ask parties to discuss whether significant intermodal special access price and quality service differentials exist and, if so, whether that implies that these services are in different product markets.

86. Finally, in determining the appropriate delineation of the product market in which to perform this analysis, we ask parties to provide their analyses consistent with their proposed geographic market.

(ii) Geographic Market

87. To define the relevant market, we typically determine not only the relevant product market, but also the relevant geographic market(s).[206] The Commission previously has identified the relevant geographic market for granting pricing flexibility for special access services as the MSA.[207] We seek comment on whether this remains the appropriate geographic market for each of the special access services product markets, identified above or by commenting parties.

88. Some parties claim that competition is concentrated in a small number of areas within MSAs and that, therefore, the MSA is too large to be the relevant geographic market.[208] They allege that a pricing flexibility trigger based on collocation coupled with competitive transport does not consider the ubiquity of competitive transport facilities throughout an MSA.[209] They thus contend that the trigger may demonstrate that numerous carriers have provisioned transport from their switches to collocation arrangements in a single wire center, such as a LEC serving wire center, but the trigger does not demonstrate the existence of competitive transport to interconnect the collocation arrangements to similar arrangements in any other price cap LEC wire centers. If, for example, a collocated competitor uses its own transport to carry traffic from a LEC serving wire center to an IXC POP, this may establish competition for this facility, but it is not sufficient to establish competition for other special access services. In short, these parties conclude that the Commission's trigger does not say enough about the geographic extent of "irreversible sunk investments" by competitors throughout the MSA in which pricing flexibility was granted. As a result, they argue, incumbent LECs may be able to exercise

[204] *See* DOJ Merger Guidelines § 2.22.

[205] Such data, for example, may include econometric estimates of cross elasticity of demand or marketing studies that show consumer substitutability of demand for competing services.

[206] *See* DOJ Merger Guidelines § 1.2.

[207] *Pricing Flexibility Order*, 14 FCC Rcd at 14260, paras. 72-74.

[208] *See, e.g.*, AT&T Reply, Reply Declaration of Lee L. Selwyn at paras. 16-21.

[209] *See, e.g.*, *Revisions by Qwest Corporation to Tariff F.C.C. No. 1*, Transmittal No. 206, Petition of Time Warner Telecom to Reject, or Alternatively, Suspend and Investigate at 4-5 (filed Aug. 23, 2004).

monopoly power through the use of exclusionary pricing strategies in some portions of the MSA. We seek comment on these contentions.

89. We note that all of the price cap LECs' special access pricing flexibility petitions to date have relied on the alternative trigger regarding the percentage of revenue associated with wire center collocation as opposed to the trigger that measures only the percentage of wire centers with collocation.[210] Because the revenue triggers require collocation, and hence facilities deployment, in fewer wire centers in the MSA, we invite commenters to address whether the MSA remains a reasonable geographic market in which to measure irreversible sunk investment in the relevant special access product markets, and particularly for channel terminations between the LEC office and the customer premise. We seek comment on this concern.

90. One reason that competition may not develop throughout an entire MSA is that the difference between the expected per unit costs of any potential competitor and a price cap incumbent LEC's expected per unit costs in the foreseeable future may be considerably greater in some areas of an MSA than others. Any such cost disadvantages may be smaller in areas of relatively high special access line density, *e.g.*, downtown Boston, than in areas of relatively low density, *e.g.*, suburban Boston. We seek comment on the degree to which special access line density affects the cost disadvantage a potential entrant would face relative to a price cap LEC, and the reasons for this disadvantage, if any exists. We also seek comment on the use of some measure of special access line density to refine the relevant geographic market definition for special access services. Under one approach, line density might be used to subdivide, not supplant, the MSA geographic market. Under a second approach, line density might replace the MSA as the relevant geographic market. We seek comment on these approaches.

91. If we were to use line density to define the geographic market, we would have to establish density zones. We request comment on how to establish density zones for purposes of defining the relevant geographic market. In this regard, we note that states generally are required to de-average state-wide UNE rates into at least three zones to reflect costs differences within the state.[211] Most states, at a minimum, have established rate zones for voice grade loops and DS1 loops. Some states also have established rate zones for UNE loops with capacities higher than DS1 and for dedicated transport and entrance facility UNEs with various capacities. We ask parties to comment on whether it would be appropriate to use the rate zones already established by the states for comparable UNEs as the density zones for interstate special access services. In this regard, we seek comment on the comparability of UNEs and special access services. For example, if a state does not de-average the rate for DS3 UNE loops, is it appropriate to use zones that it established for DS1 loops for the DS3 special access service zones? Or if a state does not de-average rates for dedicated transport or entrance facility UNEs, is it appropriate to use the zones that it established for DS1 loops as the density zones for interoffice special access services? More generally, is it necessary to establish different sets of density zones for special access channel termination services extending between the LEC's end office and the end user, for channel

[210] *E.g.*, *BellSouth Petition for Pricing Flexibility for Special Access and Dedicated Transport Services*, CCB/CPD File No. 00-20, Memorandum Opinion and Order, 15 FCC Rcd 24588 (CCB 2000); *see also Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Deployment of Wireline Services Offering Advanced Telecommunications Capability*, CC Docket Nos. 01-338, 96-98, 98-147, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, 18 FCC Rcd 16978, 17182-83, para. 341 (2003) (*Triennial Review Order*) (subsequent history omitted) ("Incumbent LECs have received special access pricing flexibility in numerous MSAs throughout their regions, based almost exclusively on meeting the *Pricing Flexibility Order's* triggers based on special access revenues.").

[211] 47 C.F.R. § 51.507(f); *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, 95-185, First Report and Order, 11 FCC Rcd 15499, 15882-82, paras. 764-765 (1996) (*Local Competition Order*) (subsequent history omitted).

termination service extending between the LEC's serving wire center and the IXC POP, and for interoffice facilities?

92. We also seek comment on alternative ways that we might develop density zones for special access rates. We ask parties to define the appropriate measure of special access line density. Should we measure density, for example, based on price cap incumbent LEC DS0-equivalent special access lines per square mile, DS1 lines per square mile, DS3 lines per square mile, or on some other basis? We also request comment on how to group line densities, *e.g.*, 10,000 DS0-equivalent special access lines and above, 1,000 DS0-equivalent lines and below. We request that parties propose density zones for special access service. Parties that propose these zones should demonstrate why these zones would reflect varying degrees of special access competition.

93. Finally, we seek comment on how to apply any triggers that we adopt for pricing flexibility if we adopt density zones to define geographic markets for special access services. If we retain use of collocation as a trigger, for example, is there some special access line density level that is so high, *e.g.*, 10,000 lines or greater per square mile, that it would enable us to conclude that it is unnecessary to examine data regarding the presence of collocation facilities? Or, if we use density zones to define geographic markets and collocation presence as a trigger, should the amount of collocation required vary inversely with special access line density within a zone? For example, could we grant pricing flexibility where there is relatively low amount of collocation in a relatively high density zone or where there is a relatively high amount of collocation in a relatively low density zone?

(iii) Demand Responsiveness

94. Parties may seek to demonstrate that the market for a particular special access service is not competitive by showing that a significant number of the price cap incumbent LEC's customers do not have the ability to purchase a full range of comparable special access services from carriers other than the LEC. Economists traditionally measure demand responsiveness by identifying other special access options, relevant to that particular market, that are close substitutes, and determining whether consumers are impeded from switching to these substitutes.[212]

95. Although the Commission did not address demand responsiveness in the *Pricing Flexibility Order*, the demand responsiveness of a price cap incumbent LEC's customers may be an important factor in assessing the level of competition for incumbent special access services. In providing a demand-response analysis, parties should show whether the demand responsiveness before and after pricing flexibility was granted differed significantly. Parties should also show whether this response is significantly different, *ceteris paribus*, between an MSA in which Phase II pricing flexibility has not been granted and an MSA in which it has.

96. Because an MSA-by-MSA, service-by-service, customer-class-by-customer-class demand-response analysis may be unduly burdensome to parties and to the Commission, parties may aggregate demand-response data, statistics, and analyses.[213] We are concerned, however, that too much aggregation may lead to inconclusive results. For example, because we have emphasized distinctions between product markets (*e.g.*, special access channel terminations between the customer premise and the LEC office, special access channel terminations between the IXC POP and the LEC serving wire center, and other special access services), we ask parties not to aggregate data from these markets. Also, we request that

[212] More specifically, demand responsiveness measures the sensitivity of the quantity demanded to price changes. Demand responsiveness is typically measured by the elasticity of demand, which is the percentage change in the quantity demanded for a particular product will be following a one percent change in the price of that product. *See* Robert S. Pindyck & Daniel L. Rubenfeld, MICROECONOMICS 29 (1992).

[213] *See Pricing Flexibility Order*, 14 FCC Rcd at 14267-69, paras. 84-86.

parties provide disaggregated customer class data, regardless of how the commenter chooses to identify the relevant customer class(es) (*e.g.*, the occupancy of buildings, the distribution of revenues either by building or enterprises).

(iv) Supply Responsiveness

97. Parties may seek to demonstrate that the market for a particular special access service is not competitive by showing that, for each product market, competitors do not have enough readily-available supply capacity to constrain the price cap LEC's market behavior. Supply responsiveness measures the ability of carriers, other than the price cap LEC, to supply enough capacity to respond to demand migrating from the price cap LEC's network in the event of a LEC price increase for its special access services.[214] Supply elasticities of a LEC's competitors may be important in assessing the level of competition for an incumbent's special access services after Phase II pricing flexibility is granted.

98. We seek comment on whether the triggers, adopted in 1999, remain reasonable when assessed against marketplace data since the granting and exercise of Phase II pricing flexibility. In the *Pricing Flexibility Order*, the Commission predicted a relationship between price cap LEC special access rates and supply responsiveness, stating that "[i]f an incumbent LEC charges an unreasonably high rate for access to an area that lacks a competitive alternative, that rate will induce competitive entry, and that entry will in turn drive rates down."[215] This assessment directly addresses the issue of sustainability. The Commission reasoned that substantial rate increases would not be sustainable because they would attract entry, increase competition, and ultimately result in lower rates.[216]

99. We invite parties to provide detailed analyses of supply responsiveness,[217] including providing the relevant data and information that would be necessary to determine whether a price cap LEC's competitors are supply-responsive.[218] Parties providing this data should demonstrate the presence or lack of entry and/or increased competitive supply so that we may assess whether it is reasonable to continue to rely on our prior conclusions. We ask commenters to provide evidence showing whether there is a statistically significant relationship between higher special access rates and high levels of competitive LEC entry. Parties should quantify the purported relationship between rates and entry. For example, one way to quantify this relationship is to demonstrate a statistically significant relationship between increased competitive LEC entry and investment and the relative levels of special access rates and/or special access profit margins in MSAs where Phase II pricing flexibility has been granted. Also, we are particularly interested in data that would show whether the LEC responded to the competitive

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[214] *See* Pindyck & Rubenfeld at 32; *see also* DOJ Merger Guidelines §§ 1.0, 1.3, 3 (the guidelines refer to these factors as supply substitution factors, *i.e.*, possible production responses).

[215] *Pricing Flexibility Order*, 14 FCC Rcd at 14297-98, para. 144.

[216] *Id*.

[217] Supply responsiveness is typically measured using elasticity of supply, a concept parallel to that used for demand elasticity. *See* Pindyck & Rubenfeld at 32. Supply elasticity measures the percentage change in the quantity supplied that results from a one percent change in the price of a product. High supply elasticity indicates that entry is relatively easy and that any attempt by an incumbent to raise prices will result in new entry. Conversely, low supply elasticity is indicative of market power.

[218] The incumbent LEC's elasticity of demand is affected by the new entrant's elasticity of supply. It may be possible to show that the incumbent LEC's demand becomes more responsive to changes in price as new entrants' supply becomes more elastic and their market share increases. Such results would indicate that, as new entrants become more capable of supplying special access services to more customers, an increase in special access prices by the incumbent LEC results in a larger decrease in the quantity of special access services purchased from the incumbent LEC and an increase in the amount supplied by the new entrants. *See* Dennis W. Carleton & Jeffrey M. Perloff, MODERN INDUSTRIAL ORGANIZATION 158-69, 172-74 (1993).

threat on a narrowly targeted basis (*e.g.*, by offering new lower contract tariff rates to the customer or customer location (*e.g.*, specific building) served by the competitor) or on a broader basis (*e.g.*, MSA-wide).

100. We ask parties to provide detailed information about their existing supply of special access facilities, including their ability or inability to self-deploy transport facilities, and/or to gain access to third-party alternatives. In providing such information, it would be most helpful for parties to disaggregate data among, at least, special access channel terminations between customer premises and the LEC office, special access channel terminations between the IXC POP and the LEC wire center, and other special access facilities. In addition, we invite each commenter, for its company, to provide information about the supply of special access facilities at the MSA level for each MSA in which that company is present.[219] The most relevant data would be provided for the following time periods: deployment before and up to the granting of Phase II pricing flexibility, deployment from the time pricing flexibility was granted until the present, and planned future deployment. Further, we ask parties, now that Phase II pricing flexibility has been granted in many MSAs, to demonstrate the strength of any correlation between collocation and the provision of competitive transport facilities.[220]

101. We encourage competitive LECs and other parties that have deployed their own special access transport facilities to provide their actual deployment cost information instead of relying on theoretical, estimated, or modeled costs of price cap LEC special access transport facilities. To the extent that parties compare their costs to the costs of price cap LEC transport facilities, these comparisons should be made across facilities that are as similar as possible. We note that some deployment costs are location specific.

102. Finally, we note that, in certain industries, a short-term supply response may be ameliorated by other long-term supply responsiveness factors. For example, in an industry where assets can be deployed only in large increments, fixed costs are high, and there are substantial transaction costs to adding supply, we expect lags between changes in prices and a supply response.[221] We therefore ask parties to demonstrate that supply responsiveness trends are stable by providing evidence of long-term trends.

(v) Market Share

103. A high market share does not necessarily confer market power, but it is generally a condition precedent to a finding of market power.[222] Although the Commission did not rely on a market share analysis in the *Pricing Flexibility Order*,[223] we now invite parties to provide data and analysis of price cap LECs' market shares for special access services, by MSA where Phase II pricing flexibility has been granted, before and after that pricing flexibility was implemented. We invite parties to supply market share data and analysis based on revenues and/or volumes on an annualized basis. If parties

[219] To the extent that a party contends that the relevant geographic market is something other than the MSA, that party should also provide information about the supply of special access facilities at the level of that geographic market (for each market).

[220] *Pricing Flexibility Order*, 14 FCC Rcd at 14266-67, para. 82 (For example, in the *Pricing Flexibility Order*, the Commission recognized that the "correlation between operational collocation arrangements and competitive transport facilities is somewhat attenuated, . . . [and therefore] require[d] incumbent LECs to show that at least one competitor relies on transport facilities provided by a transport provider other than the incumbent in each wire center . . . [with] an operational collocation arrangement.").

[221] *See* Jean-Jacques Laffont & Jean Tirole, COMPETITION IN TELECOMMUNICATIONS 16-17 (2001).

[222] *See* DOJ Merger Guidelines § 1.11.

[223] *See Pricing Flexibility Order*, 14 FCC Rcd at 14271-72, paras. 90-91.

choose one measure of market share over others, they should identify their proposed measure with specificity and provide a thorough justification of their choice of measurement as compared to others. We note that there are many ways of defining market share, such as volume of traffic, revenues, or network capacity. We ask parties to be specific in defining both the numerator and the denominator in the ratio that determines market share.[224] For example, while parties should identify the size of the actual and potential market, they should not assume, without providing supporting evidence, that every building in an MSA is a potential customer for special access services. We also ask parties to disaggregate, as much as possible, any market share data provided by the special access product market (*e.g.*, special access channel terminations between the LEC end office and customer premises), and by customer classes. We invite parties to provide market share information at the MSA level (and any other geographic market level they deem appropriate).

104. A company that enjoys a very high market share will be constrained from raising its prices substantially above cost if the market is characterized by high supply and demand elasticities.[225] In other words, an analysis of the level of competition for special access services based solely on a price cap LEC's market share at a given time may not provide sufficient evidence for us to conclude that substantial competition exists or does not exist.[226] We therefore propose to consider market share in conjunction with other factors, including, but not limited to, supply and demand responsiveness, growth in demand, market shares before Phase II flexibility was implemented, and pricing trends. Market share analyses provided by commenters should take these factors into consideration.

105. In particular, market share analysis and supply responsiveness should be used jointly to assess market power. Parties should ensure that the data and analyses they provide on supply responsiveness issues are consistent with their market share analyses and data. We do not believe it necessary for parties to provide estimates of supply elasticities separately from the data and analyses they include in their comments responding to supply responsiveness issues. Instead, we intend to use the supply responsiveness data and analyses provided by parties in response to the information requested above in the Supply Responsiveness section of this NPRM.[227] We expect that parties submitting this information will submit market share data and analyses that can be used in conjunction with supply responsiveness data and analyses.

106. Finally, because market share analysis is primarily concerned with ascertaining the level of competition in the wholesale special access service market, where price cap LECs provide these services to intermediate customers (*e.g.*, IXCs, CMRS providers) that ultimately supply the retail market, we invite parties to provide wholesale market share analyses and data, excluding retail market analyses and data. If parties would like to include market share analysis and data for the special access retail market, they may do so, as well. Further, we ask that parties identify whether and, if so, how UNEs are included in their analysis.

[224] We require parties to be consistent between the numerator and denominator to address, in part, the problems the Commission identified with the record submitted by parties in the pricing flexibility proceeding. *See id.*, 14 FCC Rcd at 14271-72, paras. 90-91.

[225] *Access Charge NPRM, Order, and NOI*, 11 FCC Rcd at 21424, para. 158. The "'small but significant and non-transitory' increase in price" standard is based on the assumption that supply and demand elasticities can constrain monopoly pricing. *See* DOJ Merger Guidelines § 1.11.

[226] *See* DOJ Merger Guidelines § 1.11 (market share is one of many measures used to evaluate market power).

[227] *See supra* section III.B.1.b(iv).

(vi) Barriers to Entry

107. An entry barrier may be defined as a cost of production that must be borne by competitors entering a market that is not borne by an incumbent already operating in the market.[228] Cost advantages derived solely from the efficiency of the incumbent are not considered a barrier to entry.[229] Markets where a price cap LEC owns or has access to important assets or resources that are not accessible to the potential entrant bestows an absolute advantage on the incumbent.[230]

108. The ease with which competitors can enter the special access market influences the level of competition in that market.[231] For example, a LEC might have a market share of over 50 percent but no market power if there are no significant barriers impeding entry into that market.[232] In such a situation, the threat that an increase in price could eventually attract new entrants might be real enough to discourage the price cap LEC from increasing its price. Similarly, high rates of return may attract competitors to that market if entry barriers are relatively low.

109. In the *Pricing Flexibility Order*, the Commission predicted that substantial "irreversible, or 'sunk' investment in facilities used to provide competitive services," would be sufficient to constrain the LECs' pricing behavior.[233] Specifically, the Commission determined that collocation "usually represents a financial investment by a competitor to establish facilities within a wire center. . . . [T]he investment in transmission facilities associated with collocation arrangements is largely specific to a location; the competitive LEC's facilities cannot, for the most part, easily be removed and used elsewhere if entry does not succeed."[234] Because these investments were location specific, the entrant incurred sunk costs,[235] making it less likely that the incumbent could successfully use exclusionary strategies to drive the entrant from the market.[236]

110. Parties contend that the Commission's economic reasoning is incomplete. They claim that market entry by some carriers does not fully ameliorate the effect of sunk costs as a continuing and substantial barrier to entry.[237] We seek comment on whether our assessment in the *Pricing Flexibility*

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[228] *See* Spulber, *supra* note 186, at 40 (citing George J. Stigler, THE ORGANIZATION OF INDUSTRY 67 (1968)).

[229] *See id*.

[230] *See id*.

[231] *See id*.

[232] *See* Herbert Hovenkamp, Federal Antitrust Policy – The Law of Competition and Its Practice § 3.7d (1999).

[233] *Pricing Flexibility Order*, 14 FCC Rcd at 14263-64, para. 79.

[234] *Id.*, 14 FCC Rcd at 14265-66, para. 81.

[235] Sunk costs refer to the investments that have to be made to enable production of a good or service. These costs are incurred even before a single unit of good or service is produced. An example of sunk costs can be found where the cable network has to be put in place – at a high cost – before any voice or data transmission can be made.

[236] *Pricing Flexibility Order*, 14 FCC Rcd at 14264, para. 80 ("An incumbent monopolist will engage in exclusionary pricing behavior only if it believes that it will succeed in driving rivals from the market or deterring their entry altogether. . . . Once multiple rivals have entered the market and cannot be driven out, rules to prevent exclusionary pricing behavior are no longer necessary. Investment in facilities, particularly those that cannot be used for another purpose, is an important indicator of such irreversible entry. . . . [T]he presence of facilities-based competition with significant sunk investment makes exclusionary pricing behavior costly and highly unlikely to succeed.").

[237] *See, e.g.*, Letter from Brian R. Moir, counsel for the Special Access Reform Coalition, to Marlene H. Dortch, Sec'y, Federal Communications Commission, Attach. Phoenix Center Policy Paper Number 18 (George S. Ford & Lawrence J. Spiwak, *Set It and Forget It? Market Power and the Consequences of Premature Deregulation in*

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Order of the relationship between entry barriers and irreversible, sunk investment by competitive carriers remains sufficiently robust. We also seek comment on whether this assessment has been validated by actual marketplace developments since the *Pricing Flexibility Order* was adopted in 1999.

111. Finally, we seek comment on the effect that numerous competitors exiting the market has on our predictive judgment that collocation shows evidence of irreversible market entry. The Commission predicted that collocation equipment would remain "available and capable of providing service in competition with the incumbent, even if the incumbent succeeds in driving that competitor from the market."[238] In light of the numerous competitors that have exited the market (in whole or in part) since 1999, we seek comment on whether their collocation facilities (space and equipment) continue to be used by other competitive LECs or are available for use by competitive LECs without their first having to incur significant additional sunk costs. We note that price cap LECs retain data on which carriers are collocated in their offices (and on the equipment located in the collocation spaces), and believe such information is particularly relevant here. We, therefore, invite these LECs to provide data (disaggregated on an MSA basis) that identifies whether and how the collocation spaces and equipment of carriers that have exited the market are used by, or available to, other competitive carriers. We seek comment on what changes, if any, we should make to our pricing flexibility rules if the data show that collocation has not proven to be as accurate a proxy for irreversible competitive market entry as we expected.

(vii) Other Factors

112. We invite interested parties to provide discussion, supply data, and present analysis of other factors in addition to those discussed above that would be helpful in evaluating the level of competition for special access services in the MSAs where Phase II pricing flexibility has been granted. The discussion and analysis of these additional factors should include considerations as to the importance of these factors in making a final determination as to the level of competition in the special access market.

2. Relationship Between Market Power and Impairment Standards

113. While the Commission was working to reform its special access price cap rules in the mid-to-late 1990s, it also was implementing section 251 of the 1996 Act, which requires incumbent LECs to offer network elements on an unbundled basis.[239] In undertaking its unbundling analysis, the Commission repeatedly confronted the issue of whether to unbundle network elements or combinations of network elements comprising essentially the same facilities as those used to provide special access services.[240] Indeed, in these proceedings some parties have advocated variations on the pricing flexibility

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Telecommunications Markets (2003)) at 18 (filed July 18, 2003); *see also* Jean Tirole, INDUSTRIAL ORGANIZATION 305-56 (1994).

[238] *Pricing Flexibility Order*, 14 FCC Rcd at 14264, para. 80. The Commission further explained that "[a]nother firm can buy the facilities at a price that reflects expected future earnings and, as long as it can charge a price that covers average variable cost, will be able to compete with the incumbent LEC." *Id*.

[239] *See, e.g.*, *Triennial Review Order*, *supra* note 210, 18 FCC Rcd at 17025, para. 70; *Implementation of The Local Competition Provisions of The Telecommunications Act of 1996*, CC Docket No. 96-98, Third Report and Order and Fourth Further Notice of Proposed Rulemaking, 15 FCC Rcd 3696, 3704, para. 14 (1999) (*UNE Remand Order*) (subsequent history omitted); *Local Competition Order*, *supra* note 211, 11 FCC Rcd at 15616-775, paras. 226-541.

[240] For example, at one time, the Commission imposed temporary use restrictions on combinations of unbundled loops and unbundled dedicated transport (known as enhanced extended links, or EELs) to prevent the unbundling requirements from "caus[ing] a significant reduction of the incumbent LECs' special access revenues prior to full implementation of access charge and universal service reform" due to the possibility of mass migration of special access services to cost-based UNEs. *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98, Supplemental Order, 15 FCC Rcd 1760, 1761, para. 3 (continued....)

standard for determining when certain network elements should be unbundled,[241] and the D.C. Circuit, in its *USTA II* decision, recently instructed the Commission to take account of tariffed special access services when conducting its unbundling inquiry.[242] We note that the Commission recently modified its unbundling analysis in response to *USTA II*,[243] and we seek comment on the relationship, if any, between the market power threshold that underscores the pricing flexibility rules and the impairment standard for unbundling.

3. Tariff Terms and Conditions

a. Background

114. Although traditional market power analysis focuses on whether a firm can impose a substantial and sustained price increase within, and examines the cost characteristics of, the relevant geographic and product/service market, market power can also be exercised through exclusionary conduct. Such conduct may be evidenced from the terms and conditions contained in a carrier's tariff offering.[244]

115. The Commission has long been concerned about dominant carriers offering their services on terms and conditions that weaken or harm the competitive process sufficiently to reduce consumer welfare.[245] Notably, with specific regard to special access services, the Commission has sought to exercise great care to prevent exclusionary conduct while transitioning the market from monopoly to competition.[246] For example, the Commission permitted price cap LECs to offer volume and term discounts for special access services without any competitive showing, but it found that some large discounts might be anticompetitive or raise questions of discrimination.[247] Moreover, it has prohibited

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(1999) (quoting *UNE Remand Order*, 15 FCC at 3913, para. 489). More recently, however, the Commission adopted new EELs eligibility criteria that were not based on the preservation of special access revenues. *Triennial Review Order*, 18 FCC Rcd at 17350-61, paras. 590-611.

[241] *Triennial Review Order*, 18 FCC Rcd at 17182-83, 17225-26, paras. 341, 397.

[242] *United States Telecom Ass'n v. FCC*, 359 F.3d 554, 577 (D.C. Cir. 2004) (*USTA II*), *pets. for cert. filed*, Nos. 04-12, 04-15, 04-18 (June 30, 2004).

[243] *See FCC Adopts New Rules for Network Unbundling Obligations of Incumbent Local Phone Carriers*, FCC News (Dec. 15, 2004).

[244] *See, e.g.*, *AT&T v. Central Office Tel., Inc.*, 524 U.S. 214, 223 (1998) ("Rates, however, do not exist in isolation. They only have meaning when one knows the services to which they are attached."), *rehearing denied*, 524 U.S. 972.

[245] *See, e.g., Expanded Interconnection with Local Telephone Company Facilities*, CC Docket Nos. 91-141, 92-222, Report and Order and Notice of Proposed Rulemaking, 7 FCC Rcd 7369, 7463, para. 201 (1992) (*Expanded Interconnection Order*), *modified by* 7 FCC Rcd 7936 (1992), *rev'd, in part, on other grounds*, *Bell Atlantic Tel. Cos. v. FCC*, 24 F.3d 1441 (D.C. Cir. 1994), *reinstated in pertinent part*, *Expanded Interconnection with Local Telephone Company Facilities*, CC Docket No. 91-141, Memorandum Opinion and Order, 9 FCC Rcd 5154, 5156, 5200-01, paras. 4, 168-71; *AT&T Communications Tariff F.C.C. No. 15, Competitive Pricing Plan No. 2, Resort Condominiums International*, CC Docket No. 90-11, Memorandum Opinion and Order 5648, 5649-50, paras. 12-22.

[246] *See Expanded Interconnection Order*, 7 FCC Rcd at 7447-70, paras. 164-215.

[247] *See id.*, 7 FCC Rcd at 7463, para. 200.

price cap LECs from incorporating growth discounts into their tariffs.[248] The Commission has also limited the termination liabilities that carriers may include in their tariffs.[249]

116. In the *AT&T Petition for Rulemaking* and responses thereto, parties have complained that the terms and conditions for special access services in the tariff offerings of price cap LECs represent exclusionary conduct designed to deter market entry or to induce market exit.[250] They argue that the price cap LECs, as dominant firms, can and have adopted pricing structures through tariff terms and conditions that negate the price breaks a competitor can offer a customer for a particular service because the customer would then lose its discounts from the price cap LEC on other services or in other markets.[251] They contend that dominant firms are likely to engage in this form of exclusionary conduct because, unlike classic exclusionary pricing, this conduct does not require the firm to set any price below cost.[252]

117. The BOCs respond that allegations of strategic anticompetitive pricing represent mere theoretical arguments and that they have not engaged in exclusionary conduct.[253] They point out that special deals to attract or retain customers may injure individual competitors but result in a net increase in overall consumer welfare.[254] They claim, moreover, that a general restriction on any discriminatory conduct would restrict competitive behavior and harm consumers by denying them the direct benefit of the tariff terms (including any volume and term price reductions) and by reducing the vigor of competition.[255] The BOCs also contend that the pricing flexibility triggers, which serve as a proxy for irreversible market entry, ensure that any anticompetitive strategy to frustrate entry through the use of pricing flexibility tariffs or contract tariffs is too late to be effective.[256]

118. Further, the BOCs claim that precluding the use of volume and term discounts would place them at a competitive disadvantage.[257] Long-term contracts assure recovery of direct facility costs and allow amortization of up-front sunk costs over the life of the transaction. The BOCs argue that customers willingly agree to volume and term commitments to obtain discounts and that every carrier makes available such offerings in all forms of their tariffs.[258] Finally, they contend that the complaining parties have extensive networks of their own and can simply elect to self-provision any service they choose not to purchase from a BOC.[259]

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[248] *See Transport Rate Structure and Pricing*, CC Docket No. 91-213, Fourth Memorandum Opinion and Order on Reconsideration, 10 FCC Rcd 12979, 12985, at para. 17 (1995).

[249] *See Expanded Interconnection Order*, 7 FCC Rcd at 7464, para. 202.

[250] These complaints relate to the terms and conditions contained in the BOCs' price cap tariffs, their contract tariffs (offered after receiving and exercising Phase I or Phase II pricing flexibility), and their Phase II pricing flexibility tariffs. *See, e.g.*, *AT&T Petition for Rulemaking* at 18-23; Arch Wireless Comments at 4; WorldCom Comments at 11-12, Pelcovits Decl. at 11-15; XO Comments at 5-7. Although our discussion of contract terms and conditions occurs within the pricing flexibility section of the NPRM, we invite parties to comment on tariff terms and conditions for any of these forms of tariffs.

[251] WorldCom Reply, Pelcovits Decl. at 8, 11.

[252] *Id*. at 5.

[253] Kahn/Taylor Decl., *supra* note 77, at 29.

[254] *Id*. at 30.

[255] *Id*.

[256] *Id*. at 31.

[257] *Id*.

[258] *Id*. at 32.

[259] *Id*. at 33.

b. Discussion

119. There are several reasons that a firm might bundle product offerings.[260] We are concerned here with whether a firm bundles the purchase of one product with the purchase of a product the customer might otherwise not have made. A provider dominant in one product may seek to influence the purchase of other products by imposing terms and conditions that bundle the products together. As with the market power type analysis described above, in evaluating the terms and conditions associated with a price cap LEC tariff offering, parties should identify the special access product and geographic markets.[261]

120. As a first approximation, special access service involves facilities dedicated to connecting two locations. We seek comment on whether this connection is a single product or whether it represents several products. In the *Pricing Flexibility Order*, the Commission identified three categories of product markets for special access services: (1) special access channel terminations between a price cap incumbent LEC's end office and customer premises, (2) special access channel terminations between an IXC POP and a LEC service wire center and channel terminations and (3) other special access facilities.[262] As explained *supra* in section III.B.1.b(i), we seek comment on whether these continue to be the relevant product markets. The Commission also identified the MSA as the relevant geographic market. As explained *supra* in section III.B.1.b(ii), we seek comment on whether this remains the logical geographical market.

121. In conjunction with these product and geographic market analyses for special access services, we seek comment on the reasonableness of various levels of aggregation that a carrier may require of a customer to qualify for a discount.[263] For example, are there cost justifications for bundling discounts with aggregations of services (*e.g.*, DS-1, DS-3, OCn) and/or geographic regions (*e.g.*, routes, wire centers, zones, LATAs, LEC footprints)? Is it reasonable for LECs to require that customers aggregate purchases across equivalent transport and special access products (*e.g.*, channel terminations and entrance facilities)? We also seek comment and data on whether, where there are discounts based on aggregations of products, price cap LECs offer equivalent non-bundled, product-by-product discounts.

122. Where a volume commitment is a condition precedent to obtaining a discount, we seek comment on whether it is reasonable to condition the discount to the (individual) customer's previous purchase level. We invite parties to comment on whether the manner of specifying volume levels affects the quality of competition. We also seek comment on how the discounts offered in price cap LEC tariffs vary with the volume of service purchased. Is there a trade-off between the amount of aggregation allowed and the restrictiveness of the discount terms that we allow? Finally, parties should comment on whether they believe such conditioning of discounts on prior volumes and future volume commitments violates our prohibition on growth discounts.[264]

123. Where discounts are based on the length of the term commitment, we seek comment on the relationship between up-front, non-recurring charges and termination penalties. Prior to the advent of competition, the trade-off between an up-front charge and amortization over the lease period was the cost

[260] *See* Robert B. Wilson, NONLINEAR PRICING 7-8 (1993) (discussing appropriate and inappropriate reasons to bundle product offerings).

[261] *See supra* sections III.B.1.b(i)-III.B.1.b(ii).

[262] *Pricing Flexibility Order*, 14 FCC Rcd at 14234-35, 14273-74, 14278-81, 14299-300, paras. 24-25, 93, 100-07, 148-50.

[263] For instance, Ameritech's tariff appears to require volume and term discounts be based on each customer's previous total regional purchase of service. Ameritech Tariff F.C.C. No. 2 §§ 19.3(B)-(D).

[264] *See Pricing Flexibility Order*, 14 FCC Rcd at 14294, paras. 134-35.

of money. With competition, non-recurring charges and termination penalties raise issues concerning barriers to entry, risk bearing, and retail versus wholesale churn. We seek comment on whether we should allow or require up-front, non-recurring charges to recover the costs associated with initiating service for a specific customer. Should we require amortization over the life of the facility of the cost of activities that benefit all customers using the facility?

124. Additionally, we seek comment on whether it is reasonable for a price cap LEC to bundle a tariff discount with the condition that the customer terminates service with a competitor. Is such bundling for the same service on the same route reasonable?

125. Finally, we ask parties to comment on whether it is reasonable for a price cap LEC to bundle a tariff discount with restrictions on the use or reuse of a facility.

4. Relationship Between New Pricing Flexibility Rules and New Special Access Price Cap Rules

126. If we modify the pricing flexibility rules, we seek comment on whether and how to adjust the price cap rules to incorporate the affects of changes in the pricing flexibility rules. In the event that a price cap LEC currently has pricing flexibility for services for which it will not have flexibility under any new rules we adopt, we tentatively conclude that rates for these services should be regulated no differently from rates for services for which a LEC never had pricing flexibility and for which it would have none under any new criteria. We may, for example, adopt a single price cap special access basket that includes separate categories for special access DS1 channel terminations extending between a price cap LEC end office and a customer premises, for DS1 channel termination services extending between a price cap LEC serving wire center and an IXC POP, and for DS1 interoffice facilities. If, in this example, a LEC either never had pricing flexibility for DS1 special access services, or currently has pricing flexibility but will no longer have it for these services under any new criteria, it would have to establish separate rates in a tariff and categories within the basket for each of the three service categories. Going forward, under the new price cap rules, the rate levels for the DS1 channel termination and interoffice facility services would be subject to the upper SBI limit for each category. These rate levels also would be constrained, as would those for any other special access service subject to price caps, because they are reflected in the API for the special access services basket that, in turn, must not exceed the PCI for the basket. We tentatively conclude that services subject to a new price cap plan going forward should be treated the same regardless of whether they never had or currently have pricing flexibility because, under the new criteria, there presumably is no distinction between the two services. We seek comment on this tentative conclusion. We also invite comment on other options under a new price cap plan for regulating rates for services that currently have pricing flexibility, but would have none under any new rules we might adopt.

127. We tentatively conclude that we should use the same approach to establish initial rates under a new price cap plan for services for which a LEC currently has pricing flexibility, but will have none going forward under any new criteria we adopt in this proceeding, and for services for which a LEC never had pricing flexibility and for which it would have none under any new pricing flexibility criteria. For example, if we find that initial rates should be based on a forward-looking cost study, rates for both of these categories of services would be set based on a forward-looking cost study, even though previously they were regulated differently. Again, there presumably is no distinction between the two services under any new pricing flexibility criteria that we adopt. There is therefore no obvious reason to establish initial rates for these services using different methods. We seek comment on this tentative conclusion. We also invite comment on other options under a new price cap plan for setting initial rates for services that currently have pricing flexibility, but would have none under any new criteria we adopt.

C. Interim Relief

128. AT&T has requested that, while the requested rulemaking is pending, the Commission: "(1) immediately reduce all special access charges for services subject to Phase II pricing flexibility to the rates that would produce an 11.25% rate of return[,] and (2) impose a moratorium on consideration of further pricing flexibility applications pending completion of the rulemaking."[265] We reject AT&T's requests at this time.[266] As discussed throughout this NPRM, we are fulfilling our ongoing commitment to re-examine periodically rules based on predictive judgments and to evaluate whether those judgments are, in fact, substantiated by marketplace developments.[267] As described above, evaluating the reasonableness of the Commission's predictions is a complex undertaking and we do not yet have sufficient data in the record to enable us to foresee the likely outcome of this analysis.

129. We do not find the evidence submitted by AT&T in its petition sufficient to justify the requested relief at this time. In particular, AT&T did not and could not, based on the paucity of data, establish the relationship between high rates of return and Phase II pricing flexibility. The most recent data presented in the *AT&T Petition for Rulemaking* dated from 2001.[268] The BOCs only implemented Phase II pricing flexibility in late 2000 and 2001.[269] One year's data are insufficient to support conclusions about the relationship between pricing flexibility and high rates of return. Even if the Commission had enough data, moreover, we question AT&T's central reliance on accounting rate of return data to draw conclusions about market power. High or increasing rates of return calculated using regulatory cost assignments for special access services do not in themselves indicate the exercise of monopoly power.[270]

130. Furthermore, even assuming that AT&T had established a strong likelihood that we would reverse or modify the findings of the *Pricing Flexibility Order*, the request for a re-initialization of certain special access rates to levels that would produce an 11.25 percent rate of return has not been justified. The request goes well beyond restoring the rate levels that would have been in place had the Commission never adopted the pricing flexibility rules that have been challenged. Given the complexities of setting reasonable special access rates and their interrelationship with other price cap rates, this requested interim relief is not warranted by the record now before us. Specifically, the record does not support a finding that every special access rate established pursuant to a grant of Phase II pricing flexibility violates section 201 of the Communications Act.[271] In addition, we find the record inadequate for prescribing new special access rates pursuant to section 205 of the Communications Act.[272] We note, however, that further development of evidence in the record may justify future interim relief if we conclude it is necessary to avoid market disruption as we move towards broad reforms.[273]

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[265] *AT&T Petition for Rulemaking* at 39.

[266] Because we reject AT&T's first two requests, we do not need to reach its third request, that the requested relief not trigger any termination liabilities in the carrier OPP Plans. *Id.* at 40.

[267] *Pricing Flexibility Order*, 14 FCC Rcd at 14261-81, 14288-302, paras. 77-107, 121-56.

[268] *AT&T Petition for Rulemaking* at 7-16.

[269] *BellSouth Petition for Pricing Flexibility for Special Access and Dedicated Transport Services*, CCB/CPD File No. 00-20, Memorandum Opinion and Order, 15 FCC Rcd 24588, para. 1 (CCB 2000) (granting the first filed pricing flexibility application on December 14, 2000).

[270] *See* Fisher & McGowan, *supra* note 167, 73 AMERICAN ECON. REV. at 83.

[271] 47 U.S.C. § 201.

[272] 47 U.S.C. § 205.

[273] *See Competitive Telecommunications Ass'n v. FCC*, 309 F.3d 8, 14 (D.C. Cir. 2002).

131. As a separate issue, however, we seek comment on what interim relief, if any, is necessary to ensure special access rates remain reasonable while we consider what regulatory regime will follow the CALLS plan. Given the complexities of the proceeding we initiate in this NPRM, there is a strong likelihood this proceeding will not be completed prior to July 1, 2005. This record contains substantial evidence suggesting that productivity has increased and continues to increase in the provision of special access services.[274] Under the CALLS plan, however, there is currently no productivity factor in place to require price cap LECs to share any of their productivity gains with end users.[275] Accordingly, we anticipate adopting an order prior to July 1, 2005 that will establish an interim plan to ensure special access price cap rates remain just and reasonable while the Commission considers the record in this proceeding. One interim option would be to impose the last productivity factor, 5.3 percent, that was adopted by the Commission and judicially upheld.[276] We seek comment on this and other reasonable interim alternatives.

IV. PROCEDURAL MATTERS

A. *Ex Parte* Requirements

132. This proceeding will continue to be governed by "permit-but-disclose" *ex parte* procedures that are applicable to non-restricted proceedings under 47 C.F.R. § 1.1206.[277] Parties making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must contain a summary of the substance of the presentation and not merely a listing of the subjects discussed. More than a one- or two-sentence description of the views and arguments presented generally is required.[278] Other rules pertaining to oral and written presentations are set forth in section 1.1206(b) as well.[279] Interested parties are to file any written *ex parte* presentations in this proceeding with the Commission's Secretary, Marlene H. Dortch, Contact Information Redacted, and serve with one copy: Pricing Policy Division, Wireline Competition Bureau, Contact Information Redacted, Attn: Jeremy D. Marcus. Parties shall also serve with one copy: Best Copy and Printing, Inc., Portals II, Contact Information Redacted, telephone Contact Information Redacted, facsimile (202) 488-5563, e-mail Contact Information Redacted or via its website http://www.bcpiweb.com.

B. Initial Paperwork Reduction Act Analysis

133. This document does not contain proposed information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. In addition, therefore, it does not contain any new or modified "information collection burden for small business concerns with fewer than 25 employees," pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. § 3506(c)(4).

[274] *See supra* section III.A.1.

[275] *See* 47 C.F.R. § 61.45(b)(1)(iv); *CALLS Order*, 15 FCC Rcd at 13025, paras. 149, 151.

[276] *1995 Price Cap Review Order*, 10 FCC Rcd at 9050, para. 198, *aff'd Bell Atlantic Tel. Cos. v. FCC*, 79 F.3d 1195, 1202-05 (D.C. Cir. 1996).

[277] *See* 47 C.F.R. § 1.1206.

[278] *See* 47 C.F.R. § 1.1206(b)(2).

[279] *See id.*

C. Initial Regulatory Flexibility Analysis

134. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[280] the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this NPRM. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the NPRM provided in paragraph 62 of the item. The Commission will send a copy of the NPRM, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).[281] In addition, the NPRM and IRFA (or summaries thereof) will be published in the Federal Register.[282]

1. Need for, and Objectives of, the Proposed Rules

135. In this NPRM, the Commission explores the appropriate regulatory regime to establish for price cap LEC interstate special access services after June 30, 2005.[283] The Commission tentatively concludes that a price cap regime should continue to apply and seeks comment on this tentative conclusion.[284] The Commission also seeks comment on the appropriate rate structure and levels under any such price cap regime, including seeking comment on: a productivity factor,[285] a growth factor,[286] earnings sharing,[287] a low-end adjustment,[288] rate baskets and bands,[289] and the initial rates.[290] As part of our examination, we also seek comment on whether to maintain, modify, or repeal the pricing flexibility rules.[291] Finally, we deny AT&T's requests that we impose a temporary moratorium on pricing flexibility applications and that we re-initialize interstate special access rates presently subject to pricing flexibility by applying an 11.25 percent rate of return.[292]

2. Legal Basis

136. This rulemaking action is supported by sections 1, 2, 4(i), 4(j), 201-205, and 303 of the Communications Act of 1934, as amended.[293]

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[280] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. §§ 601-12, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[281] *See* 5 U.S.C. § 603(a).

[282] *See id*.

[283] *See supra* sections I, III.A-III.B.

[284] *See supra* section III.A.

[285] *See supra* section III.A.2.a.

[286] *See supra* section III.A.2.b.

[287] *See supra* section III.A.2.c.

[288] *See supra* section III.A.2.d.

[289] *See supra* section III.A.3.

[290] *See supra* section III.A.4.

[291] *See supra* section III.B.

[292] *See supra* section III.C.

[293] 47 U.S.C. §§ 151, 152, 154(i), 154(j), 201-205, and 303.

3. Description and Estimate of the Number of Small Entities to Which the Notice will Apply

137. The RFA directs agencies to provide a description of, and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[294] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[295] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[296] A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[297]

138. In this section, we further describe and estimate the number of small entity licensees and regulatees that may also be directly affected by rules adopted in this order. The most reliable source of information regarding the total numbers of certain common carrier and related providers nationwide, as well as the number of commercial wireless entities, appears to be the data that the Commission publishes in its *Trends in Telephone Service* report.[298] The SBA has developed small business size standards for wireline and wireless small businesses within the three commercial census categories of Wired Telecommunications Carriers,[299] Paging,[300] and Cellular and Other Wireless Telecommunications.[301] Under these categories, a business is small if it has 1,500 or fewer employees. Below, using the above size standards and others, we discuss the total estimated numbers of small businesses that might be affected by our actions.

139. We have included small incumbent LECs in this present RFA analysis. As noted above, a "small business" under the RFA is one that, *inter alia*, meets the pertinent small business size standard (*e.g.*, a wired telecommunications carrier having 1,500 or fewer employees), and "is not dominant in its field of operation."[302] The SBA's Office of Advocacy contends that, for RFA purposes, small incumbent LECs are not dominant in their field of operation because any such dominance is not "national" in scope.[303] We have therefore included small incumbent LECs in this RFA analysis, although we

[294] 5 U.S.C. § 603(b)(3).

[295] 5 U.S.C. § 601(6).

[296] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in the Small Business Act, 5 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[297] 15 U.S.C. § 632.

[298] FCC, Wireline Competition Bureau, Industry Analysis and Technology Division, *Trends in Telephone Service*, Table 5.3 (August 2003) (*Trends in Telephone Service*).

[299] 13 C.F.R. § 121.201, North American Industry Classification System (NAICS) code 517110 (changed from 513310 in October 2002).

[300] *Id*. § 121.201, NAICS code 517211 (changed from 513321 in October 2002).

[301] *Id*. § 121.201, NAICS code 517212 (changed from 513322 in October 2002).

[302] 5 U.S.C. § 601(3).

[303] Letter from Jere W. Glover, Chief Counsel for Advocacy, SBA, to William E. Kennard, Chairman, FCC (May 27, 1999). The Small Business Act contains a definition of "small business concern," which the RFA incorporates into its own definition of "small business." *See* 15 U.S.C. § 632(a); 5 U.S.C. § 601(3). SBA regulations interpret "small business concern" to include the concept of dominance on a national basis. 13 C.F.R. § 121.102(b).

emphasize that this RFA action has no effect on Commission analyses and determinations in other, non-RFA contexts.

140. *Wired Telecommunications Carriers*. The SBA has developed a small business size standard for Wired Telecommunications Carriers, which consists of all such companies having 1,500 or fewer employees.[304] According to Census Bureau data for 1997, there were 2,225 firms in this category, total, that operated for the entire year.[305] Of this total, 2,201 firms had employment of 999 or fewer employees, and an additional 24 firms had employment of 1,000 employees or more.[306] Thus, under this size standard, the majority of firms can be considered small.

141. *Incumbent Local Exchange Carriers (LECs)*. Neither the Commission nor the SBA has developed a size standard for small businesses specifically applicable to incumbent local exchange services. The closest applicable size standard under SBA rules is for Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.[307] According to Commission data,[308] 1,337 carriers reported that they were engaged in the provision of local exchange services. Of these 1,337 carriers, an estimated 1,032 have 1,500 or fewer employees and 305 have more than 1,500 employees. Consequently, the Commission estimates that most providers of incumbent local exchange service are small businesses that may be affected by the rules and policies adopted herein.

142. *Competitive Local Exchange Carriers (CLECs), Competitive Access Providers (CAPs), and "Other Local Exchange Carriers."* Neither the Commission nor the SBA has developed a size standard for small businesses specifically applicable to providers of competitive exchange services or to competitive access providers or to "Other Local Exchange Carriers," all of which are discrete categories under which TRS data are collected. The closest applicable size standard under SBA rules is for Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.[309] According to Commission data,[310] 609 companies reported that they were engaged in the provision of either competitive access provider services or competitive local exchange carrier services. Of these 609 companies, an estimated 458 have 1,500 or fewer employees and 151 have more than 1,500 employees.[311] In addition, 35 carriers reported that they were "Other Local Service Providers." Of the 35 "Other Local Service Providers," an estimated 34 have 1,500 or fewer employees and one has more than 1,500 employees.[312] Consequently, the Commission estimates that most providers of competitive local exchange service, competitive access providers, and "Other Local Exchange Carriers" are small entities that may be affected by the rules and policies adopted herein.

[304] 13 C.F.R. § 121.201, NAICS code 517110 (changed from 513310 in October 2002).

[305] U.S. Census Bureau, 1997 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 5, NAICS code 513310 (issued October 2000).

[306] *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is "Firms with 1,000 employees or more."

[307] 13 C.F.R. § 121.201, NAICS code 517110 (changed from 513310 in October 2002).

[308] *Trends in Telephone Service* at Table 5.3.

[309] 13 C.F.R. § 121.201, NAICS code 517110 (changed from 513310 in October 2002).

[310] *Trends in Telephone Service* at Table 5.3.

[311] *Id.*

[312] *Id.*

4. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

143. The NPRM explores the appropriate post-June 30, 2005 interstate special access regime for price cap carriers.[313] The NPRM considers the varying options on setting rate structures and rate levels, as well as whether to maintain, modify, or repeal the pricing flexibility rules.[314] If we determine to retain without modification the pricing flexibility rules and permit the existing price cap interstate special access regime to continue unchanged, there will be no additional reporting or recordkeeping burden on price cap LECs with respect to interstate special access rate structures or rate levels. If we adopt new or modified interstate special access charge rules, including without limitation the pricing flexibility rules, such rule changes may require additional or modified recordkeeping. For example, price cap LECs may have to file amendments to certain aspects of their interstate special access tariffs.[315]

5. Steps Taken To Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

144. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.[316]

145. The overall objective of this proceeding is to determine the appropriate interstate access charge regime for price cap LECs. As part of our examination, we seek comment on the appropriate price cap interstate special access rate structures and levels, including seeking comment on: a productivity factor,[317] a growth factor,[318] earnings sharing,[319] a low-end adjustment,[320] rate baskets and bands,[321] and the initial rates.[322] We also seek comment on whether to maintain, modify, or repeal the pricing flexibility rules.[323] We have invited commenters to provide economic analysis and data. We will consider any proposals made to minimize significant economic impact on small entities.

6. Federal Rules That May Duplicate, Overlap, or Conflict With the Proposed Rules

146. None.

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[313] *See supra* sections I, III.A-III.B.

[314] *See supra* section III.A-III.B.

[315] *See supra* section III.

[316] 5 U.S.C. § 603(c)(1)–(c)(4).

[317] *See supra* section III.A.2.a.

[318] *See supra* section III.A.2.b.

[319] *See supra* section III.A.2.c.

[320] *See supra* section III.A.2.d.

[321] *See supra* section III.A.3.

[322] *See supra* section III.A.4.

[323] *See supra* section III.B.

D. Comment Filing Procedures

147. Pursuant to Sections 1.415 and 1.419 of the Commission's rules,[324] interested parties may file comments on or before 60 days and reply comments on or before 90 days after publication of this NPRM in the Federal Register. **All pleadings must reference WC Docket No. 05-25.** Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) or by filing paper copies.[325] Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/cgb/ecfs>. Generally, only one copy of an electronic submission must be filed. If multiple docket or rulemaking numbers appear in the caption of this proceeding, however, commenters must transmit one electronic copy of the comments to each docket or rulemaking number referenced in the caption. In completing the transmittal screen, commenters should include their full name, U.S. Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to <Contact Information Redacted and should include the following words in the body of the message: "get form <your e-mail address>." A sample form and directions will be sent in reply. Commenters also may obtain a copy of the ASCII Electronic Transmittal Form (FORM-ET) at <http://www.fcc.gov/e-file/email.html>.

148. Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appear in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number.

149. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although we continue to experience delays in receiving U.S. Postal Service mail). The Commission's contractor, Natek, Inc., will receive hand-delivered or messenger-delivered paper filings for the Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002.

- The filing hours at this location are 8:00 a.m. to 7:00 p.m.
- All hand deliveries must be held together with rubber bands or fasteners.
- Any envelopes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
- All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

150. Regardless of whether parties choose to file electronically or by paper, parties should also file one copy of any documents filed in this docket with the Commission's copy contractor, Best Copy and Printing, Inc., Portals II, Contact Information Redacted , telephone Contact Information Redacted, facsimile Contact Information Redacted e-mail Contact Information Redacted or via its website at http://www.bcpiweb.com. In addition, one copy of each submission must be filed with the Chief, Pricing Policy Division, 445 12th Street, S.W., Washington, DC 20554. Documents filed in this proceeding will be available for public inspection during regular business hours in the Commission's Reference Information Center, 445 12th Street, S.W., Washington, DC 20554, and will be placed on the Commission's Internet site. For further information, contact Jeremy D. Marcus at Contact Information Redacted.

[324] 47 C.F.R. §§ 1.415, 1.419.

[325] *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 24121 (1998).

151. Accessible formats (computer diskettes, large print, audio recording and Braille) are available to persons with disabilities by contacting the Consumer & Governmental Affairs Bureau, at Contact Information Redacted, TTY Contact Information Redacted, or at <Contact Information Redacted

V. ORDERING CLAUSES

152. Accordingly, IT IS ORDERED that, pursuant to the authority contained in section 1.407 of the Commission's rules, 47 C.F.R. § 1.407, the AT&T Corp. Petition for Rulemaking IS GRANTED to the extent specified herein and otherwise IS DENIED.

153. IT IS FURTHER ORDERED that, pursuant to the authority contained in sections 1, 2, 4(i), 4(j), 201-205, and 303 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 154(j), 201-205, and 303, NOTICE IS HEREBY GIVEN of the rulemaking described above and COMMENT IS SOUGHT on those issues.

154. IT IS FURTHER ORDERED that the Commission's Consumer Information Bureau, Reference Information Center, SHALL SEND a copy of this Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

EXHIBIT GS-37

Protecting consumers by promoting competition: Oftel's conclusions - 20 June 2002

Statement issued by the Director General of Telecommunications

Contents

Summary

S.1 This statement sets out Oftel's conclusions on its review of the fixed telephony market. The review was necessary because the current price control arrangements on BT are due to expire in July 2002. Oftel has carried out an assessment of the level of competition in the residential market and decided on the measures that are now needed to promote competition and protect consumers.

S.2 This statement sets out a radical package of measures to give consumers a greater choice of service providers while maintaining controls on BT's prices as competition develops and continuing to protect the most vulnerable consumers from excessive charges.

Regulation in a changing market

S.3 Oftel has imposed controls on BT's retail prices since 1984 to protect consumers from excessive prices. Price controls have been used to require BT to lower prices because there has been insufficient competition in the retail market to exert downward pressure on prices.

S.4 Since price controls were introduced, BT's residential calls prices have fallen by over 50 per cent in real terms. The current control of RPI-4.5 per cent was introduced in 1997 for four years and extended for one year in 2001.

S.5 Oftel's review of the fixed telephony market has found that the level of competition in the provision of fixed calls has steadily increased. Consumers in many areas now have a wide range of choice from other suppliers cable operators, indirect access, calls and access and carrier pre-selection service providers. BT's market share for calls is gradually being eroded, and BT's call profits are falling (in absolute terms) over time.

S.6 Oftel welcomes both the increase in competition and the continued reduction in BT's prices. However, the market is not yet effectively competitive. In particular, BT continues to have a large share of both lines and calls markets, and makes very high returns on calls, although these are offset to a significant degree by low returns on access (ie the basic provision of the exchange line, paid for by the telephone rental charge).

(Note that in this statement, the terms line rental or rental charge are used for convenience even though at present BT's standard quarterly fixed charge also includes an allowance of free calls (ie an inclusive call allowance)).

S.7 BT's continuing strong market position means that immediate withdrawal from regulation would put consumers at risk. Oftel believes that, as well as some continued price regulation, new measures are needed to promote additional competition from different service providers that will lead to a greater range of choice for consumers. And as the additional competition

increases commercial pressures on BT to reduce its prices, the price control regime both can and should be relaxed.

S.8 The current price control is focussed on the lowest spending 80 per cent of residential customers, for whom the rental charge makes up a large proportion of their bills. Because BT's calls are much more profitable than lines, BT makes much higher returns from higher spending customers than from lower spending customers. Under the current price control, the significant profits made by BT on its highest spending consumers from calls have been used to offset the required price reductions on lower spending customers.

S.9 As BT's profits on calls are increasingly eroded through competition, the price control regime also needs to be modified. In particular, change is needed because, profits from high spenders might not be available in future to continue to support the level of price reductions to low spenders required by current price controls.

Promoting competition

S.10 The main element of Oftel's package of measures to promote competition is to require BT to provide a new wholesale line rental (WLR) product.

S.11 The review identified that a significant inhibitor of competition and innovation was the inability of alternative service providers to provide a single bill to their customers. For example, consumers who use indirect access or carrier pre-selection services receive two bills – one from BT for the line rental and one from the service provider for calls. However, both indirect access and carrier pre-selection have helped to increase competition in calls markets. But WLR might encourage larger numbers of customers to consider whether they are receiving the best deal available to them for their expenditure.

S.12 Oftel is to require BT to introduce a new line rental product to enable alternative suppliers to provide a single bill that covers both line rental and telephone calls. A single bill will give suppliers the opportunity to develop innovative tariffs such as no or low line rental with all costs recovered from calls or virtually unlimited calls paid through a monthly subscription.

S.13 The new line rental product will be available to other network operators and service providers on cost-based and non-discriminatory terms. It will be available from BT in a basic form within four months. Oftel intends to set the following prices for the following products:

- wholesale line rental (residential quality of service) – £28 per line, per quarter;
- wholesale line rental (business quality of service) – £29.87 per line, per quarter;
- transfer of service from BT to a service provider – £1.41 per line or multiples thereof; and
- connection of a new line for a service provider – £92.89 per line.

S.14 WLR will need to be developed to operate efficiently at large volumes and seamlessly with other products such as carrier pre-selection. In July, Oftel will set up industry groups comprising operators, service providers and consumer representatives to develop a product specification.

S.15 The specification will cover issues such as how orders are processed, how WLR suppliers forecast demand, how BT provides for that demand in its systems a service level agreement and will consider operational penalties for over-forecasting. It will also include a code of practice on marketing for WLR suppliers to ensure that selling practices are fair and that consumers are protected.

S.16 Developing the WLR product will require commitment and participation from all stakeholders. Oftel will lead the groups where appropriate and resolve issues that develop. With this commitment, Oftel believes it will be poss ble to consult on and publish a specification in autumn 2002. BT will then be in a position to develop its systems and implement an enhanced product.

Controlling prices as competition develops

S.17 As competition develops, Oftel will ensure that customers continue to be protected through a price control. This will be an "RPI-RPI" control focussed on the expenditure patterns of the bottom 80 per cent of residential customers by expenditure. This means that the lower spending 80 per cent of residential customers will face no increase in their phone bills. The price control will ensure BT does not exploit its market power in the residential telephony market.

S.18 Full introduction of the wholesale line rental product, however, will lead to a significant increase in competitive pressures on BT. This could make the RPI-RPI control on the lowest spending 80 per cent of residential customers unduly tight, as the return BT makes on this group of customers is fairly small.

S.19 In the light of this concern, and in order to give an additional incentive for BT to introduce the WLR product as quickly and efficiently as possible, Oftel is ready to modify the RPI-RPI control to RPI+0 per cent. This will happen once a commercially viable WLR product has been fully implemented by BT in line with the determined product specification and is being taken up by service providers.

Protecting low users

S.20 In parallel, with the further opening of the market, Oftel will introduce additional measures to protect those customers who do not make many calls and for whom the line rental makes up a significant proportion of their bill. BT's Light User Scheme, which currently provides protection for the most vulnerable 20 per cent of customers in the form of a rebate on the line rental and there are provisions to extend it to cover the lowest 30 per cent of customers by spend.

S.21 There will also be a ceiling on BT's line rental charge to ensure that it does not rise above cost for all of BT's

residential customers. The geographic averaging of BT's prices, which ensures that basic telephony charges are the same throughout the country, will continue.

Review process

S.22 The price controls set out in this statement will be set for four years. Oftel will review the retail market in 2004. The review will consider the effectiveness of competition at that time, including the operation of WLR, and the appropriateness of the continuing controls and consumer protection measures. The approach set out in this statement may then be modified as a result of this review.

Consultation

S.23 This statement includes draft modifications to BT's licence that will implement those measures. Comments on these are required by 19 July 2002. Unless BT objects to the proposed modifications, they will take effect from 1 August 2002. However, should BT object to the proposed modifications, Oftel will refer the issue to the Competition Commission and the existing controls on BT's retail prices, including the controls on BT's retention for calls to mobiles will continue for another year while the Commission considers the case.

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Chapter 1

Introduction

Price control and market power

1.1 Oftel's aim is to obtain the best poss ble deal for consumers in terms of quality, choice and value for money. Competition is most likely to provide consumers with the best deal. The need to compete in terms of price, quality and otherwise meeting customers' needs provide the best incentives for companies to strive to be efficient and provide customers with the most attractive all-round communications package. However, in markets in which competition is not effective or there is a monopoly supplier, the incentives to increase efficiency and provide customers with the best deal are diminished. This is because there is little or no threat to the profitability of the supplier.

1.2 In telecommunications, BT has market power in the provision of access and calls. Approximately half of the UK has little choice but to get access to telecommunications networks through BT. In calls markets, BT is faced with a greater threat but continues to have high market shares whilst maintaining prices that are well in excess of the level necessary to maintain a sustainable business.

1.3 Price controls have been used to restrict BT from excessive pricing that its dominance would otherwise allow, and they have also been used to encourage BT to increase its efficiency. BT is given incentives to increase its efficiency because it is allowed to keep the benefits of cost reductions until the end of the price control period if these cost reductions are higher than those that had been anticipated when the controls were set. These controls have generally been set for four years.

The current price control and market review

1.4 BT has been subject to the current price controls since 1 August 1997. These controls were set at RPI-4.5 per cent and limited BT's ability to increase prices for a basket of services provided to the bottom 80 per cent of residential customers. The services controlled have been as follows:

- connection (of a new service);
- take-over (of a service already installed);
- line rental;
- local geographic calls;
- national geographic calls;
- international calls; and
- operator assisted calls.

1.5 The controls were focussed on the bottom eight deciles of residential customers because Oftel believed that competition would deliver a better deal to the highest spending residential customers and business customers than would be delivered by the price controls.

1.6 Oftel has also controlled BT's retention for calls to BTCellnet and Vodafone since 1 April 1999. These controls were introduced because competition in calls to mobiles was not strong enough to protect consumers. They were set at RPI-7 per cent for three years and were extended for four months to align them with the controls for the other retail services referred to in paragraph 1.4.

1.7 Originally, the main price controls set out in paragraph 1.4 were set to last for four years, but Oftel extended them for a further year to 31 July 2002 following Oftel's 2001 review of competition in the provision of the price-controlled services.

1.8 Oftel extended the controls in order further to assess the growing impact of indirect access and the early impact of carrier pre-selection and local loop unbundling. In addition, Oftel noted that the extension to the control would also enable it to assess

later financial data that would show whether the trends of decreases in overall profitability of the controlled services were continuing.

1.9 Oftel has considered the growing competitive threat that BT is faced with and in January 2002 published a consultation document, *Protecting consumers by promoting competition: consultation on Oftel's review of the fixed telephony market*. That document set out Oftel's market analysis and sought comments on a set of proposals to promote competition and protect consumers. The responses to that consultation document are summarised throughout this statement and are available on Oftel's website (www.oftel.gov.uk/publications/responses/2002/pcr0102/index.htm).

1.10 This statement sets out the outcome of the review and sets out Oftel's final proposals for the future.

European legislation

1.11 Although Oftel's review of competition in fixed markets commenced before the publication of the new Directives resulting from the European Commission's review of communications regulation, Oftel's market assessment is consistent with the Framework Directive (Directive 2002/21/EC). The Framework Directive stated that:

"National regulatory authorities shall..define relevant markets appropriate to national circumstances" (Article 15(3)).

Additionally, national regulatory authorities:

"shall determine on the basis of its market analysis..whether a relevant market is effectively competitive" (Article 16(2)).

1.12 As part of the implementation of the new Directives, operators' licence conditions will be replaced by general conditions of entitlement and, where considered necessary, individual significant market power conditions by 25 July 2003. Unless Oftel carries out a review of the retail market, beginning later in 2002, the provisions in the licence conditions that result from this statement will cease after 24 July 2003. Oftel therefore intends to conduct a review of this market later in 2002.

1.13 Oftel intends to conduct a further review of the retail market in 2004.

Consultation

1.14 At annex B, Oftel has set out the proposed modifications to BT's licence that are required to give effect to Oftel's proposals. Oftel has set out these proposed modifications for statutory consultation. Interested parties are given until **19 July 2002** to comment on the proposed modifications. These modifications are intended to give effect to the policies outlined in chapters 2, 3 and 4.

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Chapter 2

Market assessment

Market definition and assessment of competition

2.1 In the consultation document *Protecting consumers by promoting competition*, 31 January 2002, Oftel set out its views on the definition of the relevant markets in the light of responses to its July 2001 consultation document *Competition in the provision of fixed telephony services*. Oftel also outlined its assessment of competition in markets for basic telephony services.

Market definition

2.2 Oftel's approach to market definition is based on identifying constraints on the price-setting behaviour of firms. These constraints may arise from customers substituting other services for those in question (demand side substitution), or from suppliers switching production to supply the relevant products (supply side substitution) following a price increase. This approach is widely used by competition authorities.

2.3 Oftel has proposed the following as separate markets:

- fixed access;
- local calls;
- national calls;
- international calls in two categories, which is consistent with its review of competition in international markets; calls from fixed to mobile; and operator assisted calls.

2.4 This is identical to the list proposed in Competition in the provision of fixed telephony services, with the exception of international direct dial (IDD) calls where the definition used in the November 2001 review of competition in international markets was adopted. Oftel has also stated that it considers that these markets are national in scope and that separate markets can be defined for each of the above for business and residential customers. Oftel has also considered whether a further subdivision of residential markets by spend could be made. However, although Oftel found evidence that competitive pressure tends to increase with spend, it found no firm basis for, and does not intend to define, separate markets for lower and higher spending residential customers.

Responses to *Protecting consumers by promoting competition*, on market definition issues

2.5 Most respondents, who commented on the market definitions, broadly agreed with Oftel's proposals and there was general agreement that calls markets were separate from access and that all markets were national in scope.

2.6 In the previous round of consultation, most respondents who commented on the issue agreed that mobile and fixed markets were currently separate. BT, however, argued in its response that fixed mobile substitution had developed to such an extent that fixed and mobile telephony were now part of a single market and that Oftel, by regarding them as separate markets, had underestimated the extent of competitive pressure on BT. BT submitted a study by the consultants .econ suggesting that consumers would switch between fixed and mobiles in response to price changes. This was discussed further in annex C to *Protecting consumers by promoting competition.*

2.7 Some respondents to *Protecting consumers by promoting competition,* commented that fixed mobile substitution was increasing, but had not reached the point where fixed and mobile services could be regarded as being in the same market. Price differentials between fixed and mobile services, together with limitations on mobile coverage and quality of service, were mentioned as possible reasons for fixed and mobile services remaining separate markets. One respondent with particular requirements for confidentiality, privacy and reliability commented that mobiles were unsuitable for its purposes.

2.8 BT has again argued that mobile services should be regarded as part of the same market as fixed services. In support of this view, BT submitted a response by .econ to the points made by Oftel in Annex C to *Competition in the provision of fixed telephony services.* However, this seeks to defend .econ's earlier analysis rather than presenting new evidence. It is perhaps worth stating that Oftel, in its earlier response, did not take issue with the econometric techniques used by .econ on the grounds that different or better techniques should have been used. Rather it argued that the results of the econometric analysis did not demonstrate that fixed and mobile services now constitute a single market, still less that competition from mobiles is sufficient for measures to control or increase competitive pressure on BT's prices to be unnecessary. Oftel has noted the points made by .econ but continues to believe that fixed and mobile services should be regarded as being in separate markets.

Conclusions on market definition

2.9 In the light of the above, Oftel believes that the market definitions proposed in Protecting consumers by promoting competition are appropriate. The following separate retail markets will therefore be defined for the purposes of the price control review:

- fixed access;
- local geographic calls;
- national geographic calls;
- international calls in two categories as in the review of competition in international markets;
- calls from fixed to mobile; and
- operator assisted calls.

2.10 Oftel also confirms its proposal to define separate markets for each of the above for business and residential customers but not to make any formal subdivision of residential markets by spend and that it regards these markets as national in scope.

Assessment of competition

2.11 In *Protecting consumers by promoting competition,* Oftel set out its belief that access and calls markets are not effectively competitive (with the exception of the competitive business IDD markets identified in the review of competition in international markets). However, it appeared to Oftel on the basis of responses and other information that competition was increasing and that there were good prospects for effective competition in retail calls markets if the remaining barriers were addressed. Existing policies addressed these problems to some extent, although there was no policy in place to address one of the main barriers identified: the current need for indirect access (IA) and carrier pre-selection (CPS) customers to pay two bills.

Responses to *Protecting consumers by promoting competition* on competitiveness

2.12 Most respondents agreed that competition, at least in calls markets, is increasing but not fully effective and not yet sufficient, by itself, adequately to protect consumers. BT's dominance in access markets was felt to be rather more intractable, particularly in remote areas, as significant expansion of cable networks was considered unlikely. In addition, some argued that competition for low users was l kely to remain weak because such customers had little to gain from switching and were least attractive to competing operators.

2.13 Some drew attention to price cuts and reductions in BT's market share as evidence that competition is already well developed, particularly in business markets. However, others noted that the level of BT's market share remains above the threshold for a presumption of dominance in most calls markets, and that the profitability of calls is also very high despite the availability of indirect access.

2.14 CPS was felt to be a potential source of increased competition in calls markets in future and BT pointed out that the CPS customer base is growing at some 60 per cent a month. However, some felt that progress could still be hampered by low awareness of the availability of CPS and by the need for CPS customers to pay two bills. On the other hand, use of BT's existing calls and access product, which allows service provider customers to receive only a single bill, has fallen dramatically since 2000. Nevertheless, there was support for Oftel's proposal to require BT to provide a new wholesale line rental product so that operators could offer a total service to the customer, with a single bill. Some argued that this would also help drive growth in CPS take-up.

2.15 One respondent pointed out that the widespread use of direct debit by retail customers could also reduce the inconvenience of paying two bills. However, others referred to experience in energy markets and research supporting the view that the inability to offer a total service to the customer, with a single bill, is a factor currently preventing calls markets from being effectively competitive.

2.16 BT argued that competition was now sufficiently well established for price controls to be removed without the need for additional measures to stimulate competition. In addition to arguing that substantial competition was provided by mobile operators (see above), it also presented in support of its case an empirical analysis commissioned from OXERA which suggested that customers respond to price differentials by switching operator. The rates of switching (nine per cent of customers in cabled areas have switched fixed-line access provider in two years) and use of IA (13 per cent) found by OXERA appear, in fact, to be broadly consistent with those from Oftel's surveys (four per cent switched in the last year and 11 per cent using IA in February 2002). In an econometric analysis, OXERA found that price differentials are a significant determinant of switching. However, it does not follow from OXERA's empirical findings that switching is sufficient to constrain prices to the competitive level.

Competition indicators

2.17 A number of other sources of data relating to the competitiveness of markets have become available since January. These include results from Oftel's February 2002 international benchmarking study, Oftel's February 2002 survey of residential customers and updated market share data. BT has published its group financial results for 2001-02, but its regulatory financial statements are not available for this period (as a result, BT has been unable to extract and reanalyse the necessary data in order to update the financial information outlined in *Protecting consumers by promoting competition*). The new data are summarised in the following paragraphs. Where possible, Oftel has differentiated between business and residential customers.

International benchmarking

2.18 If UK fixed telephony markets are competitive, one would expect UK consumers to be getting a deal which is as good as or better than that available to customers in similar economies overseas. In order to assess whether this is the case, Oftel has undertaken a series of surveys to compare UK prices and trends with those in other comparable countries. The latest survey was conducted in February 2002.

2.19 The survey found that UK prices for residential PSTN services generally compare favourably with prices elsewhere, with only Sweden and California among the sample having lower prices. UK residential prices were lower than equivalent prices in France and Germany for all usage patterns considered, while for the US the results varied according to usage. UK prices for business PSTN services were slightly above average: roughly five to eight per cent higher than in France, California and Germany, significantly higher than in Sweden but 10 per cent lower than those in Ohio.

2.20 Prices paid by residential consumers in the UK fell by around four per cent between February 2001 and February 2002. This is similar to price falls seen in most other countries (prices in Sweden have remained stable). Prices for business consumers in the UK fell by about five per cent. This is similar to the price falls seen in Germany and Sweden while larger price falls have been seen in France and the US.

2.21 The UK's relative position is generally little changed since the 2000 and 2001 surveys. As before, the existence of a significant price gap between the UK and Sweden is consistent with the proposition that UK fixed telecommunications markets may not yet be effectively competitive. However, it is not possible to draw firm inferences in the absence of an analysis of the reasons for the good performance of the Swedish operators. Given the relatively short history of competition in France and Germany, it is perhaps to be expected that UK operators would fare better when compared with counterparts in these countries.

Customer satisfaction

2.22 Oftel's February 2002 UK survey found that, among residential customers, satisfaction remained high. Some 96 per cent of those respondents for whom the home fixed phone was the main method of telephony were satisfied with it. This compares to 97 per cent in the August and November 2001 surveys.

2.23 Oftel's first international consumer and business survey was conducted in February 2002 in UK, France, Germany, Italy, Sweden, Canada, Japan and the US states of Ohio and California. The UK was found to have significantly above average residential customer satisfaction with price and reliability of fixed service, price and reliability. Amongst UK businesses, however, overall satisfaction was about average although satisfaction with value for money was slightly below average.

Awareness and take-up of indirect access

2.24 Oftel's February 2002 survey yields updated information on consumers' awareness and use of IA. BT also provided some survey evidence of customer awareness in the note by OXERA included in its response. Table 2.1 compares the results of BT's survey with evidence from Oftel's August and November 2001 and February 2002 surveys.

Table 2.1: Survey data

	BT/OXERA	Oftel residential		
	Q4 2001	Aug 2001	Nov 2001	Feb 2002
Customers aware of the availability of		53%	56%	52%

indirect access				
Customers using indirect access	13.2%	12%	13%	11%

2.25 Oftel's surveys suggest that there has been little change in either awareness or use of indirect access by residential customers since August 2001. OXERA's estimate of the proportion of customers using IA in Q4 2001 is very similar to Oftel's. However, there is evidence of a continuing decline in the proportion of customers using IA for all of their calls which in November 2002 was about half the level of a year ago. The survey results do not conclusively identify the cause of this.

2.26 In Oftel's February 2002 international survey, the UK was found to be significantly above average on awareness of alternatives for residential customers and about average for business customers.

Customer switching

2.27 The February 2002 survey found that four per cent of residential fixed telephone users had switched supplier in the last year. This appears to confirm the fall in switching rates identified in the November survey which was thought possibly to have been anomalous. These figures compare to eight per cent in the August survey, a figure which had changed little since March 2000.

2.28 As noted above, the rates of switching found by OXERA's study for BT appear to be broadly consistent with those from Oftel's surveys. But the headline figure quoted in the main BT response document refers to switching by customers in cabled areas only. Overall, OXERA find rates of switching to be lower than in Oftel's surveys (seven per cent in two years, 15.5 per cent ever, compared to four per cent in the last year and 22 per cent ever in Oftel's February 2002 survey, figures which have not changed significantly in recent quarters). However, OXERA has found similar reasons for switching.

2.29 In Oftel's February 2002 international survey, the UK was found to be about average on rates and ease of switching for residential customers and ease of switching for business customers, although rates of switching by business customers were below average.

Market shares – retail access

2.30 Table 2.2 shows trends in BT's market shares to December 2001. BT's share of residential lines has fallen slightly since September 2000. There appears to have been a small fall in its share of business lines but this remains nearly 90 per cent.

Table 2.2: Market shares (number of lines)

		Operator share (no. of lines)	**Operator share (no. of lines)**	**Operator share (no. of lines)**	**Operator share (no. of lines)**
Market segment		September 1999	September 2000	September 2001	December 2001
Residential Customers	BT	83.0%	81.0%	80.5%	80.2%
	Cable	16.3%	18.3%	18.9%	19.2%
	Kingston	0.7%	0.7%	0.6%	0.6%
Business Customers	BT	89.9%	87.2%	87.3%	87.4%
	Cable	8.4%	10.1%	9.6%	9.5%
	Kingston	0.5%	0.6%	0.7%	0.7%
	Others	1.2%	2.1%	2.4%	2.4%

Source: Oftel Market Information

Market shares – retail calls

2.31 Table 2.3 shows trends in BT's shares of calls markets to December 2001. BT's shares in volume terms are declining at a faster rate than its share of lines. There have been significant reductions in BT's shares of residential national and international calls since September 2000 although recent data revisions suggest that this decline may have been less marked than suggested in the January document. However, BT's revenue shares are still over 50 per cent in all markets except international calls for business customers, which suggests that it is likely to be dominant in most calls markets. It should be noted that, although data are only presented here for international calls as a whole, Oftel's view is that it is appropriate to regard individual country-pair routes as separate markets, at least where these are not competitive at the wholesale level. BT's share on some routes is likely to be significantly higher than on others, and this may be part of the cause of the difference between BT's shares by volume and by revenue.

Table 2.3: Market shares (calls)

	% Market share July – Sept 99		% Market share July – Sept 00		% Market share July – Sept 01		% Market share Oct – Dec 01	
Residential customers	volume	revenue	volume	revenue	volume	revenue	volume	revenue
Local calls	75.7%	74.4%	77.2%	76.4%	77.6%	74.2%	78.4%	73.0%
National calls	72.4%	74.0%	68.2%	70.5%	63.6%	67.3%	64.6%	64.4%
International calls	53.8%	64.0%	52.5%	61.6%	45.6%	58.9%	46.9%	56.8%
Calls to mobiles	72.4%	71.2%	72.9 %	71.7%	72.6%	69.6%	73.3%	65.6%
Business customers								
Local calls	58.2%	66.0%	58.5%	66.2%	54.1%	64.9%	53.4%	63.9%
National calls	44.2%	57.4%	42.4%	57.0%	40.9%	55.5%	40.4%	54.4%
International calls	20.2%	38.1%	20.3%	41.4%	19.8%	40.1%	19.3%	38.3%
Calls to mobiles	53.4%	53.5%	53.8%	53.4%	50.4%	54.7%	47.3%	49.3%

Source: Oftel Market Information. Market shares have been adjusted to allow for the fact that some operators do not provide separate data for business and residential customers. In addition, Worldcom's submitted national minutes and revenues have been apportioned among local calls, national calls and calls to mobile. BT market shares include Concert market shares for these purposes.

Profitability

2.32 In its competition assessment in Protecting consumers by promoting competition, Oftel reported financial information showing the end-to-end profitability of individual retail basket services for 1998-99, 1999-2000 and 2000-01. This information was an extraction and reanalysis by BT of data underlying figures disclosed in the 1998-99 and 1999-2000 CCA financial statements. Comparable data on BT's profitability for 2001-02 are not yet available. BT has however published its fourth quarter and preliminary group financial results for 2001-02 and its group statutory accounts and these enable overall trends in BT profitability to be inferred.

2.33 Turnover in BT Retail for the year 2001/02 increased by 0.2 per cent compared to the previous year. However, reductions in sales and administration costs have enabled earnings before tax, interest, depreciation and amortisation (EBITDA) to increase by some 21 per cent compared to 2000-01. Calls turnover and call volumes have fallen slightly, though the rate of decline in the latter is said to have been 'stemmed'. On the other hand, both turnover from and volumes of fixed lines have increased and this is partly attributed to the success of the BT Together packages and to customers returning to BT. The profitability of lines has improved due, according to BT, to price changes, cost reductions and volume growth. BT estimates that its share of the market for residential fixed voice calls has been stable since June 2000. Its share of business voice calls is estimated to have fallen by 3 per cent, compared to a fall of 4.5 per cent in the previous year.

2.34 It is difficult to draw firm conclusions on trends in profitability in retail price controlled services from these data. However, there does not appear to be any reason to expect there to have been a significant decline in BT's rates of return on calls, which are therefore likely to have remained extremely high.

Entry by broadband and other operators

2.35 Growth in take-up of broadband service using ADSL and cable modems has continued. Demand for LLU has continued to be much lower than originally expected. In total, there are still only just over 500,000 end users of broadband Internet access, mainly ADSL and cable modem customers. However, demand for ADSL is likely to grow as a result of recent price reductions and the introduction of self-install products.

Price of operator assisted calls ('OA' calls)

2.36 In *Protecting consumers by promoting competition,* Oftel proposed that, until competition becomes fully effective, OA prices should continue to be subject to price control. It did not however propose a separate control for OA services. In the light of responses received, Oftel confirms its intention to subject prices for OA services to the same controls as other prices.

Price of calls to mobiles

2.37 BT is currently subject to a separate control on its retail retention on calls to BTCellnet and Vodafone. The retention is

subject to a cap set at RPI-7 per cent per annum. In *Protecting consumers by promoting competition,* Oftel proposed that, in future, BT's retail retention would be included in the retail price control basket rather than be subject to a separate control.

2.38 Oftel received a number of responses from mobile operators on this issue. Few other respondents mentioned it. Those mobile operators who responded argued that BT's retention on calls to mobiles should be subject to a separate cap as now, although those fixed line operators who commented did not share this view. The former argued that, without this, reductions in mobile termination rates would not be passed on to end users. Oftel believes, however, that it is not necessary for BT's retention on calls to mobiles to be subject to a separate cap in order for customers to benefit from reductions in termination rates. If BT's retention on calls to mobiles increases, it will need to make offsetting reductions in the prices of other services within the basket.

2.39 Oftel believes that competitive conditions in calls to mobiles are broadly similar to those for other call types. Mobile operators tended to disagree, arguing that fixed operators did not appear to be actively competing on calls to mobile prices. Oftel noted in *Protecting consumers by promoting competition,* that returns on calls to mobiles are lower than on other call types and that this may have discouraged some operators from offering them. However, BT's current level of returns should be sufficient to attract entry unless operators have a significant cost disadvantage to BT. BT's share of calls to mobile minutes is similar to its shares of local calls and national calls. In addition, calls to mobiles are available from CPS operators under the "all calls" option. These factors suggest a similarity of competitive conditions between calls to mobiles and other call types and this is reflected in Oftel's proposals set out later in this document.

2.40 It should be noted that competitive conditions in the retail provision of calls to mobiles are intrinsically different from those in the provision of mobile call termination. The latter largely reflect the fact that, under the calling-party pays principle, there is little incentive for the called party to change his or her mobile network in response to an increase in call termination charges. Oftel's proposal for the retail control on calls to mobile prices is therefore entirely consistent with its proposals for individual controls on mobile call termination charges.

Conclusions on competitiveness

2.41 In the light of responses to *Protecting consumers by promoting competition,* and other new information, Oftel believes that access and calls markets are not effectively competitive (with the exception of the competitive business IDD markets identified in the review of competition in international markets). Responses suggest that Oftel's proposal for a wholesale line rental as set out in *Protecting consumers by promoting competition,* would address one of the main remaining barriers to competition identified: the current need for IA and CPS customers to pay two bills.

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Chapter 3

Wholesale line rental

3.1 In the January 2002 consultation document, Oftel set out its view that competition in the provision of fixed services was not effective and that BT remained dominant in the provision of access and calls.

3.2 In calls markets, BT is faced with increasing competition on a national basis from indirect access operators using short dial codes or carrier pre-selection. However, in access markets, the competition is in the main provided by the cable operators whose geographic reach extends to approximately 50 per cent of the country. Competition in access is therefore limited in its geographic scope.

3.3 One consequence of BT's dominance in access " over 80 per cent of residential and business customers are connected to BT's network " has been its ability to maintain call prices that are well in excess of its cost of capital (Oftel estimates that BT's cost of capital is 13.5 per cent " see Oftel's website at www.oftel.gov.uk/publications/pricing/pcr0101.htm). BT continues to maintain extremely high shares in most calls markets and its extremely high profitability in these markets has still to be eroded.

3.4 To increase competition in the fixed telephony market, Oftel proposed that BT should be required to provide wholesale line rental (WLR) to other operators and service providers on cost-based and non-discriminatory terms. This would allow competitors to take on the retail relationship with the customer. All interactions would be with the reseller and who could offer a "single bill" to end users for all telecommunications services. This would be in contrast to IA under which the retail customer retains a contractual relationship with BT for the provision of the line.

3.5 The introduction of WLR would also provide customers in areas not served by cable operators with a choice of access providers. In addition, Oftel believes that service providers might introduce innovative tariffs that might change the "balance" between line rental and call charges. It might lead to similar packages to those now available in the mobile market, such as a fixed fee charge including line rental and call charges. Alternatively service providers might choose to offer packages that include a lower fixed rental charge and higher prices for calls.

Responses to the consultation

3.6 Respondents broadly welcomed Oftel's proposal to introduce WLR. However, opinions differed on the extent to which the supply of BT's existing calls and access product were adequate to support WLR. Several service providers and operators argued that Oftel would have to take a proactive role in industry groups that Oftel stated that it would set up to define the product and oversee the development of appropriate supply processes.

3.7 Consumer groups in particular believed that it was essential that adequate consumer protection arrangements were established to counter possible mis-selling. Other respondents urged Oftel to consider ways in which BT could be incentivised to deliver WLR as early as possible.

Oftel's conclusions

3.8 Oftel intends to require BT to provide WLR on cost based and non-discriminatory terms to anyone wishing to offer access to BT's public telephone system or publicly available telephone services. Oftel is therefore consulting on modifications to BT's licence to introduce a new condition requiring BT to provide "access services". Oftel is also determining the amount BT can charge other providers for key access services. The proposed licence modifications and the charges for certain access services are descr bed later in this chapter and in annex B (licence modifications) and E (setting the charges).

3.9 Initially, Oftel expects that WLR will be made available in a form similar to the access element of BT's existing calls and access product, as soon as practical after 1 September 2002. However, Oftel is not simply resetting the price of the access element of calls and access. Oftel is setting prices for new products that will need to inter-work with current interconnection products, such as CPS, in order to give competitors an offering that will enable them to compete with BT Retail. In this chapter and in annex D, Oftel has set out key elements of the fully operational second stage product.

3.10 The fully operational second stage product should be made available at the earliest possible date. Oftel therefore proposes to take a lead role in designing the specification of this product. It intends to establish industry groups " comprising operators, service providers and consumer representatives " to develop a product specification for the enhanced WLR. The product specification will include:

- a product functional description;
- a process definition and manual;
- ordering handling and maintenance processes;
- a service level agreement;
- marketing guidelines;
- consumer protection measures;
- consumer guide;
- contract terms; and
- a cost determination for any enhancements if necessary.

3.11 Although Oftel proposes to lead on the design of the product specification, it intends to consult interested parties. Oftel aims to complete and publish the product specification by October 2002.

WLR: provision of access services

3.12 In Condition 69B.1 of the proposed licence modifications Oftel has described access services as follows:

> ".any and all Public Switched Network services ("Access Services") that the Service Provider so reasonably requests for the purposes of providing to his own customers access to the Fixed Public Telephone Systems run by the Licensee or Fixed Publicly Available Telephone Services provided by the Licensee to his own customers, or both."

3.13 In effect, Oftel believes that by virtue of Condition 69B.1 service providers should be able to offer a basic telephony service that is equivalent to the service that BT Retail offers to its customers in terms of the technical offering. In terms of the WLR product, this means that the service provider could provide its retail customer with a line for the provision of incoming call services. It also guarantees that the line would be repaired in the event of failure and that the customer would receive phone books on a non-discriminatory basis. In addition, WLR would allow the service provider to offer outgoing calls services to its customers, although these would have to be bought separately from BT or another operator offering calls services eg a supplier of service using CPS.

3.14 The terms and conditions under which the access services are commercially made available would need to be established within BT's contract with the service provider and within its service level agreement. However, the proposed licence modification would underpin both the contract and the service level agreement, as it includes provisions that are intended to prevent discriminatory behaviour. But the contract and service level agreements are bilateral agreements. Service providers would therefore be expected to honour their obligations. BT would not be expected to maintain service for a service provider in breach of contract.

The proposed licence modifications

3.15 The main provisions of the proposed modifications to BT's licence are as follows:

- *Condition 69B.1 requires BT to provide access services.*

  This is a broad undertaking requiring BT to provide all reasonably requested access services to anyone wishing to offer access to BT's public telephone system or publicly available telephone services.

- *Conditions 69B.3 to 69B.5 empower the Director General to resolve disputes.*

  This would allow the Director General to resolve disputes about charges or other terms and conditions relating to access services.

- *Conditions 69B.6 to 69B.8 requiring BT not to act in a discriminatory manner.*

  This is a broad provision requiring BT not to act in a discriminatory manner. The Director General would need to decide on a case-by-case basis whether BT had acted in a discriminatory or otherwise in an anti-competitive manner. However, in general, Oftel would not expect service providers' customers to experience longer lead times in the provision of service or experience more faults or slower repair of such faults than BT Retail customers' experience.

- *Condition 69B.9 establishes publication requirements.*

  Oftel believes that BT should publish a notification (the 'Access Charge Change Notice') before changing the price for any access service. Oftel believes that notification requirements should match those in Condition 69. It is therefore proposing that BT should issue a notice ninety days before changing a price for services for which Oftel is setting price controls ' in effect, these are regarded as non-competitive services. For other services, Oftel believes that BT should provide twenty eight days' notice.

- *Condition 69B.10 sets starting charges for certain access services.*

  Oftel proposes to set starting charges for the following services:

  - wholesale line rental (residential quality of service);
  - wholesale line rental (business quality of service);
  - transfer of a single line or multiples thereof; and
  - installation charge per line.

  Oftel proposes that these will take effect on 1 September 2002.

- *Condition 69B.11 to Condition 69B.21 set the price controls.*

  Oftel proposes to control the charges for the services for which it is setting starting charges. This would be through the introduction of price controls that would apply to the basket of services. However, within the basket the transfer charge would be subject to a sub-cap. Oftel proposes to set the charges for the basket control and the sub-cap at RPI-2 per cent.

3.16 At Annex B, Oftel has set out the proposed new Condition 69B to give effect to the requirement to provide WLR. Oftel has set out this proposed modification to BT's licence for statutory consultation and is therefore seeking comments on these proposed modifications by **19 July 2002.** Thereafter, Oftel will remind BT that it has seven days to object to the proposed licence modifications. If it does not do so, the modifications will take effect from 1 August 2002.

WLR: Costs, charges and charge controls

3.17 Oftel is setting the following starting charges for the following services:

- wholesale line rental (residential quality of service) ' '28.00 per line, per quarter;
- wholesale line rental (business quality of service ' '29.87 per line, per quarter;
- transfer of a single line and multiples thereof ' '1.41 per transaction or multiples thereof; and
- each newly installed line ' '92.89 per line.

3.18 Oftel has set these charges on the basis of BT's incremental costs in providing these services plus a contr bution towards common costs. Oftel has set out its cost calculation in annex E.

3.19 In addition, Oftel proposes to subject these services to a basket control set at RPI-2 per cent and subject the transfer charges to a sub-cap within the basket, which will also be set at RPI-2 per cent. These controls would last for four years ' if Oftel has introduced a specific condition of entitlement to give effect to these controls after 24 July 2003 ' with each control set to commence on 1 September 2002.

3.20 At present, Oftel does not propose to set prices for ancillary services such as call waiting. However, Oftel expects BT to provide these services and expects prices for them to be reasonable. The Director General would consider any dispute brought to him on the reasonableness of any charges.

WLR residential and business quality of service

3.21 In paragraph 3.17, Oftel has stated that it proposes to set starting charges for two WLR services and the difference in the charges is due to the different levels of service quality in terms of fault repair. The residential quality of service product offers fault repair by the end of the next working day (Monday to Friday) if reported within normal working hours (8am to 5pm). Although BT only states that it offers similar repair services to its business customers, its actual aim is to restore service in faster for business customers. Oftel intends to monitor how quickly BT repairs services for its own customers in comparison to service providers' customers. Service providers need not buy residential quality of service for a residential customer and nor do they have to buy business quality of service for a business customer.

Implementing WLR

3.22 As explained in paragraph 3.10, Oftel intends to set up industry groups to develop a Product Specification for enhanced

WLR. The two main groups that Oftel envisages are:

- a **steering group**, comprising senior representatives of the operators, service providers and consumers to monitor the progress of the project and to consider significant policy or process issues which cannot be resolved in other groups; and

- an **operations group**, which will co-ordinate the development of the product specification.

3.23 Oftel proposes to chair both groups. Other tasks groups will be set up on an ad hoc basis to develop particular aspects of the Product Specification eg processes, systems, service level agreements and contract terms.

3.24 The task groups will deliver their output to the operations group. Oftel may appoint consultants with specialist technical expertise to assist in the development of the product specification as appropriate. However, in the first instance, Oftel intends to build on the processes designed for carrier pre-selection and calls and access.

3.25 Oftel will hold workshops in July to discuss an outline product specification and the groups and work plan needed to deliver it. Further details of the workshops will be given on Oftel's website.

3.26 The rest of this chapter seeks to define the essential elements of the enhanced WLR product and processes to be described in the product specification.

WLR: relationship with carrier pre-selection (CPS)

3.27 WLR allows the purchaser to offer "access" to an end user. It is likely that some service providers would wish to combine WLR with either the CPS functionality – purchased directly or indirectly depending upon their status – while others might prefer to buy wholesale conveyance purchased from BT. Operators with Annex II status can purchase cost based call origination services from BT and can mix this service with other interconnection services purchased from BT, other operators or services provided over their own networks in order to compete in the provision of end to end calls. Service providers without Annex II status could choose to purchase wholesale calls services from BT or other operators though these would not necessarily be available on cost-based terms.

3.28 In theory, it is not necessary for WLR and CPS to be provided simultaneously, provided that the customer experiences a single transfer to the WLR provider. The service provider could ask BT to provide the WLR and activate CPS as soon as possible thereafter. In between these times the end-user would use BT for calls services. However, in practice, it is likely that the service provider reselling WLR would wish to offer access and the means of making outgoing calls simultaneously or, if that is not poss ble, with little gap in the provision of both services.

WLR: indirect access

3.29 BT's current call and access product has a facility whereby calls and access customers can override the routing selected by their service provider and choose to route calls via an indirect access operator. This facility will be present in the basic WLR product available after 1 September 2002. Indeed, some customers might prefer the ability to select other call service providers and this might make the retail offering giving such freedom an attractive proposition. However, Oftel is aware that some service providers would prefer not to allow their customers to have a choice to route calls via anyone other than themselves. They argue that they need to guarantee that they will receive the customer's call income if they are going to be able to offer innovative tariffs, such as lower fixed elements being subsidised by higher price variable elements.

3.30 Oftel believes that the requirement to provide call origination services should be applied only to operators that have SMP in the relevant market. In the national markets for access and calls, this is BT. This principle would suggest that service providers using the WLR should not be obliged to allow their retail customers to choose to route their calls via an alternative IA or CPS operator. However, to enable service providers to bar their customers from using IA operators could require alterations to BT's network, which might involve costs.

3.31 Oftel therefore proposes to consult on whether service providers taking WLR should be able to bar access to indirect access (including CPS) operators' services on WLR lines. This consultation will include discussions on the relevant costs and who should pay them taking account of Oftel's six principles of cost recovery, namely:

- **cost causation** – costs should be recovered from those whose actions cause the costs to be incurred at the margin;

- **cost minimisation** – the mechanism for cost recovery should ensure that there are strong incentives to minimise costs;

- **distribution of benefits** – costs should be recovered from the beneficiaries especially where there are externalities;

- **effect on competition** – the mechanism for cost recovery should not undermine or weaken the pressures for effective competition;

- **reciprocity** – where services are provided reciprocally, charges should also be reciprocal; and

- **practicability** – the mechanism for cost recovery needs to be practicable and relatively easy to implement.

Notification requirements

3.32 Oftel is requiring BT to provide WLR and related services because of its dominance in the provision of access. It therefore follows that competitors will need prior notification before BT is permitted to change a price for any access service. Oftel believes that it is reasonable to require BT to provide advance notification that is consistent with BT's interconnection requirements. BT will therefore be required to give ninety days' notification before changing the price or the structure of the price for the services subject to price controls. For other services, BT will be required to give twenty eight days' notice.

3.33 These notification periods are intended to give competitors an opportunity to change the prices for their retail services in line with changes at the wholesale level.

Other issues

3.34 Respondents to the January 2002 consultation raised several other issues about the WLR product and processes. These are set out in annex D. Oftel's views on these issues, also set out in that annex, will inform the content and development of the product specification. Oftel's broad views on the essential features of the fully operational WLR product are summarised in Table 3.1.

Table 3.1, WLR: essential features

Customer/WLR supplier relationship	• WLR customer can receive just one bill covering access and calls. • WLR provider will handle customer enquiries.
BT/WLR supplier relationship	• BT to provide residential and business products. • number portability available. • BT Retail sales and marketing functions not to have access to details of WLR customers.
Relationship between WLR suppliers	• transfer of service between WLR suppliers available. • number portability available subject to industry agreement to the process.
Volume capability	• needs to handle significant volumes. • appropriate forecasting requirements.
Transfer process	• highly automated with little manual intervention except where a manual method is more cost effective. • appropriate level of 'winback' activity. • no blocking of transfers because of outstanding customer debt. • BT to be able to demonstrate that its retail business incurs similar costs when customers transfer back as is charged to SPs in outgoing transfers.
Consumer protection	• appropriate consumer protection measures. • Marketing Code of Practice to be established.
Interaction with CPS	• inter-working with CPS seamless from customer's perspective. • where practical, a single process for transferring lines and calls. • minimal delay between the transfer of a line and CPS routing.
Developments after launch	• standard processes for notification of price or other service level changes. • formal modification process for the development of product. • on-going monitoring of WLR performance measures.

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Chapter 4

Retail price controls

4.1 Oftel believes that the main constraint on BT's call prices in future should be provided by competition. As explained in chapter 2, competition is increasing (but not yet effective) and Oftel believes it should be stimulated further by the availability of the wholesale line rental product. Some control on line rentals may continue to be necessary, although competitive pressure could be brought to bear on these charges by suppliers using the wholesale line rental product. However, despite the current and prospective growth in competition, Oftel believes that protection continues to be needed to prevent BT from exploiting its market power as competition develops. Oftel also recognises that longer term protection will be needed for the lowest spending customers.

4.2 The main elements of Oftel's price control proposals in the January 2002 consultative document to address these issues were:

- an RPI-RPI safeguard control to control customers' bills while allowing BT to respond to increasing competitive pressure in calls markets,
- a method of removing the RPI-RPI control as competition becomes effective, and
- ongoing consumer protection measures for lowest spending customers.

Safeguard control

4.3 In *Protecting consumers by promoting competition*, Oftel explained its view that another retail price control similar to the current one is not appropriate in the current circumstances, with the expectation of increasing competitive pressures in calls markets. The current cap relies on the continuation of excess profits from business and high-spending residential customers to finance losses (measured on a consistent basis) on lower spending customers. This would not be sustainable in a world where increased competition is expected to eliminate persistent excess profits.

4.4 Oftel also considered the imposition of broader price controls covering all residential and business customers. This would target price controls on the areas where BT continues to make excessive profits. However, it would supplant the forces of competition rather than using them. Oftel believes that this would not be appropriate as the primary means of reducing BT's call prices unless there were little or no prospect of competition emerging in the foreseeable future. Oftel believed that this is not the case and so considered that such a broadening of price controls would not be appropriate.

4.5 Oftel also took the view that it would be undesirable for the cap to be too narrowly focused. A cap based on the spending patterns of too small a group of customers could invite BT to target price reductions precisely on this group, with little benefit to customers outside it who might also not yet be benefiting from effective competition. This could also undermine the intention not to give BT an incentive to raise the line rental ahead of competitive pressure described above.

4.6 Oftel considered whether it could identify a level of spend above which competitive conditions were clearly different to those below it. It considered the profile of average call prices by spend, taking account of discounts and calls provided in the form of Inclusive Call Allowances, together with survey results on customer awareness and use of alternative operators. Both types of indicator suggested that competitive pressure tends to increase with spend, but Oftel has found that there is no obvious threshold of spend at which calls markets become competitive.

4.7 Oftel explained that as competition develops BT is likely to want to rebalance, that is increase the residential line rental to the point where it covers its costs, including a standard contribution to the recovery of common costs. Indeed, this is likely to be necessary if competition develops in the way Oftel hopes. Oftel does not believe that it would be consistent with the emergence of increased competition in calls markets to assume that BT will continue to make sufficient supernormal profits from higher spending customers to fund lower spending customers. Oftel also noted that most customers would be better off than they are today if prices for lines and calls properly reflected costs. Thus, rebalancing within a vigorously competitive environment for calls would be to the benefit of most customers, as well as providing a more economically sensible structure of prices.

4.8 In the light of these concerns, Oftel proposed in the consultative document that there should be a safeguard control – RPI-RPI – over retail prices, at least as a short-term measure. This would be based on the spending patterns of the lowest 80 per cent of residential customers. This would allow BT to rebalance as call prices are forced down by competition, but would not give BT an incentive to raise rentals and reduce call prices in the absence of vigorous competition in calls markets. The control has this effect because of the high weight of access in the spending of the bottom 80 per cent of residential customers means that increases in the line rental have to be offset by relatively large reductions in call prices (which also benefit higher spenders). The required call price reductions can be such that increases in the line rental are overall unprofitable for BT, unless it would have to reduce call prices anyway as a result of competitive pressure. The design of the cap therefore discourages BT from rebalancing unless competition is forcing call prices down. In the absence of competitive pressure on call prices, BT is likely to wish to increase the residential line rental only relatively slowly.

Responses

4.9 BT argued that the RPI-RPI control was excessively tight if focused on the lowest 80 per cent of customers, a group from which BT earns less than its cost of capital. Other providers recognised that, in the absence of effective competition at the wholesale level, there was potential for BT to exploit its position through excessive pricing. Because of this they accepted the need for the safeguard control but argued that Oftel's emphasis should be on establishing the wholesale line rental product. Some consumer groups preferred a control similar to the current RPI-X cap aimed at driving out BT's excess profits or targeted at call price reductions.

Oftel's conclusions

4.10 On balance, Oftel believes that a RPI-RPI control weighted towards the spending patterns of the bottom 80 per cent of residential customers provides the most appropriate degree of customer protection, as well as having desirable incentive properties.

4.11 The control would not be expected to act as the ultimate determinant of prices, but would give consumers confidence that some level of price constraint would remain if competition developed less rapidly than expected. It would also allow BT to raise the line rental to recover a greater proportion of common costs from its access business as competition develops, without giving it a regulatory incentive to do so in advance of competitive pressure.

4.12 A control set at RPI-RPI has the potential to become unduly onerous for BT if inflation turns out to be unexpectedly high. In order to avoid this, the Director General is empowered under the proposed new Condition 70 to limit the control to RPI-4 per cent if inflation is greater than 4 per cent per year.

4.13 The proposed licence modification to introduce this control – Condition 70 – is set out in Annex B. The control is intended to last for four years – if Oftel has introduced a specific Condition of Entitlement to give effect to these controls after 24 July 2003 – although Oftel is able to modify or remove the control during that period.

Treatment of calls to mobiles

4.14 As explained in chapter 2, BT continues to have high market shares and makes high returns in all calls markets. However, in calls originating on BT's network bound for any of the five mobile operators (BTCellnet, Hutchison 3G, Orange, T-Mobile and Vodafone), its returns are lower than for other major call types. This reflects the controls that have capped BT's retention for calls to BTCellnet and Vodafone that have been in place since 1 April 1999. BT's market share for calls to mobiles and other major call types are broadly similar.

4.15 As the competitive conditions for calls to mobiles and other calls types were (and remain) broadly similar, Oftel proposed in the consultation document to include BT's retention for calls to mobiles within the general price control basket. This remains Oftel's proposal. In its 1998 report on the Prices of Calls to Mobiles, the then Monopolies and Mergers Commission (now the Competition Commission) stated that it believed that BT's retention for calls to different mobile networks should be the same at all times of day, so that BT's retention could not distort any competitive pressures brought about by different termination rates charged by different mobile operators. The current licence condition dealing with BT's retention for calls to BTCellnet and Vodafone reflects this, and BT's retention for calls to different mobile networks is allowed to differ in any time of day period by no more than 0.1 pence per minute. Oftel intends that the price control basket and this non-discrimination requirement (the 0.1 pence per minute differential) will continue and, although Oftel did not refer to calls to Hutchison 3G in *Protecting consumers by promoting competition,* Oftel believes it should also apply to calls to Hutchison when it starts offering retail services.

Removing controls as competition develops

4.16 The speed of the development of competition has implications for the sustainability of the proposed price RPI-RPI price control. As competition develops there is a risk that the RPI-RPI control could prevent BT from recovering its costs. The returns from the lowest spending 80 per cent of residential customers, measured on a fully-allocated cost basis, are below the cost of capital. Profits from other higher spending customers allow BT to recover its costs overall. If competition develops as expected, the profits that BT makes outside the basket on calls will be competed away and the control may eventually not be sustainable for BT.

4.17 To address these issues, Oftel proposed in *Protecting consumers by promoting competition* that there should be a trigger to remove the control once competition reduced BT's call profits. Oftel suggested that it would automatically remove the control once call prices had fallen by 50 per cent (reflecting a rate of return on calls of around 25 per cent).

Responses

4.18 The automatic trigger raised widespread concerns. BT argued that a level of 50 per cent was much too high and rendered the proposal meaningless. Other providers were concerned that the proposal would give BT an incentive to reduce call prices ahead of competitive pressures and make competitors' market position unsustainable. Consumer groups argued that the automatic nature of the trigger, focussing on one indicator of competition, was not appropriate and proposed instead for a review taking account of all relevant factors.

Oftel's conclusion on the process for relaxing the control

4.19 Oftel does not intend to proceed with the trigger to remove price controls automatically. As explained above, Oftel proposes to carry out a full review of the retail market in 2004 in line with the requirement in the new European Directives to hold regular reviews. This would enable Oftel to take account of all indicators of competition in assessing which controls were appropriate.

4.21 In the meantime, Oftel believes that concerns about the poss ble excessive tightness of the proposed control, particularly if the introduction of the WLR generates additional competitive pressure on BT, can be addressed in an alternative way.

4.22 As explained in paragraph 4.16, it is conceivable that the RPI-RPI control focussed the bottom 80 per cent of residential customers could be too tight, as the return that BT makes on this group of customers is lower than its cost of capital. The likelihood of this control being too tight is increased with the introduction of WLR, as BT could lose higher spending customers that currently allow BT to earn more than its cost of capital overall.

4.23 In view of this concern, and in order to provide BT with an incentive to introduce WLR as quickly and efficiently as possible, Oftel proposes to modify the price control from RPI-RPI to RPI+0 per cent. But this modification will take place only when Oftel is convinced that a fit-for-purpose product is available and being actively used by competitors.

4.24 Additionally, Oftel does not anticipate carrying out an assessment of the functionality of WLR until it has been available for three months, as this would allow for any significant operational issues to be identified. Oftel would make use of external expert advice if appropriate. If Oftel concluded that that BT had implemented a fit-for-purpose WLR product in line with the determined Product Specification, as far as reasonably practical, it would issue a draft Determination proposing to modify the control. The modified control would be monitored on the same basis as the RPI-RPI control. Table 4.1 shows the sequence of events that might lead to an easing of the price controls.

Table 4.1: Implementation of WLR and easing of retail price controls

Implementation work	**Timing**
Oftel-led development of WLR Product Specification	July to September 2002
Consultation on draft Product Specification	October 2002
Publication of final Product Specification	November 2002
BT development, testing and implementation	August 2002 to Date ?X?
BT notifies Oftel of implementation	Date ?X?
Oftel carries out fit-for-purpose assessment	Date ?X? plus three months
Oftel issues draft Determination proposing to relax the price control	Date ?X? plus four months
Oftel issues final Determination relaxing price control (see note 1)	Date ?X? plus five months

Ongoing protection

Light User Scheme

4.25 In *Protecting consumers by promoting competition,* Oftel proposed additional measures to protect the lowest-spending residential customers. Because the line rental forms a significant proportion of these customers? bills, reductions in call prices are unlikely to compensate fully for rental increases, as competition pressures force BT to change the relative prices within the price control basket. Oftel therefore proposed to protect these customers in one of two ways:

a) the application of a bill constraint of RPI+0 per cent on the amount by which the bills of customers in deciles 3, 4 and 5 could increase; or

b) by extending the Light User Scheme (LUS), which currently provides rebates to the line rental for qualifying BT customers in deciles 1 and 2, to include qualifying customers in decile 3.

4.26 Oftel stated that these measures would remain in place even if the RPI-RPI control were modified or removed.

Responses

4.27 BT argued against RPI+0 per cent controls on the grounds that they would be unnecessarily restrictive and prevent BT from addressing the structural imbalances in tariffs between access and calls. BT favoured instead an extension of the LUS to customers in decile 3, which would take effect if and when BT raised line rental by an amount that would otherwise increase the average decile 3 bill by more than inflation. Other providers also preferred the LUS extension seeing it as the option least likely to distort the market. Consumer groups tended to favour the RPI+0 per cent control but were concerned that the interaction of the RPI-RPI and RPI+0 per cent controls and LUS made the package of measures overly complex.

Oftel?s conclusions

4.28 Oftel believes that the protection should be targeted at those customers whose overall bills might increase as rental charges increase. Customers in deciles 4 and 5 should be no worse off and in most cases should benefit if line rental and call charges reflected costs. Oftel therefore favours the targeted protection provided by an extension of LUS to the 3rd decile. The main feature of the new arrangements is to protect LUS customers in decile 3 from line rental increases, after allowing for inflation. This approach is consistent with Oftel?s strategy of regulating only where necessary. It also has the advantage of simplifying the main price control measures to a single control of RPI-RPI with ongoing protection provided by LUS.

4.29 There is a risk of the call spend deciles could be distorted over time by ?all calls? CPS customers (who make no calls via BT and therefore would appear in the lowest call spend deciles). To prevent LUS having a decreasing populace, BT has indicated that it would be willing to ?freeze? the maximum number of minutes enabling customers to qualify for the existing and extended LUS schemes at an amount determined by the current levels and patterns of usage of customers at the 21st percentile and 31st percentile respectively. This would protect the value of LUS over time. BT has also indicated that it would be willing to modify its current blanket exclusion of mobile users from LUS to address the issue that some customers now have a mobile for emergency purposes only.

4.30 Oftel is scheduled to review all Universal Service schemes in 2003. This review will examine the operation of the revised

LUS scheme and ensure it is providing adequate protection. In particular, Oftel will consider the treatment of consumers who also have mobile phones (and who are thereby excluded by BT from LUS, although BT has agreed to modify its treatment of such customers ◆ see previous paragraph).

Rental ceiling

4.31 In *Protecting consumer by promoting competition,* Oftel argued that, because of BT◆s dominance in access, there was a need for a ceiling on the retail line rental to ensure that would not rise above cost.

Responses

4.32 BT argued that a ceiling would be increasing regulation and unnecessary because of developing retail competition.

Oftel◆s conclusions

4.33 Oftel continues to believe that there should be a cost-based ceiling (ie the costs of provision of WLR and a contribution its retail costs in providing service) on BT◆s retail line rental because of BT◆s dominance in access. Oftel will require BT to demonstrate that increases in the line rental do not make it rise above a ceiling. However, Oftel recognises that the WLR product may eventually provide sufficient competitive pressure to prevent BT from pricing line rental above cost. Oftel would assess the level of BT◆s market power in access as part of the 2004 market review and consider the ongoing need for a regulatory ceiling.

Hardwired phones

4.34 Around 200,000 customers rent hardwired phones from BT. There is currently a licence requirement on BT not to increase the rental charge for hardwired phones in real terms (ie RPI+0 per cent) and this expires on 31 July 2002. BT currently charges ◆25 to convert the connection from hard-wired to a plug and socket connection. In the January 2002 consultative document Oftel proposed that this protection should continue, given the absence of competition in the provision of hard-wired phones and the costs involved in switching to the plug and socket connection.

Responses to the consultation

4.35 BT recognised that elderly and vulnerable customers use hardwired phones but argued that, because numbers of such customers are currently falling by 20 per cent each year, the control should continue only for a defined period of time or until numbers fall to an agreed level (for example, 100,000). Consumer groups argued that the control should continue until BT removes its charge for converting the socket.

Oftel◆s conclusions

4.36 Oftel believes that the charge for socket conversion may prevent customers from upgrading and may provide BT with an opportunity to raise rental charges above what would be the competitive level. Oftel therefore believes that the RPI+0 per cent control should remain. However, if BT were to offer free socket conversions on a permanent basis, Oftel would propose to waive the control.

Small business safeguard

4.37 As part of the current price control package, BT has given voluntary assurances: (i) to offer a package to small businesses that is equivalent to that offered to residential customers; and (ii) not to increase the line rental for small businesses by more than RPI each year.

Responses

4.38 BT argued that high awareness and increasing use of IA, together with low take-up of the safeguard tariff (less than 1 per cent of BT◆s business customers) meant that the controls were no longer needed. Consumer groups responding on the issue felt that the safeguard should continue to protect in particular very small businesses and business without a choice of access provider.

Oftel◆s conclusions

4.39 Because of BT◆s continuing dominance in the access market, Oftel believes that the RPI+0 per cent rental safeguard should continue. Oftel will seek BT◆s voluntary assurance to this. In calls markets, Oftel recognises that businesses are able to choose a range of alternative suppliers. This should be further enhanced by the introduction of the WLR product. Oftel therefore does not intend to seek BT◆s commitment to provide a business calls safeguard. Oftel will continue to monitor the business market and will include this area in the 2004 market reviews.

Notes

1 This assumes that the 'fit-for-purpose' assessment has been satisfactorily met

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Chapter 5

Consultation details

How to make representations and objections to the proposed changes

5.1 Parties l kely to be affected by the proposed changes to BT's licence have until 19 July 2002 to make representations or objections to the proposed changes. Any representations or objections must be made in writing and, where poss ble, sent by e-mail to Contact Information Redacted However, copies may also be posted or faxed to the address below. If any affected parties are unable to respond in one of these ways, they should discuss alternatives with the Oftel manager named below:

Mike Galvin
Oftel
Contact Information Redacted

Tel: Contact Information Redacted
Fax: Contact Information Redacted
e-mail: Contact Information Redacted

5.2 In accordance with Section 12(6D) of the Telecommunications Act 1984, representations made against the proposed modifications shall be taken to constitute an objection only if a written statement that they are to be so taken accompanies them. The Director is required by Section 12(2) of the Act to consider any representations or objections on the proposed modifications duly made and not withdrawn. Subject to such consideration, and to the consent of BT for the respective modifications, the Director proposes to make the modifications as soon as practicable after the statutory consultation is completed.

Further copies of this document

5.3 This document can be viewed in the Publications section of Oftel's website at www.oftel.gov.uk, under classification Pricing and price control. Paper copies and alternative formats such as large print, Braille, disc and audio cassette can be made available on request. Please contact the Oftel Research and Information Unit on Contact Information Redacted or by e-mail at Contact Information Redacted for more information.

Publication of representations and objections

5.4 Representations and objections will be published, except where respondents indicate that a response, or part of it, is confidential. Respondents are therefore asked to separate out any confidential material into a confidential annex which is clearly identified as containing confidential material. Oftel will take steps to protect the confidentiality of all such material from the moment that it is received at Oftel's offices. However, in the interests of transparency, respondents should avoid applying confidential markings wherever poss ble.

5.5 Non confidential representations and objections can be viewed in the Publications section of Oftel's website under classification Responses to Oftel consultations. They may also be viewed in Oftel's Research and Information Unit. Appointments must be made in advance (see contact details in paragraph three).

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Annex A

Respondents to consultation

A.1 On 31 January 2002, Oftel published the consultation document entitled Protecting consumers by promoting competition. That document set out Oftel's initial proposals for future price control arrangements, having considered the competitiveness of basic retail telephony markets, with the focus especially on competition in the provision of access and calls. Oftel had set out its initial views on competitiveness in the consultation document entitled *Competition in the provision of fixed telephony services,* 31 July 2001. Responses to that document had been taken into account in reaching the initial proposals set out in *Protecting consumers by promoting competition.*

Responses, industry workshop and other meetings

A.2 Oftel received twenty-seven responses (one of which was confidential) to *Protecting consumers by promoting competition.* Responses were received from established telecommunications operators and others that have recently entered the market, as well as from all major consumer representatives. The respondents were (in alphabetical order):

1. Ashley, Pauline;
2. Association of Communications Service Providers;
3. BT;
4. Cable & Wireless;
5. Calls and Access Interest Group (CAIG);
6. Centrica;
7. Communication Workers Union;
8. Consumer Communications for England and Communications for Business;
9. Advisory Committee for Disabled and Elderly people (DIEL);

10. Energis;
11. LE Group/Virgin HomePhone Ltd;
12. National Consumer Council;
13. NCS Pearson;
14. Northern Ireland Advisory Committee on Telecommunications;
15. OneBill Telecom Ltd;
16. Operators Group (see note 2);
17. Orange;
18. Powergen;
19. Public Utilities Access Forum;
20. The Royal Society for Mentally Handicapped Children and Adults (Mencap);
21. Scottish Advisory Committee on Telecommunications;
22. Telephone Helplines Association;
23. Telewest;
24.TXU;
25. Welsh Advisory Committee on Telecommunications; and
26. Wendon, Dave

Notes

2 Cable & Wireless; Colt Telecommunications; Energis; Fibernet Group plc; Global Crossing; Kingston Communications; Redstone Communications; Telia International Carrier; Thus; WorldCom; and Your Communications

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Annex B

Proposed Modifications to BT's Licence

(DEFINITIONS)

In paragraph 1 of Part 1 of Schedule 1 to BT's Licence under the sub-heading entitled 'ADDITIONAL DEFINITIONS RELATING TO SCHEDULE 1 TO THIS LICENCE', the following definitions shall be inserted in the appropriate places in alphabetical order or substitute the existing definitions (as the case may be), as described below:

1. the following new term **"Access Services"** shall be inserted

> "Access Service" has, for the purposes of Condition 69B, the meaning given to it in Condition 69B.1;

2. the following new term **"Access Services Charges"** shall be inserted

> "Access Services Charges" for the purposes of Condition 69B mean charges (being in all cases the amounts offered or charged by the Licensee) to Service Providers for Access Services described in paragraphs 69B.11(a) to 69B.11(h), as the case may be, of Condition 69B;

3. the following new term **"Calls to Mobiles"** shall be inserted

> "Calls to Mobiles" mean, for the purposes of Condition 70, a circuit switched conveyance of a Message originating in a telecommunication system which is not an Applicable System but which is connected to any of the Applicable Systems, and intended to terminate on a handset connected to the mobile public telecommunication system of any Specified Mobile Operator, other than:
>
> (a) any call by which there is conveyed a voice telephony Message in relation to any services provided by means of any of the Applicable Systems which form part of its Supplemental Service Business;
>
> (b) any call, however paid for, from a Public Call Box, any call from a Private Call Box where the charge to the renter is based on charges for calls from Public Call Boxes published by the Licensee in accordance with Condition 7 and transferred charges in respect of calls from Calls from Call Boxes;
>
> (c) any call connected with the assistance of a human operator;
>
> (d) any call billed by means of the Licensee's Chargecard service or any successor service;

4. for **sub-paragraphs (ii) and (iii) of the definition of "Controlling Percentage"** there shall be substituted the following, respectively

> **(ii)** for the purposes of Condition 69B, has the meaning given to it in Condition 69B.13;
>
> **(iii)** for the purposes of Condition 70, has the meaning given to it in Condition 70.6;

5. the following new term **"Existing Line Transfer"** shall be inserted

"Existing Line Transfer" means the combination of transactions consisting of a customer (including a customer who is a

service provider) of the Licensee for an Exchange Line terminating his contract (the customer contract) with the Licensee for the Exchange Line, and the Licensee entering into a contract for that Exchange Line with a Service Provider (the Service Provider contract), except where the Service Provider contract is entered into after the Licensee has ceased the Exchange Line (in which case the Service Provider contract shall be deemed to be a New Line Installation)."

6. for the definition of **"General Prices"** there shall be substituted the following

"General Prices" mean:

(i)

(A) charges for the use and Ordinary Maintenance of a residential Exchange Line;

(B) charges for the connection or taking over of a residential Exchange Line;

(C) charges for the conveyance by means of such Exchange Lines of voice telephony Messages from a place within the Licensed Area to any other place (whether or not within the Licensed Area);

(D) charges for the facility of transferring, with assistance from a human operator, voice telephony Messages referred to in sub-paragraph (i)(C) above;

(E) the Retention for Calls to Mobiles; and

(F) charges (or groups of charges) including the fee, (if any) for services offered in combination with charges (or groups of charges) for other services (or groups of services) or with a periodic or non-periodic fee and which, if the Value Added Service (or group of services) was charged for separately or a fee was not payable, would be General Prices,

other than:

(AA) charges payable by Operators;

(BB) charges for Private Leased Circuits or International Simple Bearer Circuits;

(CC) charges for special, emergency or priority Fault Repair Services;

(DD) charges for the conveyance of voice telephony Messages in relation to any services provided by means of the Licensee's Applicable Systems which formed part of its Supplemental Services Business;

(EE) charges for the conveyance of voice telephony Messages which are to be conveyed to custmers of an Operator which is not a Fixed Link Operator;

(FF) charges for Specially Tariffed Voice Services;

(GG) charges for Dirctory Information Services;

(HH) charges, whether paid in cash or by credit card or debit card or token or otherwise, in respect of calls from Public Call Boxes, and calls from Private Call Boxes where the charge to the renter is based on charges for calls from Public Call Boxes published by the Licensee in accordance with Condition 7, and transferred charges in respect of calls from Call Boxes;

(II) charges for any Maritime Services;

and each discrete charge of any such description shall be treated as a separate General Price;

(ii) for the purposes of Condition 71, the meaning given to it in sub-paragraph (i) above, except that it shall not include those General Prices agreed between the Director and the Licensee on or before the date on which that Condition came into force and, subject to that exception, shall include charges for services which, if offered to residential customers, would be General Prices;

7. the following new term **"New Line Installation"** shall be inserted

"New Line Installation" means a service provided under Condition 69B for the installation of an Exchange Line, where some or all external (or internal) wiring has to be provided, or brought into use for the first time, by the Licensee. For purposes of this definition, "external wiring" means wiring from the distribution point to the protection box (or where one would be fitted) at the premises at which the Network Termination and Testing Apparatus is located and "internal wiring" means wiring from the protection box up to and including the first main

socket, block terminal or other Network Termination Point;&#65533;

8. for sub-paragraph (ii) of the definition of **"Percentage Change"** there shall be substituted the following&#65533;

&#65533;(ii) for the purposes of Condition 70, has the meaning given to it in paragraph 70.2;&#65533;

9. the following new **sub-paragraphs (iii) and (iv) of the definition of "Percentage Change"** shall be inserted immediately after paragraph (ii) of that definition:

&#65533;(iii) for the purposes of Condition 69B, in relation to the aggregate of charges for the Access Services specified in paragraphs 69B.11(a) to 69B.11(d), has the meaning given to it in paragraph 69B.12;&#65533;

&#65533;(iv) for the purposes of Condition 69B, in relation to the charge for Existing Line Transfer, has the meaning given to it in paragraph 69B.14;&#65533;

10. for sub-paragraph (i) of the definition of **"Relevant Year"** there shall be substituted the following&#65533;

&#65533;(i) except for the purposes of Conditions 69, 69B and 73, any of the four periods of 12 months beginning on 1st August starting with 1st August 2002 and ending on 31st July 2006;&#65533;

11. the following new **sub-paragraph (iv) of the definition of "Relevant Year"** shall be inserted immediately after paragraph (iii) of that definition:

&#65533;(iv) for the purposes of Condition 69B only, any of the four periods of 12 months beginning on 1st September starting with 1st September 2002 and ending on 31st August 2006;&#65533;

12. the following new term **"Retention"** shall be inserted&#65533;

&#65533;"Retention" means the retail charge made by the Licensee at its standard tariffs net of discounts for Calls to Mobiles less the payment made by the Licensee to each Specified Mobile Operator for interconnection of the Calls to Mobiles, and the term "interconnection" has the same meaning as in the Telecommunications (Interconnection) Regulations 1997;&#65533;

13. the following new term **"Specified Mobile Operator"** shall be inserted&#65533;

&#65533;"Specified Mobile Operator" means any and all of the following specified companies or their subsidiaries or branded operations, or any successor company operating the same or substantially the same mobile public telecommunication system:

(a) BT Cellnet Limited (formerly Telecom Securicor Cellular Radio Limited);

(b) Vodafone Limited;

(c) Orange Personal Communications Services Limited;

(d) T-Mobile (UK) Limited (formerly One 2 One Personal Communications Limited which was, in its turn, formerly Mercury Personal Communications Limited);

(e) Hutchison 3G UK Limited;

14. the following new term **"Value of Inclusive Calls"** shall be inserted&#65533;

&#65533;"Value of Inclusive Calls" means, for the purposes of Condition 70, the monetary value of the charges for the conveyance by means of residential Exchange Lines of voice telephony Messages from a place within the Licensed Area to any other place (whether or not within the Licensed Area) which are included in the charges for the use and Ordinary Maintenance of such Exchange Lines;"

15. the following new term **"Wholesale Line Rental"** shall be inserted&#65533;

&#65533;"Wholesale Line Rental" means a service provided to a Service Provider under Condition 69B for the use and Ordinary Maintenance of an Exchange Line.&#65533;

(CONDITION 69B)

REQUIREMENT TO PROVIDE, AND CONTROL OF CHARGES FOR, ACCESS SERVICES

Provision of Access Services

69B.1 The Licensee shall, within a reasonable period of receipt of a request from a Service Provider, provide, or offer to provide, to that Service Provider any and all Public Switched Network services ("Access Services") that the Service Provider so reasonably requests for the purposes of providing to his own customers access to the Fixed Public Telephone Systems run by the Licensee or Fixed Publicly Available Telephone Services provided by the Licensee to his own customers, or both.

69B.2 Subject to paragraphs 69B.10 to 69B.21, the Licensee shall provide, or offer to provide, Access Services to the Service Provider on terms and conditions (including charges) which are reasonable.

Dispute Resolution

69B.3 Where any question arises out of this Condition as to the reasonableness of:

(a) any term or condition (including a charge); or

(b) any request made by a Service Provider pursuant to paragraph 69B.1,

either party may refer in writing the dispute to the Director for determination, which determination shall be binding on both parties.

69B.4 Before referring a dispute to the Director under paragraph 69B.3, the parties shall take all reasonable steps to resolve the matter (including, where appropriate, the provision of relevant evidence to support any assertions made). The Director may decline to give a determination where it appears to him that the parties have not complied with the provisions of this paragraph, including where a Service Provider is unable to demonstrate to the satisfaction of the Director that there are sufficient reasons for the Provider to assert that:

(a) any term or condition (including a charge) is not reasonable; or

(b) the Provider has reasonably requested the Access Services in question pursuant to paragraph 69B.1.

69B.5 The Licensee shall ensure that he is able to demonstrate to the Director at his request that any term or condition (including a charge) is reasonable. Where the Licensee fails to the satisfaction of the Director to demonstrate such reasonableness, the Director may take such failure into account in considering whether a term or condition (including a charge) is reasonable and may draw such inferences as he considers appropriate in the circumstances of each case in order to make his determination.

Undue Preference and Undue Discrimination

69B.6 The Licensee shall not (whether in respect of the charges or other terms or conditions applied or otherwise) show undue preference to, or exercise undue discrimination against, particular persons or persons of any class or description as respects the provision of any of the matters to which this Condition relates.

69B.7 The Licensee may be deemed to have shown such undue preference or to have exercised such undue discrimination if it unfairly favours to a material extent a business carried on by it in relation to the doing of any of the things mentioned in paragraph 69B.6 so as to place at a competitive disadvantage Service Providers competing with that business.

69B.8 Any question relating to whether any act done or course of conduct pursued by the Licensee amounts to such undue preference or such undue discrimination shall be determined by the Director, but nothing done in any manner by the Licensee shall be regarded as undue preference or undue discrimination if and to the extent that the Licensee is required to do the thing in that manner by or under any provision of this Licence, or any provision of law.

Access Charge Change Notice

69B.9 The Licensee shall send a written notice (an "Access Charge Change Notice") to the Director and to all Service Providers with which it has entered into (or offered to enter into) an agreement pursuant to this Condition:

(a) in the case of an Access Service subject to the provisions in paragraphs 69B.10 to 69B.20, not less than 90 days before any change to a charge for such a Service is to come into effect; and

(b) in the case of all other Access Services, not less than 28 days before any change to a charge for such a Service is to come into effect,

which identifies:

(i) the current charge offered for, and the location in the Licensee's current price list of the terms and conditions associated with, the provision of any Access Service under this Condition; and

(ii) the date on which or the period for which the proposed new charge will take effect.

Control of Charges for certain Access Services

69B.10 Without prejudice to the generality of paragraph 69B.2, the Licensee shall secure that the following starting charges for each respective Access Service specified below, to be effective from 1 September 2002, are not exceeded by more than the Controlling Percentage in the first Relevant Year and that, for any following Relevant Year, those starting charges are not exceeded except in so far as, and to the extent that, the Licensee may do so under paragraphs 69B.11 to 69B.18:

(a) for the Wholesale Line Rental (residential quality of service), £28.00 per line per quarter, or pro-rated figure for any fraction of a quarter;

(b) for the Wholesale Line Rental (business quality of service), £29.87 per line per quarter, or pro rated figure for

any fraction of a quarter;

(c) for the Existing Line Transfer of a single line or multiples thereof, £1.41; and

(d) for the New Line Installation, £92.89 per line.

69B.11 The Licensee shall take all reasonable steps to secure that during any Relevant Year the Percentage Change in the aggregate of charges for the following Access Services (determined by the formula set out in paragraph 69B.12), namely:

(a) Wholesale Line Rental (residential quality of service);

(b) Wholesale Line Rental (business quality of service);

(c) Existing Line Transfer of a single line or multiples thereof;

(d) New Line Installation

is not more than the Controlling Percentage.

69B.12 The formula mentioned in paragraph 69B.11 is:

where:

C is the Percentage Change in the aggregate of charges for the Access Services specified in paragraphs 69B.11(a) to 69B.11(d);

R(t-1) is the actual revenue from service i in the year immediately preceding the Relevant Year where service i is one of the specific Access Services identified in paragraph 69B.11.

V(t-1) is the actual volume of service i in the year immediately preceding the Relevant Year where service i is one of the specific Access Services identified in paragraph 69B.11.

Rt is the actual revenue from service i in the Relevant Year where service i is one of the specific Access Services identified in paragraph 69B.11.

Vt is the actual volume of service i in the Relevant Year where service i is one of the specific Access Services identified in paragraph 69B.11.

subject to that, for the first Relevant Year, the Percentage Change in the charge for each of the separate Access Services specified in paragraphs 69B.11(a) to 69B.11(d) shall be the amount of the difference between the charge for each such Service at 1st September 2002 and at 31st August 2003 expressed as a percentage of the charge as at 1st September 2002.

69B.13 The Licensee shall take all reasonable steps to secure that during any Relevant Year the Percentage Change in the charge for Existing Line Transfer (determined by the formula set out in Condition 69B.14) is not more than the Controlling Percentage.

69B.14 The formula mentioned in paragraph 69B.13 is:

where:

C is the Percentage Change in the charge for Existing Line Transfer.

R(t-1) is the actual revenue from Existing Line Transfer in the year immediately preceding the Relevant Year.

V(t-1) is the actual volume of Existing Line Transfer in the year immediately preceding the Relevant Year.

R(t) is the actual revenue from Existing Line Transfer in the Relevant Year.

V(t) is the actual volume of Existing Line Transfer in the Relevant Year.

69B.15 The Controlling Percentage in relation to any Relevant Year is the amount of the change in the Retail Prices Index ("RPI") in the period of 12 months ending on 30 June immediately before the beginning of that Year expressed as a percentage (rounded to two decimal places) of that Index as at the beginning of that period, reduced by 2.

69B.16 Where, notwithstanding the obligations imposed on the Licensee by paragraphs 69B.10 to 69B.15, the Percentage Change as calculated according to the formula in 69B.12, or the Percentage Change as calculated according to the formula in 69B.14, fails in the opinion of the Director, to meet the requirements of those paragraphs, the Licensee shall make such adjustments in the charges for each of the separate Access Services specified in paragraphs 69B.11(a) to 69B.11(d) (or leave them unchanged) for the period, whether in the Relevant Year in question or the following Relevant Year as may be reasonably required to satisfy the Director that the matter has been remedied.

69B.17 Where the Licensee makes a material change (other than to an Access Service Charge) to any Access Service for which an Access Service Charge is charged or to the date on which its financial year ends or there is a material change in the basis of the Retail Prices Index, paragraphs 69B.10 to 69B.16 shall have effect subject to such reasonable adjustment to take account of the change as the Director may determine to be appropriate in the circumstances. For the purposes of this paragraph, a material change to any Access Service includes the introduction of a new Access Service wholly or substantially in substitution for an existing Access Service.

69B.18 If the Licensee imposes, during any Relevant Year, a specific charge or an increased charge in relation to any goods or service which up to the time when the charge or increased charge is first imposed had been provided without charge or at a lower charge and the Director determines that some or all of the costs properly attributable to that service had previously been attr buted to Access Services and that it would be proper in the circumstances for the newly introduced or increased charge to be controlled, all revenues accruing from that service will be deemed to relate to one or more Access Service and revenues from such services will be taken into account in determining the Percentage Change calculated according to the formula in paragraph 69B.12 and, if those costs had previously been attributed to Existing Line Transfer, the Percentage Change according to the formula in paragraph 69B.14, in that Relevant Year.

69B.19 The Licensee shall no later than the time at which it notifies or should have notified the Director under paragraph 69B.9 of any change to any Access Service Charge inform the Director in writing of:

(a) the amount of revenue which the Licensee reasonably believes to have accrued in the Relevant Financial Year for each Access Service in respect of which an Access Service Charge is charged; and

(b) the amount of each Access Service Charge at the beginning of the Relevant Year.

69B.20 The Licensee shall as soon as practicable after the end of each Period in which there has been a change in an Access Service Charge inform the Director in writing of:

(a) the changes made or new charges imposed in relation to any other Access Service Charge in the same group of aggregate Access Service Charges, whether under paragraphs 69B.11(a) to 69B.11(d) during that Period specifying its nature and amount and the Access Service for which the Access Service Charge is charged; and

(b) the amount of the Percentage Change in the relevant aggregate of Access Service Charges which has taken place during the Period and whether by way of increase or reduction.

69B.21 Paragraphs 69B.9 to 69B.20 shall not apply to such extent as the Director may determine.

(CONDITION 70)

CONTROL OF GENERAL PRICES

70.1 The Licensee shall take all reasonable steps to secure that, during any Relevant Year, the amount of General Prices remains such that the Percentage Change in the aggregate of all General Prices (determined by employing the formula set out in paragraph 70.2 and, as the case may be, calculated as set out in paragraphs 70.4 and 70.10) is not more than the Controlling Percentage.

70.2 The formula mentioned in paragraph 70.1 is:

where:

C is the Percentage Change in the aggregate of all General Prices;

$N_{(t-1)ij}$ is the actual net revenue from service j within package i in the year immediately preceding the Relevant Year where service j is a specific service for which a General Price is charged and package i is a group of services which, if offered separately, would each be a specific service for which a General Price is charged;

$V_{(t-1)ij}$ is the actual volume of service j within package i in the year immediately preceding the Relevant Year where service j is a specific service for which a General Price is charged and package i is a group of services which, if offered separately, would each be a specific service for which a General Price is charged;

N_{tij} is the actual net revenue from service j within package i in the Relevant Year where service j is a specific service for which a General Price is charged package i is a group of services which, if offered separately, would each be a specific service for which a General Price is charged;

V_{ij} is the actual volume of service j within package i in the Relevant Year where service j is a specific service for which a General Price is charged and package i is a group of services which, if offered separately, would each be a specific service for which a General Price is charged;

m is the number of packages available during the Relevant Year or a sufficient number of packages to reasonably reflect the totality of revenues accrued by the Licensee in the Relevant Year to be agreed in writing by the Licensee and the Director; and

n is the number of General Prices or a sufficient number of services to reasonably reflect the totality of revenues accrued by the Licensee in the Relevant Year to be agreed in writing by the Licensee and the Director.

70.3 In applying the formula referred to in paragraph 70.2, references in that formula to revenues from, and volumes of, package i and service j shall mean those revenues and volumes accrued from all residential customers whose bills issued by the Licensee to them are equal to or less than the highest bill of residential customers in the eighth decile (ranked on the basis of the amount billed by the Licensee to all residential customers for the services for which General Prices are charged, the highest bill being at the top of the tenth decile) in the Relevant Financial Year.

70.4 Where the Value of Inclusive Calls:

(a) is increased during any Relevant Year beyond the Value of Inclusive Calls as at 31 July 2002, such increase shall not be taken into account in the calculation of the Percentage Change in the aggregate of General Prices (calculated in accordance with paragraph 70.2) for the Relevant Year in question or any following Relevant Year; and

(b) is decreased during any Relevant Year, such decrease shall be deemed as a corresponding increase in the charge for the use and Ordinary Maintenance of a residential Exchange Line and shall be taken into account as such in the calculation of the Percentage Change in the aggregate of General prices (calculated in accordance with paragraph 70.2) for the Relevant Year in question.

70.5 Where, notwithstanding the obligation imposed on the Licensee by paragraph 70.1 (or paragraphs 70.1 or 70.2 of Condition 70 having effect on 31 July 2002) and without prejudice to the generality of that obligation, there has taken place a change in General Prices (or General Prices as defined in that Condition 70) of a kind not permitted under paragraph 70.1 (or paragraphs 70.1(a), 70.1(b) or 70.2 of Condition 70 having effect on 31 July 2002), the Licensee shall make such adjustments in General Prices (or leave them unchanged), for such period, whether in the year in question or the following year (and whether or not that year is a Relevant Year), as may be reasonably required to satisfy the Director that the matter has been remedied. Such adjustments shall not be relevant for the purposes of establishing compliance with paragraph 70.1 in a following Relevant Year.

70.6 Subject to paragraph 70.7, the Controlling Percentage in relation to any Relevant Year is the amount of the change in the Retail Prices Index ("RPI") in the period of 12 months ending on 30 June immediately before the beginning of that Year, expressed as a percentage (rounded to two decimal places) of that Index as at the beginning of that period, reduced by RPI subject to the following provisions:

(a) where the Director notifies the Licensee in writing that he is satisfied in relation to the introduction and provision of services specified in paragraphs 69B.11(a) to 69B11(h) during any Relevant Year, he may determine that the Controlling Percentage in the Relevant Year in question shall be calculated according to the following formula:

where a is the number of days in the Relevant Year prior to the satisfactory introduction and provision of such services and b is the number of days in the Relevant Year after the satisfactory introduction and provision inclusive and that the Controlling Percentage in any following Relevant Year shall be RPI; and

(b) where on 30 June, in any Relevant Year, RPI is 4 per cent or more, the Director may determine that the Controlling Percentage for the following Relevant Year shall be RPI reduced by 4.

70.7 If the Percentage Change in any Relevant Year is less than the Controlling Percentage, then the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph 70.6 but increased by the amount of such deficiency.

70.8 Where the Licensee makes a material change (other than to the amount of a General Price) to any service for which a General Price is charged or to the date on which its financial year ends, this Condition shall have effect subject to such reasonable adjustment to take account of the change as the Director may, after consultation with the Licensee, determine to be appropriate in the circumstances; and for the purposes of this paragraph a material change to any service includes the introduction of a new service wholly or substantially in substitution for that existing service.

70.9 If the Licensee imposes a specific charge or an increased charge in relation to any goods or service which up to the time when the charge or increased charge is first imposed had been provided without charge or at a lower charge and the Director determines, after consultation with the Licensee, that some or all the costs properly attributable to that service had previously been attributed to services to which General Prices apply and that it would be proper in the circumstances for the newly introduced or increased charge to be controlled, that charge shall, unless the Director determines otherwise, be a General Price and this Condition shall have effect subject to the following provisions:

(a) the Licensee shall produce a forecast of the revenue expected to accrue as a result of the charge or increased charge for the goods or service over a period of twelve months from the date of introduction or increase of the charge; and

(b) the Percentage Change in the aggregate of General Prices shall be re-calculated to take account solely of the imposed charge or increase in the manner which the Director determines, after consultation with the Licensee, to be appropriate in the circumstances.

70.10 For each Relevant Year, the Licensee shall inform the Director in writing, no later than three months after the end of the Relevant Year in question, of the volumes and revenues which the Licensee reasonably believes to have been derived from each service in respect of which a General Price is charged such that the supplied information is sufficient to enable the calculation of the Percentage Change in the aggregate of General Prices in accordance with paragraph 70.2.

70.11 For each Quarterly Period, the Licensee shall inform the Director in writing, no later than three months after the end of the Quarterly Period in question, of the volumes and revenues which the Licensee reasonably believes to have been derived from each service in respect of which a General Price is charged. In this paragraph, "Quarterly Period" means a consecutive three month period, the first of which begins on the 1 August 2002 (or such date no later than 1 February 2003 that the Licensee is able to install and bring into operation the systems to enable such reporting to be carried out) and the last of which ends on the 31 July 2006.

70.12 Without prejudice to its obligations under Conditions 7 or 58, the Licensee shall inform the Director, in writing, at such times as the Director may reasonably request, of the changes made, or new charges imposed, by the Licensee in relation to any General Price specifying, without prejudice to the generality of the foregoing, its nature and amount and the service for which the General Price is charged.

70.13 The Licensee shall not in any of its charging periods apply a Retention for Calls to Mobiles to any Specified Mobile Operator which is different from the Retention for Calls to Mobiles to any other Specified Mobile Operator, except:

(a) to the extent necessary to enable the Licensee to round to the nearest 0.1 of a penny per minute the charge made by the Licensee to its Subscribers for calls; or

(b) following a request by the Licensee, insofar as the Director General may consider to be appropriate, and so direct the Licensee.

70.14 In this Condition, any reference to "service" which is not part of the expression "goods or service" shall be taken to include a reference to goods for the purposes of paragraph 70.9.

70.15 This Condition shall not apply to such extent as the Director may determine upon request by the Licensee.

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(DELETED CONDITIONS)

The following conditions in Part 2 of Schedule 1 to BT's Licence shall be deleted:

- Condition 72; and
- Condition 74.

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Annex C

Price control monitoring and other issues

C.1 This annex covers a number of general issues relating to the operation of the new price control arrangements, including the monitoring of charges for wholesale line rental.

Retail price control

C.2 Oftel's approach to monitoring BT's compliance with retail price control requirements will be broadly similar to the one adopted for the current control although there will be a number of changes made to the monitoring process. These changes reflect both policy evolution and a general simplification of the existing process, which can, in many respects, be regarded as unnecessarily complex. Oftel believes that a simplified approach is appropriate given the move to a safeguard cap. There is some cost to both BT and Oftel in producing and checking the monitoring data and Oftel wishes to ensure that these costs are minimised.

Reference prices and discounts

C.3 The existing price regime consists of two separate processes. First, Oftel requires BT to nominate "reference" prices for the residential line rental and call prices and the cap is applied directly to these prices only. Second, BT is required to maintain a minimum value of discounts to residential customers, the "Score", the value of these discounts relative to the reference tariff being called the "Discount Yield". This is a complex set of arrangements that Oftel believes can be simplified

C.4 Oftel's new approach to monitoring will consist of one single process. In simple terms BT will be required to ensure that its net revenues in any relevant year (ie including discounts) from all residential customers in the bottom eight deciles are equal to or less than the net revenues received from those customers in the previous year. This process can be considered more transparent as it measures actual prices paid by residential consumers.

C.5 To ensure that this calculation is not affected by volume or compositional changes Oftel will continue to use a prior year weighting process. This adjusts the revenues in any given year to the level they would be had the volume of each service (eg individual call type) remained unchanged from the previous year. This is important as expenditure levels can increase from year to year because of factors other than price increases, such as, growth in new services.

C.6 Oftel will not allow any increases in the value of BT's current standard inclusive call allowance (ICA), currently £6.45 per quarter to count towards meeting the requirements of the new price control. This is because the price control is intended to allow the line rental to increase in response to competition forcing the generality of call prices down. If the standard ICA counted to meeting the cap BT would have an incentive to anticipate competitive pressure by raising the line rental, offsetting it by an increase in the ICA. This could then be a "cheap" way of satisfying the control compared to reductions in per minute call prices, which benefit higher spenders proportionately more. Oftel will, however, consider any decrease in the value of the standard ICA as a price rise and this will count towards the cap calculation. "Opt-in" schemes which allow consumers to purchase a certain volume of "free" minutes for a fee additional to their standard line rental will also be allowed to count towards the cap calculation.

Price cap timing constraint

C.7 BT's existing licence contains a provision preventing it from delaying required price reductions to the end of each price control year. Under this provision BT is required to time the implementation of its price changes in such a way that the combined effect is equivalent to it having made all the price changes half-way through the price control year.

C.8 This requirement will be removed under the new regime. By monitoring actual annual net revenues Oftel will effectively compare the average prices paid over the course of the year with those paid over the previous year. A price change late in the year will apply only for a relatively small proportion of the year. BT's scope to influence compliance with the cap by introducing large price reductions late in the year is thus limited. The removal of the timing constraint will also contribute to the overall simplification of the monitoring process. The price control year will continue to run from 1 August to 31 July.

Prices of calls to mobiles

C.9 The only change to the structure of the price control basket itself is the inclusion of BT's retention on calls to mobiles, which is currently monitored separately. The inclusion of BT's retention in the basket will further simplify the whole monitoring process.

C.10 Competitive conditions in the provision of retail calls to mobiles are broadly similar to those for other call types. While BT's returns on calls to mobiles are lower than on other calls, and thus potentially less attractive to competitors, BT's share of calls to mobile volumes is similar to its share of local and national calls. The restriction to BT's retention recognises the relatively high level of mobile termination charges, which means that BT has less control over the full retail price. However, to ensure BT meets its non-discrimination obligations, Oftel will continue to monitor BT's retention to each individual mobile network operator separately to ensure that its retention for calls to each network is the same.

The appropriate index for price control

C.11 The control will continue to be based on the all-items RPI. This has the advantages of public familiarity and certainty. In previous consultations, many respondents have given great weight to the need for the index to be understood by the public.

Duration

C.12 The new control will last for four years, and will initially be set so that BT is not permitted to raise its prices in absolute terms ie by more than RPI-RPI. However, Oftel proposes to relax the cap when it is satisfied that BT has introduced a wholesale line rental product which successfully stimulates competition. From such time that Oftel is satisfied that such a

product is available then the cap shall be RPI itself ie BT will not be permitted to make any "real" increases in prices of the basket of services.

Provision for carry-over

C.13 Under its current licence, if BT reduces its prices by more than is required in a particular price control year then it is allowed to count the excess price reductions towards its obligations in the following year. Oftel intends to continue these arrangements under the new regime.

Monitoring the wholesale line rental charge

C.14 The starting charges for each of the Access Services were set out in chapter 3. BT will be required to meet a basket price cap including all the Access Services set at RPI-2 per cent each year for the four years. In addition, Oftel intends to place a sub-cap set at RPI-2 per cent on the transfer charge. Consistent with the retail price control there will be no timing constraint " prices will be averaged over the course of a full year. The Relevant Year will be 1 September to 31 August.

C.15 Oftel is concerned that this flex bility within the basket could allow BT to make little or no alternation to, say, the line rental charge, and make large increases in the transfer charges. This could discourage other providers from purchasing the service and so competition would not be enhanced. As explained in paragraph C.14, Oftel has therefore proposed to set a sub-cap on the transfer charge.

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Annex D

Wholesale line rental (WLR): Other issues

D.1 Set out below in italics are views expressed by respondents on the WLR product and processes. Oftel"s comments are intended to provide guidance for the industry groups set up to develop the Product Specification.

There should be a highly automated transfer process

D.2 Oftel agrees that manual intervention should be used sparingly. If possible, all orders should be handled electronically. Nevertheless, manual intervention might be required if order requests are not correctly completed or where automatin is not cost effective. The service provider requesting service has to ensure that its operations are suitably established.

Low forecasting requirements and no financial penalties

D.3 Oftel does not wish to provide incentives for service providers to over-forecast safe in the knowledge that any costs arising from over-forecasting would be borne by their competitor. But it also believes that forecasting requirements should not be too onerous. On penalties, Oftel believes that it is appropriate for penalties to apply to service providers that provide wildly inflated forecasts. However, these penalties could be operational rather than financial (for example, by limiting future orders).

BT to face penalties if it fails to meet the requirement to provide a workable Wholesale Line Rental product

D.4 Oftel has accepted that there is a need to provide BT with incentives to offer a workable Wholesale Line Rental product. Partly for this reason, Oftel has now proposed to relax to a degree the retail price controls should the Director General be satisfied that the Wholesale Line Rental product was being offered in accordance with the Product Specification, was fit-for-purpose and was being actively taken up by service providers. Additionally, BT might be faced with contractual penalties for failing to meet the service level agreement for WLR.

The capacity of the service provider gateway (for order handling) and back end office functions need to be able to meet demand

D.5 Oftel agrees that the capacity of the gateway needs to be able to meet high demand, but does not believe that it should be over-engineered to meet demand that is unlikely to arise.

BT to share the service provider"s debt risk

D.6 Anyone providing service runs the risk of bad debt and it is not acceptable to load that risk onto BT. BT Retail is faced with the risk of bad debt when it serves its own retail customers. The charges determined for WLR reflect BT"s bad debt risk in providing a wholesale service.

Transfer of lines with Rented Equipment

D.7 Service providers have indicated that the presence on lines of BT rented equipment attached, where Calls and Access is being requested, has led to the rejection of the transfer request. Oftel believes this issue should be considered as part of the development of the Product Specification

Simple transfer process between service providers

D.8 In general, Oftel anticipates that service providers would wish to focus their offering on the difference between themselves and BT. This is only natural given BT"s dominant market position. Nonetheless, end-users should be able to switch between

service providers and Oftel agrees that this process should be simple.

Service providers deal with all complaints and enquiries from their customers

D.9 This is a fundamental characteristic of WLR. By definition, if the service provider takes on the retail relationship, it should expect to handle the customer relationship. Of course, for the purpose of installing and maintaining the line, BT might need access to the end-user's property and its engineers might need to deal with technical queries during the course of that visit.

Neutral branding of BT engineers, such as neutral uniforms and vans, when interacting with a customer to install or repair service

D.10 Oftel does not view this as an essential element of WLR at this stage. The infrequence of engineers' visits suggests that this is not of as great a competitive significance as other branding issues, such as 'one bill' and the ability to deal with all customer enquiries. Oftel believes that the industry should agree a procedure that BT engineers should follow in face-to-face interaction with end-users. In addition, BT could choose to provide on commercial terms a neutrally branded offering if a service provider were willing to pay any relevant costs. (BT already offers neutrally and positively branded services for directory enquiries.) This issue will be considered again as part of the 2004 market review and, if at that stage neutral branding appears to be a significant competitive issue, Oftel will consider what remedies are available to it.

Full separation of BT Wholesale and BT Retail

D.11 Oftel does not propose to use the review of price control arrangements to consider the structure of BT and the effects that this has on the competitive process.

Full transparency of amount BT Retail pays for Wholesale Line Rental

D.12 Oftel agrees that full transparency of costs and demonstration of non-discrimination of the WLR product range is essential.

BT Retail should not hold the details of service providers' customers

D.13 In principle, Oftel agrees that BT Retail sales and marketing functions should not have access to service providers' details relating to the service provider's customers.

Minimal 'save/winback' activity

D.14 Oftel agrees that it is appropriate for 'save' requests to be limited. In its paper 'Wholesale Line Rental: possible approach', Oftel suggested that the Calls & Access approach could be adopted, ie one save telephone call only. However, Oftel is not convinced that 'winback' activity thereafter should be limited. This might detract from the competitive process.

Protection from 'slamming' should be limited to that which is necessary to protect consumers

D.15 In principle, it is right that rules on suppliers' marketing behaviour should not go beyond what is necessary to protect consumers. However, it is necessary for consumers to have confidence that their service provider would be changed only if they chose to switch. Oftel will ensure that appropriate measures are in place to ensure that this is the case.

BT should not be permitted to refuse to allow a customer to switch whilst debt remains outstanding

D.16 Oftel agrees that BT should not be permitted to veto a switch. However, Oftel does not expect any advertising that might encourage customers to switch and to leave debts unpaid.

Formal modification process for developing product once launched

D.17 A formal modification process (for changes after the implementation of the Product Specification) should be established.

End-to-end conveyance

D.18 In its response to *Protecting consumer by promoting competition,* Centrica proposed that BT Wholesale should be required to provide end-to-end conveyance on cost-based terms to competitors of BT Retail. It argued that the cost base of interconnecting operators is higher than that of BT because of the additional switching stage used by an interconnecting operator.

D.19 As noted in Oftel's competition assessment, current retail call prices are well above costs. This allows IA operators an adequate margin to compete with BT on all call types, including local calls, despite the cost penalty caused by the need for additional switching. Oftel is not therefore minded to require BT to offer cost-based end-to-end conveyance as part of the retail price control review. It would, however, be prepared to reconsider this view at a later date. It would then decide, in the light of competition conditions prevailing at the time, and of the implications for incentives for static and dynamic efficiency, whether BT should be required to offer a cost-based end-to-end conveyance product, perhaps for a subset of call types such as local calls. Clearly, this would require that BT had an entrenched dominant position in the relevant market. Oftel is not at present convinced that BT has such a position in any relevant calls market given the potential impact of CPS and the proposed wholesale line rental product.

D.20 Oftel accepts that there is an inherent difference in the cost structure that indirect operators are faced with compared with the cost of BT end-to-end calls. Other infrastructure providers could also benefit from their investments in this way and their

cost-base could be lower than BT's for their own end-to-end calls. Although Oftel does not propose to mandate end-to-end conveyance now, it believes that it would need to review this decision in the future if WLR had not increased retail competition to any significant extent.

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Annex E

Wholesale Line Rental: Starting charges

E.1 Oftel's proposed starting charges for the wholesale line rental (WLR), connection and transfer products were set out in chapter 3. Oftel has derived these charges from the determined rental charge for an unbundled local loop (LLU). The two products share major components, most obviously the subscriber line, and it is important that a consistent approach be adopted. However, there are also a large number of differences, with some costs being relevant to LLU but not to WLR and vice versa. This annex describes the adjustments which Oftel has made to the LLU rental charge to obtain the charge for the WLR product.

Rounding

E.2 The determined LLU charge of £122 per annum was based on 1999/2000 data on the cost of a metallic path facility (MPF). This is a rounded number and, in setting the charge for WLR, Oftel has first removed the effects of rounding.

LLU specific costs

E.3 Oftel has then removed the cost of certain activities and equipment which are specific to LLU. These are:

(i) MDF general maintenance. In the case of the WLR, MDF maintenance is included in the costs of exchange accommodation which are then reflected in the overall charge. Hence, it is not necessary to include MDF maintenance as a separate item.

(ii) Pair Gain adjustment. LLU cannot be provided over lines using pair gain equipment. The charge for LLU therefore reflects the additional costs of new line provision to an LLU customer whose existing PSTN service was provided using pair gain equipment. WLR can be provided to such customers without the need for a new line, so these additional costs are removed from the WLR charge.

(iii) NTE Upgrade Adjustment. This adjustment was intended to cover the costs of upgrading NTEs to make them suitable for LLU. As such upgrades will not be required for the WLR, the costs are removed from the charge.

(iv) Dedicated LLU billing staff costs. The costs of BT's LLU-specific billing activity are not relevant to the WLR. An allowance for the cost of WLR billing is included in the adjustments below.

(v) The LLU charge is based on the average cost of an MPF. However, in addition to PSTN access, MPFs may be used to provide ISDN and private circuit local ends. The costs of the latter two are not relevant to WLR and so are removed.

(vi) The LLU charge includes a fault reporting and repair adjustment to allow for the additional such costs incurred as a result of taking LLU. These costs are not included in the WLR charge.

Additional WLR costs

E.4 The LLU charge does not include an allowance for a number of "service provision" cost categories which were deemed inappropriate to a wholesale product or were already captured elsewhere in the LLU charge. In some cases, Oftel has accepted that a portion of these costs should be reflected in the WLR charge, either because the cost of the equivalent activity in the case of LLU is among the LLU-specific costs excluded, or because the activity is relevant to WLR but not LLU. Into this category fall the following cost items:

(i) Billing for the WLR;

(ii) Research and development related to fault repair and field engineer management; and

(iii) Provision of free phonebooks.

E.5 Some other costs incurred in the provision of PSTN access were also excluded from the LLU charge, either because they were not relevant to the latter or were recovered in separate charges, notably that for collocation at the local exchange. The following such cost items are included in the WLR charge

(i) PSTN line card;

(ii) Accommodation costs recovered through the LLU collocation charge;

(iii) Pair gain equipment (this is the corollary of the removal of the pair gain adjustment descr bed above); and

(iv) Non-metallic path costs (fibre and associated duct and radio links).

Excluded costs

E.6 BT argued that a number of other cost items should also be included on the grounds that they are relevant to both LLU and WLR and had, in its view, been erroneously excluded from the former. Into this category fall the following costs:

(i) General support;

(ii) Personnel;

(iii) Customer support;

(iv) Finance;

(v) Network enabling computers; and

(vi) Field support.

E.7 Oftel has not included these costs in the WLR charge on the grounds that to do so would be inconsistent with the LLU charge. There is also a danger of introducing an asymmetry into the process by accepting additional costs for inclusion identified by BT without also considering whether there are items which were included in the LLU charge, but which would in hindsight have been excluded. Oftel intends to address the issue in its forthcoming review of LLU charges. If these costs are included in a future LLU determination, there would be grounds for subsequently including these costs in the WLR charge.

FAC "discount"

E.8 BT also proposed to add back a "discount" resulting from the fact that the cost of LLU on a long run incremental cost basis, including an equal proportionate mark-up for common cost recovery (LRIC + EPMU), was below the cost calculated on a fully allocated current cost (CCA FAC) basis. BT argued that the LLU calculation of LRIC + EPMU was understated and that a more granular analysis would have resulted in a figure closer to the CCA FAC figure. Oftel has not made this adjustment on the grounds that to do so would be inconsistent with the LLU rental and the network charge control (which was set on the basis of LRIC + EPMU data consistent with LLU).

Allowed rate of return

E.9 The LLU line rental is based on an allowed rate of return on capital of 14.5 per cent per annum. In the WLR charge, Oftel has included an allowance for BT's cost of capital of 13.5 per cent.

Drop wire connection costs

E.10 The LLU rental charge includes a specific allowance for the cost of drop wire renewal and repair. Drop wire provision and installation costs are recovered in the PSTN connection charge rather than the line rental. These costs were not included in the LLU connection charges, as the LLU connection charges were based on a bottom-up costing of work necessary for LLU. The drop wire provision and installation costs were therefore instead recovered in the LLU rental charge.

E.11 In the case of the WLR, drop wire provision and installation will be recovered in the connection charge, except where from 2000/01, these costs have been capitalised and recovered in the rental charge.

2000/01 and 2002/03 costs

E.12 The final adjustment made to arrive at the WLR charges is to recalculate the allowed cost items on the basis of 2000/01 data rather than the 1999/2000 data used for LLU and project these forward to mid-year 2002/03, which is appropriate as the starting charges will take effect from September 2002. BT has not provided a fully satisfactory estimate of 2000/01 costs on a basis consistent with that used for LLU. Oftel has therefore used BT's 2000/01 cost estimates where it believes these to be reasonable, but otherwise has estimated 2000/01 costs from the 1999/2000 data on the basis of movements in aggregate access costs. Changes in unit costs between 2000/01 and 2002/03 are projected using Oftel's financial model of BT.

Bad debt and product management costs

E.13 BT has also argued that additional bad debt and product management costs should be included. It argues that experience with LLU and Calls and Access has shown that levels of wholesale bad debt are in excess of current retail levels and that a "more realistic" allowance should be included. Oftel's view is that recent experience with these products is unlikely to be representative of bad debt rates over a longer period of time. Moreover, as BT can charge in advance for the wholesale line rental, no additional bad debt charge should be accepted and the allowed bad debt cost should be below retail levels. Oftel notes that, in the costing of the retail PSTN service by direct debit, BT proposed that there would be no bad debt cost on the grounds that these charges are recovered 3 months in advance. Oftel believes that BT should only recover a minimal bad debt cost since it is open to BT to devise incentives for operators to pay promptly, including possible penalties for non-payment. It has therefore set the charges for the WLR on the basis that only a minimal allowance for bad debt costs is included. However, this is conditional on BT and service providers reaching agreement on the measures reasonably required to achieve this minimum. If, following consultation, no agreement is reached on reasonable bad debt reduction measures, then it may be necessary to increase the allowance for bad debt costs in the WLR charge.

E.14 BT has argued that significant development of the "service provider gateway (SPG)", the interface between BT and

customers for "Calls and Access" and the WLR, will be necessary in order to support the latter product. Oftel believes however that as the wholesale access product is essentially similar to the Calls and Access product, the additional product development and management costs incurred for WLR should be limited. It has not allowed for any further product development of the SPG from 2004/05 onwards as the product should be fully fit for purpose by then. However, as it accepts that the WLR will largely supplant Calls and Access, Oftel has allowed for the undepreciated component of past costs and ongoing support costs to be recovered in the WLR charge.

Connections and Transfers

E.15 The charge for a new connection is derived from 2000/01 LRIC + EPMU data from BT's accounts, projected forward to 2002/03. As with the rental charge, Oftel has adjusted BT's estimates of network costs, has removed certain wholesale costs and has allowed only a minimal bad debt cost.

E.16 Oftel believes that only incremental costs should be recovered from transfer charges, on the grounds that this is a new activity and no implicit allocation of common costs or overheads has been made in the costing of other activities (eg LLU, network charge control). This would also be consistent with the approach adopted for LLU line sharing.

E.17 Oftel also believes that the bulk of transfer costs should be recovered through the rental as even a relatively low transfer charge could deter switching. The transfer charge therefore reflects only the direct labour cost incurred. An amount equivalent, in net present value terms, to the total of other costs incurred when a customer is transferred to a service provider is then recovered through the rental.

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Annex F

Cost-Benefit Analysis

F.1 Annex D of the consultation document entitled Protecting consumers by promoting competition set out a cost benefit analysis (CBA) of Oftel's proposals for measures to replace BT's retail price cap.

F.2 Oftel compared the costs and benefits of its preferred option of a cost-based wholesale access product combined with a safeguard price cap with a base case in which the retail price control is removed, but no additional action is taken to stimulate competition or protect consumers. It was assumed that Oftel's proposals would result in substantially lower call prices than in the base case as these were brought into line with costs by competitive pressure.

F.3 The net annual benefit of reducing call prices to cost was estimated at some £430m per annum at 2001/02 prices, equivalent to a net benefit of about £2.4bn in present value terms over a ten year period from 2006/2007. In addition, there would be smaller annual benefits in the years up to 2006/2007 before the measures have their full effect. Other benefits were not quantified but included possible efficiency savings resulting from increased competition, the avoidance of inefficient entry, the benefits of increased choice and increased innovation. Against these, compliance costs, relative to the base case of no controls, were considered likely to be relatively very small.

F.4 Annex C to BT's response to *Protecting consumers by promoting competition* is a critique of Oftel's CBA by the consultants .econ.

F.5 .econ characterises Oftel's proposals as regulatory intervention. Oftel's view, in contrast, is that they are deregulatory. This has important implications for the CBA. In particular, .econ argues that Oftel should take account £ as a cost of its proposal £ of the distortions caused by price caps.

F.6 .econ does not specify the source of these distortions, but they presumably arise from prices that do not reflect costs (allocative inefficiency). Other possible sources of distortions would be reductions in incentives to reduce costs (dynamic inefficiency) or inconsistent treatment of capital and operating costs (productive inefficiency).

F.7 The National Audit Office has recently considered the efficiency properties of the price cap regime operated by Oftel (and other regulators) in its recent report on *Pipes and Wires* (HC 723, April 2002). It concluded that "RPI-X£provides strong incentives to improve efficiency for the ultimate benefit of customers", whilst also noting that there were some risks to these incentives. For reasons set out in the NAO report, Oftel believes that its approach to setting the price cap minimises any resulting distortions even when the price cap is the main constraint on prices. Moreover, under Oftel's proposals, competition should eliminate these effects at the retail level and in any case they are more relevant to the network control where capital investment is more significant.

F.8 A key feature of Oftel's proposal, crucially, is removal of the price cap once competition is judged to be effective in a market review (which, under new EU regulations, must be carried out before the end of July 2003). The calculated benefit reflects an assumption that prices are in fact driven to costs as a result of competition, rather than a price cap. It is not clear therefore that there would be any significant distortions remaining if Oftel's proposal is successful. Oftel agrees that a price cap would be less desirable than competition because of the attendant costs (indeed, this is reflected in Oftel's objectives and the thinking behind its proposals). It was therefore able, in the CBA, to test the most deregulatory option consistent with Oftel's objectives, confident that other options would be inferior.

F.9 However, if competition does not develop as intended, which is poss ble even if the wholesale line rental product is introduced, then the RPI-RPI or RPI+0 cap may be the binding constraint on prices. But this would result in significant net benefits compared to a situation of unrestrained exploitation of market power. This is because prices would be closer to costs,

ie less distorted, than if BT raised them to the profit maximising level.

F.10 .econ does not dispute that reducing excessive prices to cost will have a significant benefit as measured by a CBA – indeed it would be contrary to much of competition economics to dispute this. Such price reductions are the source of the benefit calculated by Oftel.

F.11 .econ argues that Oftel's proposals are a package and that each element should be subject to an individual CBA. A difficulty, not acknowledged by .econ, is that the aim of, for example, the proposed extension of LUS to customers in decile 3, is distributional. To the extent that this requires some prices to be above or below cost, this will inevitably result in a net loss as measured by a CBA. It is not possible to quantify in any meaningful way the benefit of ensuring that no customers are made worse off by Oftel's proposals. Oftel therefore has to make a judgement that such protection is desirable.

F.12 .econ argues that Oftel's assumption that access prices will be the same in both the "policy" and counterfactual cases implies that the policy proposals must include unnecessary measures. Oftel accepts that, in practice, BT might well not set the same line rental in the two cases. However, it is l kely that, if anything, Oftel has understated the extent to which access prices would rise in the counterfactual case (it is assumed that they just cover costs) as there would be no control preventing them rising to the profit maximising level. This would increase the apparent benefit of the proposed measures.

F.13 .econ argues that Oftel should take account of an alleged "substantial" disincentive to invest in infrastructure resulting from its proposals. As the cost of the wholesale line rental will be based on LRIC plus an equal proportionate mark-up for common costs and including the cost of capital, it is unclear why any disincentive should result, particularly given that Oftel has assumed that the retail rental rises to the same level in the counterfactual case which, as noted above, is likely to yield a conservative estimate of benefits. .econ refers to the option value of investment which, BT has previously argued, should be added to the cost of capital. These arguments have been considered by Oftel previously (see Oftel's statement entitled *Proposals for Network Charge and Retail Price Controls from 2001,* February 2001, Annex E) and not found persuasive.

F.14 .econ argues that the proposals will stimulate retail competition but not network competition and that Oftel has, as a result, overstated the possible efficiency gains. Oftel accepts that increased pressure to reduce costs as a result of its proposals is most likely to be felt at the retail level. However, it is poss ble that some investment in competing networks could be stimulated, in particular by those providing conveyance (such as CPS operators) and indeed by access operators as the retail rental rises towards costs. In any case, as is clear in Annex D of *Protecting consumers by promoting competition,* the figure for potential efficiency gains calculated does not enter into the main CBA calculation and so cannot affect the result. It is simply noted as an additional benefit which cannot readily be quantified. The figure given is purely indicative of the potential scale of such benefits.

F.15 Oftel believes therefore that the conclusions of its CBA are robust.

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EXHIBIT GS-38

GS-38

Ofcom removes retail price controls on BT line rental and calls

19 July 2006

19 July 2006

Today, 22 years after retail price controls were first imposed to limit increases in the price of line rental and calls for BT customers, Ofcom announced their removal.

This significant deregulation follows both the conclusion of Ofcom's Strategic Review of Telecommunications in September 2005 and a specific public consultation on the removal of retail price controls begun in March 2006.

The removal of retail price controls is enabled by - and reflects - the rapid growth of competition and continued reductions in the cost of phone services for customers. More than 10.7 million households and small businesses now use providers other than BT Group plc for their phone calls - including more than 4.6 million cable customers - and the UK has some of the cheapest phone costs in the world.

This pattern of increasing competition and falling prices is likely to gather pace in the future as new technologies enter the mass market, such as Voice over IP (VoIP) phone calls over the internet, already actively used by more than 500,000 UK households and small businesses. A number of companies have also developed unbundled local loop services which offer phone calls, high-speed broadband, television over broadband and video-on-demand over their customers' existing phone lines. To date, more than 600,000 local loops have been unbundled, a total increasing by almost 100,000 a month with a further acceleration in predicted demand in the near term.

Fixed line providers also face growing competition from the mobile sector. Mobile phone usage is growing as consumers increasingly turn to mobiles rather than landline phones for many of their daily calls. Mobile phones now account for 31% of all voice call minutes in the UK, up from 20% in 2001 and 5% in 1996.

From 1st August, it's your call

The current retail price controls, put in place in June 2002, will lapse on 31 July. These changes will therefore come into effect from 1 August. A public information campaign, managed by Ofcom and funded by BT with a contribution from Ofcom, will begin on 20 July with national and regional newspaper and national poster advertisements. The public information campaign will continue through the summer and into the autumn, with further newspaper, magazine and outdoor advertising as well as an online campaign. Additionally, BT will include a letter from Ofcom in all customer bills posted over the summer.

The information campaign will seek to make consumers aware of this change and encourage them to understand the choices available in the competitive market. Images of the first newspaper and outdoor advertisements can be found online - see Related Items.

Continuing protection

BT Group plc has also given a number of assurances to offer additional protection for customers on low incomes and vulnerable groups. The company has agreed it will limit increases to its charges for its basic line rental product to a certain level to avoid disadvantaging customers for whom the line rental accounts for the overwhelming majority of their phone bill.

Those assurances are in addition to the Universal Service Obligations which BT Group plc must meet. Those obligations require BT to provide a telephone line upon request to people in all parts of the UK; they also stipulate that vulnerable groups should have access to special services and tariffs.

Ofcom Chief Executive Stephen Carter said: "The success of regulation is rarely measured by the ability to remove it. This is a good example of a market now functioning well."

He added: "This deregulation is accompanied by appropriate and specific protections for vulnerable groups."

The full Statement can be found on the Ofcom website - see Related Items.

Advice for Businesses

A starter pack for businesses (https://www.ofcom.org.uk/advice-for-businesses/inexperienced-digital-users)

Knowing your rights (https://www.ofcom.org.uk/advice-for-businesses/knowing-your-rights)

Disabled business customers (https://www.ofcom.org.uk/advice-for-businesses/help-for-disabled-business-customers)

Read all our advice for businesses (https://www.ofcom.org.uk/advice-for-businesses)

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EXHIBIT GS-39

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Expanding the Economic and Innovation	)	GN Docket No. 12-268
Opportunities of Spectrum Through Incentive	)	
Auctions	)	

REPORT AND ORDER

Adopted: May 15, 2014 **Released: June 2, 2014**

By the Commission:

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Heading Paragraph #

I. INTRODUCTION

1. This Order adopts rules to implement the broadcast television spectrum incentive auction. The incentive auction is a new tool authorized by Congress to help the Commission meet the Nation's accelerating spectrum needs.[1] Broadcasters will have the unique financial opportunity in the "reverse

[1] *See* Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, §§ 6402 (codified at 47 U.S.C. § 309(j)(8)(G)), 6403 (codified at 47 U.S.C. § 1452), 126 Stat. 156 (2012) (Spectrum Act); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Notice of Proposed Rulemaking, 27 FCC Rcd 12357, 12368, paras. 25-26 (2012) (*NPRM*). The *NPRM* provided an overview of broadcast television and other services that occupy the broadcast television bands, the Commission's historical efforts to meet America's spectrum needs and Congress's call for more broadband spectrum in the Spectrum Act, as well as the statute's incentive auction provisions. *See id.* at 12362-72, paras. 11-34.

auction" phase of the incentive auction to return some or all of their broadcast spectrum usage rights in exchange for incentive payments.[2] By facilitating the voluntary return of spectrum usage rights and reorganizing the broadcast television bands, we can recover a portion of ultra-high frequency ("UHF") spectrum for a "forward auction" of new, flexible-use licenses suitable for providing mobile broadband services.[3] Payments to broadcasters that participate in the reverse auction can strengthen broadcasting by funding new content, services, and delivery mechanisms. And by making more spectrum available for mobile broadband use, the incentive auction will benefit consumers by easing congestion on the Nation's airwaves, expediting the development of new, more robust wireless services and applications, and spurring job creation and economic growth.

2. Our central objective in designing this incentive auction is to harness the economics of demand for spectrum in order to allow market forces to determine its highest and best use. We are also mindful of the other directives that Congress established for the auction, including making all reasonable efforts to preserve, as of the date of the passage of the Spectrum Act, the coverage area and population served of remaining broadcast licensees.[4] The auction affords a unique opportunity for broadcasters who wish to relinquish some or all of their spectrum rights, but we emphasize that a broadcaster's decision to participate in the reverse auction is wholly voluntary. We are committed to removing barriers to this voluntary participation. In particular, the reverse auction in which broadcasters will have the opportunity to return spectrum rights will be transparent and easy to participate in.[5] In the descending clock auction format we choose, for example, a broadcaster need only decide whether it is willing to accept one or more prices offered to it as the reverse auction proceeds; if at any point the broadcaster decides a price is too low, it may drop out of the reverse auction.[6] No station will be compensated less than the total price that it indicates it is willing to accept.[7]

3. The auction presents a once-in-a-lifetime opportunity for broadcasters, and we are committed to providing them with information about both our process and the financial opportunity the auction represents to enable them to make informed business decisions about whether and how to participate. We have conducted numerous workshops and other direct outreach efforts.[8] We also have developed the Learn Everything About Reverse Auctions Now ("LEARN") program to provide useful

[2] Spectrum Act § 6403(a)(1) (mandating "a reverse auction to determine the amount of compensation that each broadcast television licensee would accept in return for voluntarily relinquishing some or all of its broadcast television spectrum usage rights in order to make spectrum available for assignment through a system of competitive bidding under subparagraph (G) of section 309(j)(8) of the Communications Act of 1934, as added by section 6402."); *see* § IV.B (Reverse Auction).

[3] Spectrum Act § 6403(c)(1) (A) (requiring the FCC to conduct a "forward auction" to assign licenses for the use of spectrum reallocated from broadcast television as part of the incentive auction); *see* § IV.C (Forward Auction).

[4] Spectrum Act § 6403(b)(2).

[5] *See* § IV.B (Reverse Auction).

[6] *See* § III.B.1 (Repacking Process Overview); Spectrum Act § 6403(b).

[7] *See* para. 453.

[8] *See, e.g., FCC Announces Panelists for September 30, 2013, Workshop on Issues Surrounding the Reassignment of TV Stations After the Incentive Auction*, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 13805 (2013); *FCC Announces Details for June 25, 2012 TV Broadcaster Relocation Fund Workshop*, GN Docket No. 12-268, News Release, 2012 WL 1965368 (rel. June 1, 2012); *FCC Announces Details for May 22, 2012 Channel Sharing Workshop*, GN Docket No. 12-268, News Release, 2012 WL 1524622 (rel. May 1, 2012). In addition, the Media Bureau conducted a series of webinars regarding the incentive auction for State Broadcasters Associations in 2011 and 2012. Moreover, representatives of the Media Bureau have spoken at a number of conferences about the incentive auction since the enactment of Spectrum Act, including, among others, National Association of Broadcasters (NAB) Shows, Association of Public Television Stations (APTS) Public Media Summits, and National Alliance of State Broadcasters Associations (NASBA) Winter Meetings.

information and resources.[9] We anticipate offering demonstrations of the auction bidding system, interactive tutorials, and other opportunities for broadcasters to familiarize themselves with the reverse auction application and bidding processes in advance of the reverse auction. We also recognize the importance of broadcasters that choose not to participate in the reverse auction. To free up a portion of the UHF spectrum band for new, flexible uses, Congress authorized the Commission to reorganize the broadcast television spectrum so that the stations that remain on the air after the incentive auction occupy a smaller portion of the UHF band.[10] The reorganization (or "repacking") approach we adopt will avoid unnecessary disruption to broadcasters and consumers and ensure the continued availability of free, over-the-air television service.

4. Ultimately, our actions will benefit consumers of telecommunications services. While minimizing disruption to broadcast television service, we seek to rearrange the UHF spectrum in order to increase its potential to support the changing needs of 21st Century consumers. We recognize that the same individuals may be consumers of television, mobile broadband—using both licensed and unlicensed spectrum—and other telecommunications services. To benefit such consumers, and consistent with the framework of the Spectrum Act, we have strived for balance in our decision-making process between television and wireless services, and between licensed and unlicensed spectrum uses.

5. We adopt a "600 MHz Band Plan" for new services in the reorganized UHF spectrum. By maximizing the spectrum's value to potential bidders through features such as paired five megahertz "building blocks," the Band Plan will help to ensure a successful auction. By accommodating variation in the amount of spectrum we recover in different areas, which depends on broadcaster participation and other factors, the Band Plan will ensure that the repurposing of spectrum for the benefit of most consumers nationwide is not limited by constraints in particular markets.[11] The Band Plan will promote competition and innovation by creating opportunities for multiple license winners and for future as well as current wireless technologies. Because it is composed of a single band of paired spectrum blocks only, our Band Plan also simplifies the forward auction design. We adopt for new licensees flexible-use service rules, and technical rules similar to those governing the adjacent 700 MHz Band, an approach that should speed deployment in the 600 MHz Band. Devices will be required to be interoperable across the entire new 600 MHz Band.

6. Our repacking methodology will ensure an efficient television channel assignment scheme while avoiding unnecessary disruption to broadcasters and consumers. Repacking presents a complex engineering problem that must be solved repeatedly during the course of the reverse auction bidding process: namely, how to determine which channels to assign to stations that will stay on the air, consistent with statutory requirements, as well as the technical requirements that we establish.[12] For the incentive auction to succeed, we need a methodology capable of solving the problem quickly and with certainty as the reverse auction bidding proceeds. Our repacking methodology will address these needs by simplifying the problem. During the reverse auction bidding process, provisional channel assignments that satisfy applicable requirements will be identified, ensuring that a feasible channel is available for every station that remains on the air. After the reverse auction bidding ends, final channel assignments will be optimized to strive for additional goals, such as minimizing relocation costs for broadcasters

[9] *See* http://www fcc.gov/learn.

[10] *See* Spectrum Act § 6403(b)(1) (requiring the FCC, in order to "mak[e] available spectrum to carry out the forward auction," to "evaluate the broadcast television spectrum," and authorizing it, "subject to international coordination . . . ," to "make such reassignments of television channels as the Commission considers appropriate" and "reallocate such portions of such spectrum as the Commission determines are available").

[11] Under this framework, we can generally make available for new uses the amount of spectrum we recover in most top markets, while offering different amounts in constrained markets (such as those that border Canada and Mexico) where we may recover less spectrum. *See* § III.A.2.d (Market Variation).

[12] *See* § III.B.1 (Repacking Process Overview).

assigned to new channels. This approach will meet the practical requirements of conducting a successful auction without sacrificing other objectives.

7. Our repacking approach will also fulfill Congress's mandate to use "all reasonable efforts to preserve," as of the date of the passage of the Spectrum Act, the coverage area and population served of each remaining broadcast licensee.[13] In particular, our approach will ensure that each station serves essentially the same viewers that it served before the incentive auction, and that no station causes more than a minimal (0.5 percent) amount of new interference to another station.[14] The statutory mandate covers facilities operating as of February 22, 2012, but we will extend the same protection to certain facilities authorized after that date, having determined that the benefits of doing so outweigh the potential costs to our flexibility in reorganizing the broadcast television spectrum.[15]

8. In addition to repurposing UHF spectrum for new licensed uses, the rules we adopt in this Order will make a significant amount of spectrum available for unlicensed use, a large portion of it on a nationwide basis.[16] Unlicensed devices complement licensed services, serve a wide range of consumer needs, and contribute tens of billions of dollars to our economy annually. To prevent harmful interference between licensed services, our 600 MHz Band Plan includes a number of guard bands, which we intend to make available for use by unlicensed devices. Moreover, we will allow unlicensed use of channel 37, and allow television white space ("TVWS") devices as well as wireless microphones to operate on any unused television channels following the incentive auction. We also intend to designate one unused channel in each area following the repacking process for shared use by wireless microphones and TVWS devices.

9. To facilitate broadcaster participation, we are striving for simplicity in designing the reverse auction. Broadcasters will be able to participate online through an easy-to-use computer interface. They will have several bid options, including relinquishing their licenses, moving to a lower band, and sharing a channel. The descending clock format to collect bids will enable broadcasters to gain information during the bidding, and will not require them to reveal how much compensation they ultimately would accept; they need indicate only whether they accept the opening price and—if so—any subsequent prices. If at any point a broadcaster decides prices are too low, it may drop out of the auction. No station will be compensated less than the total price that it indicates it is willing to accept. We will evaluate and select bids in conjunction with the repacking process, based on their potential impact on the recovery of spectrum and other factors. We will keep the identity of broadcasters that participate confidential, and that period of confidentiality will extend for two years after the incentive auction, except for winning bidders.[17]

10. For the incentive auction to succeed, the reverse auction and the repacking process must work seamlessly with the forward auction of new, flexible-use 600 MHz Band licenses. We are designing the forward auction for speed, so that reverse auction participants need not await its outcome for weeks or months. In particular, by conducting bidding for generic or interchangeable spectrum blocks rather than specific frequencies, we can condense the time required for bidding significantly. We establish a final stage rule to assure that the forward auction raises enough proceeds to satisfy the minimum proceeds

[13] *See* Spectrum Act § 6403(b)(2) (requiring "all reasonable efforts to preserve, as of the date of the enactment of this Act, the coverage area and population served of each broadcast television licensee, as determined using the methodology described in OET Bulletin 69").

[14] *See* § III.B.2 (Implementing the Statutory Preservation Mandate).

[15] *See* § III.B.3 (Facilities to Be Protected); Spectrum Act § 6403(b)(2).

[16] *See* § III.C (Unlicensed Operations).

[17] *See* § IV.B.1 (Reverse Auction Pre-Auction Process); Spectrum Act § 6403(a)(3) (requiring "all reasonable steps necessary to protect the confidentiality of Commission-held data of a licensee participating in the reverse auction . . . , including withholding the identity of such licensee until the [spectrum] reassignments and reallocations (if any) . . . become effective").

requirements that we establish, but bidding will continue as long as demand for wireless licenses in any area exceeds the number available in that area.[18] In the *Mobile Spectrum Holdings Report and Order* adopted today, we establish a market-based spectrum reserve in the forward auction designed to ensure against excessive concentration in holdings of low-band spectrum, and we adopt certain secondary markets limitations regarding 600 MHz Band licenses.[19]

11. Following the conclusion of the incentive auction, the transition to the reorganized UHF band will be as rapid as possible without causing unnecessary disruption. Television stations that voluntarily turn in their licenses or agree to channel share must transition from their pre-auction channels within three months of receiving their reverse auction payments.[20] The time required for stations reassigned to a new channel to modify their facilities will vary, so we will tailor their construction deadlines to their situations.[21] This approach will ensure that stations transition as quickly as their circumstances allow, and allow coordination of deadlines where, for example, one station must vacate a channel before another can begin operating on its new channel. No station will be allowed to operate on a channel that has been reassigned or repurposed more than 39 months after the repacking process becomes effective.[22] In other words, the repurposed spectrum will be cleared no later than 39 months after the effective date. Most new licensees should have access to 600 MHz spectrum well before then. Consistent with Congress's mandate, we also establish procedures to reimburse costs reasonably incurred by stations that are reassigned to new channels, as well as by multichannel video programming distributors to continue to carry such stations.[23]

12. As Congress recognized, the incentive auction and the transition that follows require coordination with our cross-border neighbors, Canada and Mexico.[24] Because of these common borders, the Commission has established processes and agreements to protect television and wireless operations in border areas from harmful interference. The FCC staff has used these processes to fully inform Canadian and Mexican officials regarding the incentive auction and, beginning in 2013, formed technical groups to meet routinely to plan for harmonious use of the reorganized UHF band following the incentive auction. Commission leadership has supplemented these efforts, meeting with their Canadian and Mexican counterparts to emphasize the need for and mutual benefits of harmonization. We are confident that the long and successful history of close cooperation with Canada and Mexico regarding the use of radio spectrum along our common borders will continue before, during, and after the incentive auction.

13. We intend to conduct the broadcast television spectrum incentive auction as soon as possible. We must proceed deliberately, however, as the auction will be the first of its kind. We also are committed to an open, transparent process with meaningful public input. The Commissioners and staff have engaged in significant public discourse throughout the course of this proceeding. In addition to the

[18] *See* § IV.C.2 (Forward Auction Bidding Process).

[19] *See Policies Regarding Mobile Spectrum Holdings*, WT Docket No. 12-269, Report and Order, FCC 14-63 (adopted May 15, 2014) (*MSH Report and Order*).

[20] *See* § V.C.2.b (Transition Procedures for Winning License Relinquishment and Channel Sharing Bidders).

[21] *See* § V.C.2.a (Construction Period for Stations with New Channel Assignments). We note that no broadcaster will be required to relocate its transmission facilities. Stations that are reassigned to new channels will have to modify their facilities to operate on the new channels, however.

[22] *See id*. Thirty-nine months includes the thirty-six month construction period provided under current FCC rules, plus three months between the effective date—when the repacking process results are announced—and the deadline for stations to file construction permit applications to modify their facilities.

[23] *See* Spectrum Act § 6403(b)(4)(A); § V.C.5 (Reimbursement of Relocation Costs).

[24] *See* Spectrum Act § 6403(b)(authorizing such reassignments of television channels as the Commission considers appropriate, and reallocation of such spectrum as it determines is available for reallocation, subject to international coordination along the border with Mexico and Canada).

usual comment and reply process, the record reflects more than 400 *ex parte* meetings, numerous public notices and workshops on specific incentive auction-related issues, and a series of Incentive Auction Task Force presentations at Commission open meetings, which have provided critical input for the decisions we make today. These decisions provide the essential framework for the incentive auction. But they will not, by themselves, enable us to implement the incentive auction. Based on the framework we establish today, we will develop the detailed procedures necessary to govern the auction process, which will be based on additional record input on the remaining, narrower set of important issues, such as auction design and issues arising from our decision to accommodate market variation in the 600 MHz Band Plan.[25]

14. Our experience with spectrum auctions over the past 20 years supports our conclusion that the public interest is best served by acting now to establish the basic framework for the incentive auction, and thereafter resolving discrete outstanding issues and adopting final auction procedures, through a process that allows additional public input and concludes well in advance of the auction itself. The Commission's past practice has been to first establish general rules governing spectrum license auctions in reports and orders, and then specific requirements through public notices that provide the opportunity for comment by interested parties, including on critical matters such as bid collection, assignment, and payment procedures and final stage rule. This approach has worked well, and a similar one is all the more necessary for the incentive auction due to its novelty and complexity. Consistent with this approach, today's Order determines many of the significant elements of the incentive auction, which are set forth in the following Executive Summary.

15. In the coming months, the Commission will solicit public input on final auction procedures by Public Notice ("*Incentive Auction Comment PN*" or "*Comment PN*"). This Public Notice will include specific proposals on crucial auction design issues such as opening prices, factors for setting reverse auction prices, and how much market variation to accommodate in the 600 MHz Band Plan. Well in advance of the auction, also by Public Notice, the Commission will resolve these implementation issues, and provide detailed explanations and instructions for potential auction participants ("*Incentive Auction Procedures PN*" or "*Procedures PN*").[26] We do not modify the Wireless Telecommunications Bureau's ("WTB" or "Wireless Bureau") well-established authority to adopt final auction procedures through a pre-auction public notice process.[27] Compared to our typical spectrum auctions, many aspects of the broadcast television spectrum incentive auction are unique, and in this proceeding we intend to establish certain procedures by Commission vote. The WTB may continue to establish final auction procedures in this proceeding concerning those matters that it typically handles under existing delegations of authority.

16. The Commission will resolve outstanding issues that fall outside the rubric of the *Comment PN* and the *Procedures PN*, including a methodology for preventing co- and adjacent channel interference between television and wireless services in certain areas, and proposals for an aggregate cap on interference to television stations in the repacking process,[28] through a separate process that will conclude in advance of decisions on the final auction procedures. The discussion that follows identifies such issues that are not being resolved in this Order and, where appropriate, delegates authority to one or more of the Commission's Bureaus and Offices to resolve those issues in accordance with our decisions.

[25] *See* §§ III.A.2.d (Market Variation), IV.A (Overview and Integration of the Reverse and Forward Auctions), IV.B.2 (Reverse Auction Bidding Process), IV.C.2 (Forward Auction Bidding Process).

[26] We refer generally to the "pre-auction process" in this Order, which includes the *Comment PN* and *Procedures PN*. We may seek comment on, and/or resolve, certain final auction procedures in separate public notices if doing so better conduces to the proper dispatch of business. *See* 47 U.S.C. § 154(j). Any such public notices will be released during the pre-auction process and well in advance of the auction.

[27] *See* 47 C.F.R. § 0.131(c).

[28] See § III.B.2.d (Preserving Population Served).

II. EXECUTIVE SUMMARY

17. *600 MHz Band Plan*. We adopt a 600 MHz Band Plan with specific paired uplink and downlink bands, comprised of five megahertz "building blocks." We find that specific uplink and downlink bands that support Frequency Division Duplex ("FDD") technologies are best suited for the new 600 MHz Band at the present time in light of current technology, the Band's propagation characteristics, and potential interference issues present in the Band; and that offering paired spectrum blocks will best facilitate the rapid deployment of networks, including by smaller carriers and new entrants. The uplink portion of the Band will begin at channel 51 (698 MHz) and expand downward, followed by a duplex gap and then the downlink portion of the Band. The Band Plan can accommodate variation in the amount of spectrum recovered in different geographic areas in order to prevent the "least common denominator market" from limiting the quantity of spectrum we can offer generally across the nation.[29]

18. In addition, the Band Plan we adopt incorporates technically reasonable guard bands, including the duplex gap, to prevent harmful interference between licensed services.[30] We adopt Partial Economic Areas ("PEAs") as the service area for the 600 MHz Band, finding that PEAs permit entry by providers that contemplate offering wireless broadband service on a localized basis, yet may be easily aggregated by carriers that plan to provide service on a larger geographic scale. Consistent with the Spectrum Act's directives, we also adopt "flexible use" service rules for the 600 MHz Band.[31]

19. *Repacking the Broadcast Television Bands.* In reorganizing the television bands to make spectrum available to carry out the forward auction, the FCC must "make all reasonable efforts to preserve, as of [February 22, 2012], the coverage area and population served of each broadcast television licensee, as determined using the methodology described in OET Bulletin 69 of the Commission's Office of Engineering and Technology" ("OET-69").[32] We interpret this mandate to require that we strive to preserve full power and Class A stations' existing service as of that date without sacrificing the objectives of the incentive auction. While we will use the methodology described in OET-69 to determine the coverage area and population served of each station, we must update the computer software and input values used to implement that methodology. Among other things, doing so will ensure that our software is capable of the rapid, complex calculations necessary to support the reverse auction and the repacking process, and that we are relying on the most accurate population and other data available. We will protect full power stations' coverage areas based on their "service areas,"[33] and protect the coverage areas of Class A stations, which do not have "service areas" under FCC rules or OET-69, based on their "protected contours."[34] Rather than merely attempting to preserve the same total population served by each station, we will make all reasonable efforts to preserve the same specific viewers it served as of

[29] If the 600 MHz Band Plan could not accommodate some market variation, we would be forced to limit the amount of spectrum offered across the nation to what is available in the most constrained market (the "least common denominator"), even if more spectrum could be made available in the vast majority of the country. *See* § III.A.2.d (Market Variation).

[30] *See* § III.A.2.e (Guard Bands). The size of the guard band between 600 MHz downlink and television depends on how much spectrum is repurposed through the incentive auction. The duplex gap will be 11 megahertz, and the potential size of the guard band between 600 MHz downlink and television is seven to 11 megahertz. If 84 megahertz or more is repurposed, there will be a three-megahertz guard band or bands between 600 MHz operations and channel 37. *See id.*; § III.D.1 (Channel 37 Services).

[31] *See* § VI.B.2 (600 MHz Band Service Rules); Spectrum Act § 6402 (granting incentive auction authority "to permit the assignment of new initial licenses subject to flexible-use service rules").

[32] Spectrum Act § 6403(b)(2).

[33] *See* § III.B.2.c (Preserving Coverage Area); 47 C.F.R. § 73.622(e); OET-69 at 1.

[34] *See* § III.B.2.c (Preserving Coverage Area); 47 C.F.R. § 73.6010.

February 22, 2012. We will not allow any channel assignments that, considered on a station-to-station basis, would reduce a station's population served by more than a *de minimis* (0.5 percent) amount.[35]

20. *Television Facilities to Be Protected in the Repacking Process.* As Congress required, we will protect full power and Class A facilities that already were operating pursuant to a license (or a pending application for a license to cover a construction permit) on February 22, 2012.[36] We also exercise our discretion to protect facilities in addition to those the statute requires us to protect, based on consideration of the potential impact on our flexibility in the repacking process and our auction goals, whether failing to protect would strand investment by broadcasters licensed on a primary basis, the loss of service to existing viewers, and the potential impact on the Class A service's digital transition. In particular, we will protect:

- the small number of new full power television stations that were authorized, but not constructed or licensed, as of February 22, 2012;
- full power facilities authorized in construction permits issued to effectuate a channel substitution for a licensed station;
- modified facilities of full power and Class A stations that were authorized by construction permits granted on or before April 5, 2013, the date the Media Bureau issued a freeze on the processing of certain applications; and
- minor change facilities authorized to implement Class A stations' mandated transition to digital operations.[37]

21. Except in very limited circumstances, we will limit discretionary protection to the above categories. We conclude that protecting other categories of facilities, including low power television ("LTPV") stations and television translator ("TV translator") stations, which are secondary in nature and are not entitled to protection from primary services under our current rules, would unduly constrain our flexibility in the repacking process and undermine the likelihood of meeting our objectives for the incentive auction. To help preserve the important services provided by LPTV and TV translator stations, we will open a special filing window for such stations that are displaced to select a new channel and will amend our rules to expedite the process for displaced stations to relocate. We also intend to initiate a rulemaking proceeding after the release of this Order to consider additional means to mitigate the potential impact of the incentive auction and the repacking process on LPTV and TV translator stations.

22. *Unlicensed Operations.* We will make the 600 MHz Band guard bands available for unlicensed use, thereby making spectrum available for unlicensed devices nationwide. Depending on the amount of spectrum repurposed through the incentive auction, we will make a total of 14 to 28 megahertz of guard band spectrum available for unlicensed use. In addition, we will make an additional six megahertz of spectrum available by allowing unlicensed use of channel 37 at locations where it is not in use by channel 37 incumbents, subject to the development of the appropriate technical parameters to protect the incumbent Wireless Medical Telemetry Service ("WMTS") and Radio Astronomy Service ("RAS") from harmful interference.[38] Following the incentive auction and the post-auction transition,

[35] We will resolve proposals for an additional, aggregate cap on interference to television stations through a separate process that will conclude in advance of decisions on the final auction procedures. *See* § III.B.2.d (Preserving Population Served).

[36] *See* § III.B.3 (Facilities to Be Protected); Spectrum Act § 6403(b)(2).

[37] *See* § III.B.3 (Facilities to Be Protected); In order to ensure that we have a largely static view of the facilities that will be protected in advance of the repacking process, we generally will limit our discretionary protection to facilities constructed and licensed on or before a Pre-Auction Licensing Deadline to be announced by the Media Bureau. We anticipate that the Public Notice will give stations at least 90 days prior notice of this deadline.

[38] *See* § III.C (Unlicensed Operations). We will initiate a separate rulemaking proceeding to establish technical rules for unlicensed operations in the guard bands and on channel 37.

TVWS devices may continue to operate on channels allocated and assigned for primary television services, consistent with our current rules.[39] We anticipate that there will be at least one channel not assigned to a television station in all areas at the end of the repacking process,[40] and we intend, after additional notice and opportunity for public input, to designate one such channel in each area for shared use by wireless microphones and TVWS devices. We expect a significant amount of spectrum to be available for continued TVWS use, particularly outside of the central urban areas of the largest television markets.[41] Any other unused television channels in a market following the incentive auction will also be available for TVWS device as well as wireless microphone use. We will initiate a rulemaking proceeding after the release of this Order to consider changes to our existing Part 15 rules to facilitate unlicensed use of the television bands, 600 MHz Band guard bands and channel 37.

23. *Other Services.* We will not relocate the WMTS or the RAS from channel 37. To protect these incumbent services from harmful interference, in the 600 MHz Band Plan we adopt guard bands between such services and any new wireless broadband services that may be deployed adjacent to channel 37. Furthermore, we will require coordination with existing RAS facilities so that any new wireless systems can be deployed to cover the broadest area possible with minimal impact to RAS observatories. We will continue to license fixed broadcast auxiliary service ("BAS") operations on a secondary basis in the post-auction TV bands.

24. We adopt measures to facilitate wireless microphone use of available spectrum in the reorganized UHF band. With regard to the 600 MHz Band guard bands, we will allow broadcasters and cable programming networks to operate licensed wireless microphones in a portion of the duplex gap, and permit users generally to operate wireless microphones in the guard bands on an unlicensed basis.[42] We will initiate a proceeding to adopt technical standards to govern these uses.[43] With regard to the remaining television spectrum, while there may no longer be two unused channels for wireless microphones in markets where those channels are currently used for that purpose, as noted above we intend to designate one unused channel in each area following the auction for use by wireless microphones and TVWS devices. We also revise our rules for co-channel operations in the post-auction television bands to expand the areas where wireless microphones may operate. We will continue to permit wireless microphone users of unused television channels to register to obtain needed protection from unlicensed TVWS devices on such channels through the TV bands database registration system, which we plan to improve to make protection more timely and effective. In a companion item that we adopt today, we extend to certain unlicensed wireless microphone users the rights of licensed wireless microphone users.[44] We will also initiate a proceeding in the near future to find additional spectrum for wireless microphone users in other spectrum bands in order to help address their long-term needs.

25. *Incentive Auction Process: Integration of the Reverse and Forward Auctions.* The reverse and forward auctions will be integrated in a series of stages. Each stage will consist of a reverse

[39] *See generally* 47 C.F.R. Part 15; § III.C (Unlicensed Operations).

[40] *See* III.C (Unlicensed Operations). For engineering reasons, there may be a few areas with no spectrum available in the television bands for unlicensed devices and wireless microphones to share.

[41] TVWS devices may continue to operate in portions of the UHF band that will be repurposed until a 600 MHz Band licensee commences operations, and in portions designated for guard band use.

[42] *See* § III.D.3 (Low Power Auxiliary Stations and Unlciensed Wireless Microphones). Wireless microphones may operate throughout the 600 MHz Band during the Post-Auction Transition Period. *See* § V.D.4 (Transition Procedures for Low Power Auxiliary Stations (LPAS) and Unlicensed Wireless Microphones).

[43] *See* § III.C (Unlicensed Operations).

[44] *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band*, WT Docket No. 08-166, WT Docket No. 08-167, ET Docket No. 10-24, Second Report and Order, __ FCC Rcd __ (2014) (adopted May 15, 2014) (*Wireless Microphones Second Report and Order*).

auction and a forward auction bidding process, and additional stages will be run if necessary. Prior to the first stage, the initial spectrum clearing target will be determined. Broadcasters will indicate through the pre-auction application process their willingness to relinquish spectrum usage rights at the opening prices. Based on broadcasters' collective willingness, the initial spectrum clearing target will be set. Then the reverse auction bidding process will be run to determine the total amount of incentive payments to broadcasters required to clear that amount of spectrum. The forward auction bidding process will follow the reverse auction bidding process. If the final stage rule is satisfied, the forward auction bidding will continue until there is no excess demand, and then the incentive auction will close. If the final stage rule is not satisfied, additional stages will be run, with progressively lower spectrum targets in the reverse auction and less spectrum for licenses available in the forward auction, until the rule is satisfied.

26. The final stage rule is a reserve price with two components, both of which must be satisfied. The first component requires that the average price per MHz-pop[45] for licenses in the forward auction meets or exceeds a certain price per MHz-pop benchmark. Alternatively, if the spectrum clearing target at a particular stage is greater than a spectrum clearing benchmark, then the first component will be met if the total proceeds of the forward auction exceed the product of the same price benchmark, the spectrum clearing benchmark, and the total number of pops for those licenses.[46] This alternative formulation will allow the auction to close if the incentive auction repurposes a relatively large amount of spectrum for wireless uses, even if the price per-MHz-pop is less than the benchmark price. The price and spectrum clearing benchmarks will be established by the Commission in the *Procedures PN*, after an opportunity for additional comment. The second component of the final stage rule requires that the proceeds of the forward auction be sufficient to meet mandatory expenses set forth in the Spectrum Act[47] and any Public Safety Trust Fund amounts needed in connection with FirstNet. If the requirements of both components of the reserve price are met, then the final stage rule is satisfied.[48]

27. *Reverse Auction Eligibility and Bid Options.* Full power and Class A station licensees will be eligible to participate in the reverse auction. They may bid to voluntarily relinquish the spectrum usage rights associated with station facilities that are eligible for protection in the repacking process. Licensees with pending enforcement matters whose bids may result in their holding no broadcast licenses may participate under a streamlined escrow approach that is consistent with current practice in the sales context. Bidders will have the three bid options specified by the Spectrum Act: (1) license relinquishment; (2) reassignment from a UHF to a VHF channel; and (3) channel sharing. UHF-to-VHF bidders may limit their bids to a high (channels 7 to 13) or low (channels 2 to 6) VHF channel. We will favorably consider post-auction waiver requests involving winning UHF-to-VHF and high-VHF-to-low-VHF bidders' technical operations. Bidders will have the additional option to bid for reassignment from a high VHF channel to a low VHF channel. Channel sharing bidders may propose licensed community changes if they cannot satisfy signal coverage requirements from their new transmitter sites, provided that

[45] The term "MHz-pop" is defined as the product derived from multiplying the number of megahertz associated with a license by the population of the license's service area.

[46] The operation of the final stage rule, including the alternative formulation of the first component, is explained in detail below in § IV.A (Overview and Integration of the Reverse and Forward Auctions). In the pre-auction process, we will consider whether to apply the final stage rule solely to "major markets" and, if so, how to identify such markets. This approach could significantly speed up the determination of whether the final stage rule is satisfied.

[47] The Spectrum Act requires that the forward auction generate proceeds sufficient to pay winning bidders in the reverse auction and cover relevant administrative costs of the auction and an estimate of relocation costs subject to reimbursement. *See* Spectrum Act § 6403(c)(2).

[48] We note that the first and second components are not cumulative: the auction need not raise sufficient proceeds to satisfy the first *plus* the second.

the new communities meet the same allotment priorities as the current ones and are located in the same Designated Market Areas ("DMAs").[49]

28. *Reverse Auction Pre-Auction Process.* Potential bidders will have to submit certified applications.[50] Consistent with the Spectrum Act, we will protect the identity of licensees that apply to participate in the reverse auction.[51] Specifically, we will maintain the confidentiality of information submitted by all licensees that apply to participate until the results of the reverse auction and the repacking process are announced. We will maintain the confidentiality of information on non-winning bids for an additional two years. Confidential information will include licensees' names, channels, call signs, facility identification numbers, network affiliations, and any other information necessary to protect licensees' identities.

29. Between the short-form application filing deadline and the announcement of the results of the reverse auction and the repacking process, all full power and Class A licensees will be prohibited from communicating directly or indirectly any reverse or forward auction applicant's bids or bidding strategies to any other full power or Class A licensee or forward auction applicant.[52] Recognizing that many broadcasters are not familiar with auction processes, we intend to make education regarding the pre-auction application process, including the scope of the prohibition of certain communications, an important part of our broadcaster outreach efforts.

30. *Reverse Auction Bidding Process.* We adopt a descending clock format for the reverse auction. In each bidding round, stations will be offered prices for one or more bid options and will indicate their choices at these prices. The prices offered to each station for options will be adjusted downward as the rounds progress in a way that accounts for the availability of television channels in different bands in the repacking process.[53] "Intra-round bidding" will enable bidders to indicate price levels (between the opening- and closing prices in a round) at which they would like to either choose different bid options or drop out of the auction and remain in their home bands. A station will continue to be offered prices for bid options until the station's voluntary relinquishment of rights becomes needed to meet the current spectrum clearing target. When all remaining active bidders are needed in this way, the reverse auction for the stage will end. If the final stage rule is satisfied in that stage, then the active bidders are winning bidders, and the price paid to each will be at least as high as the last price it agreed to accept.

31. *Forward Auction Pre-Auction Process.* At this time we adopt the same size-based bidding credits for the forward auction as the Commission applied in auctioning 700 MHz Band spectrum: 15 percent for small businesses (defined as entities with average annual gross revenues for the

[49] The Commission's television allotment priorities implement the policy goals of § 307(b) of the Communications Act. 47 U.S.C. § 307(b). *See* § IV.B.1.b.iii (Bid Options/Channel Sharing Bid).

[50] Potential channel sharers need not submit applications (only sharees), but must certify regarding their channel sharing agreements. "Sharer" refers to a licensee that agrees to share its channel with another licensee, but does not bid to relinquish spectrum usage rights to its channel in the reverse auction. "Sharee" refers to a licensee that bids to relinquish spectrum usage rights to its channel in the auction to share a different channel with another licensee.

[51] *See* Spectrum Act § 6403(a)(3) ("The Commission shall take all reasonable steps necessary to protect the confidentiality of Commission-held data of a licensee participating in the reverse auction . . . , including withholding the identity of such licensee until [the repacking process has] become effective . . . .").

[52] The prohibition will apply to all controlling interest holders in the licensee, and all directors and officers of the licensee. The prohibition will not apply to communications between (a) licensees that share a common controlling interest, director or officer (and between a licensee and a forward auction applicant that have similar overlapping interests) and (b) parties to a channel sharing agreement that is disclosed on a reverse auction application. *See* § IV.B.1.c (Confidentiality and Prohibition on Certain Communications).

[53] The more potential for interference a station has, the more assigning it a channel is likely to limit the availability of channels for other stations, increasing the likely value of its bid to voluntarily relinquish spectrum usage rights.

preceding three years not exceeding $40 million) and 25 percent for very small businesses (defined as entities with average annual gross revenues for the preceding three years not exceeding $15 million).[54] Soon we will initiate a separate proceeding to review our Part 1 designated entity rules. As part of that proceeding, we will consider whether any revisions made to the rules should apply to the incentive auction. Forward auction applicants will be subject to our existing Part 1 competitive bidding rules, with modifications we adopt today that, among other things, provide for the selection of generic licenses and prohibit communications with full power and Class A licensees during the auction process.

32. *Forward Auction Bidding Process.* We adopt an ascending clock auction format for the forward auction. Bidders will be able to bid for generic licenses in one or more categories. Intra-round bidding will be allowed. There will be a separate clock price for each category in each geographic area, and bidders will indicate the number of licenses that they demand at the current prices. The prices generally will rise from round to round, as long as the demand for licenses exceeds their availability. Bidders still demanding licenses when the clock prices stop rising in every license category in every area will become winners of those licenses, provided the final stage rule is satisfied. If the rule is not satisfied, those bidders will have an opportunity to make additional bids in an extended bidding round. Once the rule is satisfied, winners may indicate their preferences for frequency-specific licenses in an assignment round or a series of separate bidding rounds. Final license prices will reflect the winning bid amounts from the clock bidding rounds as well as any adjustments from the extended bidding and assignment rounds.[55]

33. *Completion and Effective Dates/Processing of Bid Payments.* Reverse and forward auction "completion," required for the repacking process to become effective,[56] will occur when the Commission publicly announces that the incentive auction has ended.[57] The repacking process will be "effective," triggering Commission authority to borrow up to $1 billion from the U.S. Treasury to use toward the payment of relocation costs, when the results of the reverse and forward auctions and the repacking process are announced. We anticipate that the completion and effectiveness announcements will occur simultaneously. As soon as the auction is complete and the repacking process effective, we anticipate borrowing some or all of the available $1 billion from the Treasury for reimbursement of relocation costs. We will share forward auction proceeds with licensees that relinquish rights in the reverse auction as soon as practicable following the successful conclusion of the incentive auction.[58]

34. *Post-Auction Transition*. A public notice will mark the effective date of channel reassignments based on the repacking process and specify any specific channel assignments for television stations that will continue to broadcast. Reassigned stations will have three months to file construction permit applications for any minor changes to their facilities necessary to operate on their new channels. Stations also may request alternate channels or expanded facilities on their new channels. Following the three-month application filing deadline, stations will have up to 36 months to transition to their new channels. Stations will be assigned deadlines within that period tailored to their individual circumstances. Stations may request extensions of time to construct their new facilities, but no station will be allowed to continue operating on a reassigned or reallocated channel more than 39 months after the repacking process becomes effective. Licensees that successfully bid to turn in their licenses or to share a channel will have three months from their receipt of auction proceeds to cease operations on their pre-auction

[54] *See* § IV.C.1.b (Bidding Credits).

[55] *See* § IV.C.2 (Forward Auction Bidding Process).

[56] Spectrum Act § 6403(f)(2).

[57] *See* § V.A (Auction Completion and Effective Date of the Repacking Process).

[58] *See* § V.B (Processing of Bid Payments). We will distribute auction proceeds as they become available.

channels. We also adopt transition requirements for LPTV and TV translator stations, BAS operations, wireless microphones and related services.[59]

35. *Reimbursement of Relocation Costs.* We adopt procedures to reimburse costs reasonably incurred by television stations that are reassigned to new channels in the repacking process, as well as by MVPDs to continue to carry such stations, from the $1.75 billion Reimbursement Fund established by Congress for that purpose.[60] Under these procedures, we intend to issue eligible stations and MVPDs an initial allocation of funds, in designated individual accounts in the United States Treasury, to cover the majority of their estimated costs. The funds will be available for draw down as expenses are incurred. Additional funds will be allocated as necessary prior to the three-year statutory deadline for all reimbursements. We delegate authority to the Media Bureau to establish a list of eligible expenses and estimated costs, and to calculate the amount of the allocations to eligible entities.[61] We adopt measures to minimize administrative burdens and to prevent waste, fraud, and abuse in the reimbursement process.

36. *Post-Auction Broadcast Regulatory Issues*. We will grandfather existing broadcast station combinations that otherwise would no longer comply with the media ownership rules as a result of the reverse auction. We concur with commenters that we should conduct extensive outreach to broadcasters, including minority- and female-owned broadcasters, to ensure that they are fully informed about the incentive auction. The Commission already has made significant efforts to inform broadcasters about the process, and we intend to continue and expand those efforts. To provide guidance to licensees interested in channel sharing and to promote certainty regarding channel sharing relationships following the incentive auction, we will require that channel sharing agreements include certain key provisions regarding licensee rights and responsibilities.[62]

37. *600 MHz Band Technical and Service Rules.* We adopt for new 600 MHz Band licensees flexible use service rules under Part 27 of our rules, and technical rules similar to those governing the adjacent 700 MHz Band in order to speed deployment while protecting incumbent 700 MHz Band licensees from harmful interference. We will require mobile devices to be interoperable across the entire 600 MHz Band. We will require new 600 MHz Band licensees to build out to 40 percent of the population in their service areas within six years and to 75 percent of the population by the end of their initial license terms of 12 years.[63] Subsequent license terms will be 10 years.

III. THE REORGANIZED UHF BAND

38. The current UHF band consists of 228 megahertz of spectrum divided into 38 six megahertz channels that are primarily licensed to broadcast television service.[64] In the Spectrum Act, Congress authorized the Commission to reorganize the UHF band so that the television stations that will remain on the air after the incentive auction occupy a smaller portion of the band, thereby freeing up a

[59] *See* § V.D (Transition Procedures for Other Services and Unlicensed Operations).

[60] *See* Spectrum Act § 6403(b)(4)(A); § V.C.5 (Reimbursement of Relocation Costs).

[61] In lieu of reimbursement, stations also may request service rule waivers to make flexible use of their spectrum in order to provide non-broadcast services, as long as they continue to broadcast at least one TV program stream. *See* Spectrum Act § 6403(b)(4)(B); *see* § V.C.5.e (Service Rule Waiver in Lieu of Reimbursement).

[62] *See* § VI.A.2 (Channel Sharing Operating Rules). We also address in § VI.A.2 termination and assignment or transfer of channel sharing licenses, sharing by stations operating on channels reserved for NCE operations, sharing between full power and Class A stations, the carriage rights of sharing stations, and other issues related to channel sharing relationships.

[63] If a licensee fails to meet its interim build-out benchmark, its initial license term will be shortened to 10 years. *See* § VI.B.2 (License Term, Performance Requirements, Renewal Criteria, and Permanent Discontinuance of Operations).

[64] *See NPRM*, 27 FCC Rcd at 12362-66, paras. 12-22.

portion of the band for new wireless uses.[65] The amount of repurposed spectrum depends on the outcome of the incentive auction. To carry out the auction, however, we must first establish a plan for licensing the repurposed spectrum. We have tailored our 600 MHz Band Plan to the unique challenges of the incentive auction and have made it flexible enough to work with a variety of different spectrum recovery scenarios.

39. In this Section, we begin by addressing in detail the 600 MHz Band Plan we adopt for licensing new wireless services in the reorganized UHF band.[66] We then address how we will reorganize or "repack" the spectrum that will continue to be used for broadcast television service. We also address the actions we are taking to make spectrum available for unlicensed devices in the reorganized UHF band. We then address other services in the reorganized band, including the incumbent services on channel 37, broadcast auxiliary service operations, and wireless microphones. Finally, we address the changes to the Table of Allocations that are necessary to implement the UHF band reorganization.

A. Band Plan for the New 600 MHz Band

1. Background

40. In the *NPRM*, the Commission recognized the unique challenges associated with creating a band plan from repurposed spectrum. In particular, neither the amount of spectrum available for assignment nor the specific frequencies available in each geographic area will be known in advance of the incentive auction.[67] Due to these challenges, the Commission did not propose a traditional band plan with designated frequencies and locations. Rather, it proposed a flexible band plan in which the uplink band would begin at channel 51 (698 MHz) and expand downward based on the amount of spectrum available to carry out the forward auction, and the downlink band would begin at channel 36 (608 MHz) and likewise expand downward ("Down from 51 and 36").[68] The Commission also sought comment on a number of alternative band plans, including the "Down from 51," "In from 51 and 21," and "Down from 51 TDD" band plans, that might address the challenges associated with creating a band plan, and invited commenters to propose their own plans.[69] The Commission proposed to incorporate a number of features into whichever band plan it adopted, such as licensing in five megahertz "building blocks" and offering licenses that accommodate both uplink and downlink operations.[70] The Commission also sought comment on the location of the specific band(s) under any of the plans proposed.[71]

41. The Commission identified five key policy goals that would guide the choice of a wireless band plan: utility, certainty, interchangeability, quantity and interoperability.[72] It proposed to achieve these goals by making spectrum blocks as technically and functionally interchangeable as

[65] *See* Spectrum Act § 6403(b)(1) (requiring the FCC, in order to "mak[e] available spectrum to carry out the forward auction," to "evaluate the broadcast television spectrum," and authorizing it, "subject to international coordination . . . ," to "make such reassignments of television channels as the Commission considers appropriate" and "reallocate such portions of such spectrum as the Commission determines are available").

[66] The technical and service rules for the 600 MHz Band are addressed below in § VI.B.

[67] *NPRM*, 27 FCC Rcd at 12401, para. 123.

[68] *NPRM*, 27 FCC Rcd at 12402, para. 126. The uplink band is a set of frequencies used for communication from a user device to the network. The downlink band is a set of frequencies used for communication from the network to a user device. Collectively, these are referred to as the "pass bands."

[69] *NPRM*, 27 FCC Rcd at 12420-23, paras. 177-84; *see also Wireless Telecommunications Bureau Seeks to Supplement the Record on the 600 MHz Band Plan*, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 7414, 7418-19 (2013) (*Band Plan PN*).

[70] *See NPRM*, 27 FCC Rcd at 12403-4, 12405, paras. 128, 131.

[71] *NPRM*, 27 FCC Rcd at 12406, para. 135.

[72] *NPRM*, 27 FCC Rcd at 12401-02, para. 125.

possible without limiting the Commission to offering the same amount of spectrum nationwide.[73] It proposed to retain the flexibility to accommodate "market variation," i.e., offering different amounts of spectrum in different geographic areas, to avoid the "least common denominator problem": limiting the amount of wireless spectrum available in most markets to the quantity that is available in constrained markets.[74]

42. The comments filed in response to the *NPRM* reflect strong support for a number of band plan features proposed in the *NPRM*. These include licensing in five megahertz building blocks;[75] offering paired blocks wherever possible;[76] auctioning "generic" rather than specific frequency blocks;[77] establishing guard bands that are technically reasonable to prevent harmful interference;[78] and offering blocks designated specifically for uplink and for downlink operations.[79] As explained further below, the 600 MHz Band Plan that we adopt in this Order incorporates all of these features. The comments reflect a lack of consensus on other band plan features, however, including on how and where to configure the uplink and downlink blocks, based on a number of technical concerns. These technical concerns include placing television stations between the 600 MHz uplink and downlink bands and the potential for intermodulation interference, the pass band[80] size that mobile device filters can support, mobile antenna bandwidth, and the potential for both harmonic interference and co-channel interference.[81]

[73] *NPRM*, 27 FCC Rcd at 12401-02, paras. 123-26; *see also NPRM*, 27 FCC Rcd at 12406, para. 136.

[74] *NPRM*, 27 FCC Rcd at 12406, para. 136.

[75] *See, e.g.*, CEA Comments at 18 ("[C]arriers have chosen to deploy networks using spectrum blocks that are multiples of 5 MHz in size even when their licenses encompass larger amounts of spectrum, because current standards contemplate the use of blocks that are a multiple of 5 MHz in size."); MetroPCS Comments at 19 ("MetroPCS strongly supports the use of 'building block' sized spectrum blocks . . . .").

[76] *See, e.g.*, CCA *Band Plan PN* Comments at 15 ("[T]he Commission should seek to maximize the amount of paired spectrum."); US Cellular *Band Plan PN* Reply at 15 ("[T]he Commission must strive to formulate a 600 MHz band plan that best maximizes the number of paired spectrum blocks made available in the forward auction.").

[77] *See, e.g.*, Ericsson Reply at 4 (the FCC should adopt fungible spectrum "building blocks" to ensure that specific bands are not more desirable than others); Mobile Future Reply at 5 ("[T]he Commission should auction 'generic' 5 MHz spectrum blocks . . . ."). In referring to "generic licenses" or "generic blocks" we are not referring to the actual licenses that will be assigned to winning bidders, but to standardized blocks of spectrum which will be used to represent quantities of licenses for a time during the bidding process. We emphasize that licensees will ultimately be assigned a license with a specific frequency assignment. *See* § IV.C.2.b (Bid Assignment Procedures: Determining Winning Bidders and Assigning Frequency-Specific Licenses).

[78] *See, e.g.*, Alcatel-Lucent Comments at 20 ("[I]t is necessary as a legal and practical matter that the Commission provide sufficient guard bands to ensure that licensed operations adjacent to those guard bands are not disadvantaged compared to licensed operations further away."); Comcast Comments at 21 ("[T]he Commission must adopt robust guard bands that ensure continued protection for licensees (both broadcast and wireless broadband) in the adjacent bands.").

[79] The vast majority of commenters support band plan proposals, such as the Down from 51 band plan, that use FDD technologies and designate specific spectrum bands for uplink and downlink operations. *See, e.g.*, AT&T Reply at 15-20; Ericsson Reply at 16; Motorola *Band Plan PN* Comments at 4; T-Mobile Reply at 37.

[80] As described above, the pass band comprises the uplink band and the downlink band.

[81] *See Federal Communications Commission Provides Additional Details about Workshop to Discuss the 600 MHz Band Plan*, GN Docket No 12-268, Public Notice, 28 FCC Rcd 5269 (2013). For a more comprehensive discussion of the technical issues raised in the record with respect to the band plan, *see* § VI.B.1 (Technical Rules) and the Technical Appendix.

43. On May 3, 2013, the FCC hosted a public workshop regarding these technical issues and the trade-offs associated with the various proposed band plans.[82] Many stakeholders expressed their support for a "Down from 51" band plan in which the uplink band would begin at channel 51 (698 MHz), followed by a duplex gap, and then the downlink band, but continued to express significant disagreement regarding critical features of such a band plan.[83] The Down from 51 proposals advocated by various commenters and workshop participants also raised questions about how to best accommodate market variation.[84] To address such questions, the Wireless Bureau issued a Public Notice seeking to supplement the record on how certain Down from 51 band plan variations can best accommodate market variation.[85] Commenters responding to this Public Notice remain divided on how best to accommodate market variation.[86] Although they continue to agree generally on a "Down from 51" band plan, they express a wide range of views[87] on critical features of the band plan, such as whether to place television stations between the downlink and the uplink pass bands to accommodate market variation,[88] the size of the pass bands,[89] and how much paired spectrum to offer.[90]

[82] At the workshop, a panel of FCC experts led a day-long roundtable discussion with stakeholders on how best to achieve the Commission's five policy goals in crafting a 600 MHz Band Plan. Interested parties discussed how best to address the technical challenges associated with creating a band plan, and compared various band plans. A transcript of the 600 MHz Band Plan Workshop is available at http://apps.fcc.gov/ecfs/document/view?id=7022421551 (*600 MHz Band Plan Workshop Transcript*). In addition, a video of the workshop is available at: www.fcc.gov/events/learn-workshop-600-mhz-band-plan.

[83] Such features included the size of the pass band, the utility of supplemental downlink spectrum, and the feasibility of placing TV in the duplex gap. *See generally 600 MHz Band Plan Workshop Transcript.*

[84] *Band Plan PN*, 28 FCC Rcd at 7415.

[85] *Band Plan PN*, 28 FCC Rcd at 7416-17.

[86] *Compare* NAB *Band Plan PN* Comments at 2 (". . . NAB favors the 'Down from 51 Reversed' proposal, which does not exacerbate the inherent challenges that accompany variability to the same degree as the alternate proposals.") *with* US Cellular *Band Plan PN* Reply at 3 ("Although some commenters have expressed interference concerns related to broadcasters operating within the uplink pass band in spectrum-constrained markets, the record reveals a general consensus that this interference potential could be successfully mitigated through technical and band plan solutions.") *with* Harris Broadcast *Band Plan PN* Reply at 5 (the Commission should "establish a uniform national band plan . . . [which is the] simplest way to avoid co-channel interference") *with* C Spire *Band Plan PN* Reply at 8 ("A TDD band plan provides the necessary flexibility the Commission will require and is the primary reason TDD, and not an FDD-based plan, should be used.").

[87] Parties have submitted no less than ten different "Down from 51" band plans into the record, which contain fundamental differences regarding the design of the 600 MHz Band Plan. *See* Alcatel-Lucent Comments at 12-18; AT&T Comments at 31-38; Ericsson Reply at 16-22; Intel Reply at 4-6; NCTA Reply, Att. at 25-30; Qualcomm Comments at 4-20; RIM *Band Plan PN* Comments at 11-14; Sprint Comments at 21-26; T-Mobile Comments at 10-13; Verizon Comments at 7-14. In addition, a number of commenters express support for a Down from 51 band plan, but propose significant modifications to the Down from 51 proposal in the *NPRM*. *See, e.g.*, Letter from Matt Larsen, FCC Committee Chair for WISPA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 2 (filed Jul. 11, 2013) (seeking 36 megahertz of contiguous white space spectrum).

[88] *Compare* T-Mobile *Band Plan PN* Comments at 3 ("[T]he technical concerns associated with accommodating broadcast operations . . . [between the downlink pass band and the uplink pass band] are, in our view, entirely manageable.") *with* CEA *Band Plan PN* Comments at 6-7 ("[A]llowing TV broadcast operations within the duplex gap will result in intermodulation products that will cause harmful interference to both broadcast and mobile wireless operations.").

[89] *Compare* Samsung *Band Plan PN* Reply at 3 ("If the pass band is larger than 25 MHz in the 600 MHz band, multiple duplexers may be needed. However, multiple duplexers will result in additional 1.2-1.7 dB implementation loss due to the switch between each duplexer.") *with* T-Mobile Reply at 18 ("[C]arriers can use the same antenna that supports a 25x25 MHz configuration to support a 35x35 MHz configuration with little or no performance degradation and few if any additional costs.").

2. Discussion

44. We conclude that the 600 MHz Band Plan we adopt best supports our central goal of allowing market forces to determine the highest and best use of spectrum, as well as our other policy goals for the incentive auction, including the Commission's five key policy goals for selecting a band plan.[91] The Band Plan enhances the economic value and utility of the repurposed spectrum by enabling two-way (paired) transmissions throughout this well-propagating "coverage band."[92] This approach also simplifies auction design by offering only a single configuration—paired blocks—which allows for maximum interchangeability of blocks, and enables limited market variation, thus avoiding a "least common denominator" problem.[93] It also provides certainty about the operating environment for forward auction bidders by establishing guard bands between television and wireless services in order to create spectrum blocks that are reasonably designed to protect against harmful interference. Further, the 600 MHz Band Plan promotes competition. By offering only paired blocks in a single band, and by licensing on a Partial Economic Area ("PEA") basis, the 600 MHz Band Plan will promote participation by both larger and smaller wireless providers, including rural providers, and encourage new entrants. Finally, the 600 MHz Band Plan, composed of a single, paired band, promotes interoperability and international harmonization.

45. The 600 MHz Band Plan we adopt consists of paired uplink and downlink bands offered in 5+5 megahertz blocks. The uplink band will begin at channel 51 (698 MHz), followed by a duplex gap, and then the downlink band. We will license the 600 MHz Band on a geographic area license basis, using PEAs. Further, we will accommodate market variation: specifically, we will use the 600 MHz Band Plan in all areas where sufficient spectrum is available; and in constrained markets where less spectrum is available, we may offer fewer blocks, or impaired blocks,[94] than what we offer generally in the 600 MHz Band Plan.[95] Finally, we establish technically reasonable guard bands to prevent harmful interference and to ensure that the spectrum blocks are as interchangeable as possible.[96]

(Continued from previous page)

[90] If we can repurpose 120 megahertz of spectrum, Ericsson proposes pairing 90 megahertz of spectrum while Verizon advocates for only 70 megahertz of paired spectrum. *Compare* Ericsson Reply at 18-21 *with* Verizon Comments at 7-11.

[91] *NPRM*, 27 FCC Rcd at 12401-02, para. 125.

[92] Many commenters mention that the superior propagation characteristics of the 600 MHz Band make it an ideal "coverage band," i.e., a band in which a wireless provider can use fewer base stations to cover its service area. *See, e.g.*, RIM Comments at 8; CCA Comments at 7. In contrast, higher band frequencies have relatively poor propagation, making them less suitable for providing coverage but offer advantages to carriers seeking to expand capacity because many radio components, such as filters and antenna, can support larger absolute bandwidths at higher frequencies. *See, e.g.*, Letter from Tamara Preiss, Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed Jul. 17, 2013)(discussing propagation characteristics of higher frequency bands).

[93] *See* § III.A.2.d (Market Variation).

[94] Impaired blocks are blocks in which, due to remaining broadcast TV stations that may need to be protected against harmful interference in parts of the licensee's service area, the licensees may not be able to use the entire license area. *See* § III.A.2.d (Market Variation).

[95] As discussed below, we intend to determine the threshold at which a "near nationwide amount" is sufficient to trigger a specific band plan scenario in the pre-auction process that follows this Order. In that pre-auction process, we will determine not only the threshold but how to measure the "near nationwide amount," e.g., by percentage of total population or geographic markets. *See* § III.A.2.d (Market Variation).

[96] As discussed in § IV.C.2.b (Forward Auction – Bid Assignment Procedures: Determining Winning Bidders and Assigning Frequency-Specific Licenses), although we plan to conduct bidding for generic blocks in the forward auction, we will assign specific frequencies in the assignment round. Further, we may offer different categories of paired licenses to reflect any license impairments.

46. Because we will not know the exact number of blocks licensed or their frequencies until the incentive auction concludes, the 600 MHz Band Plan we adopt today represents a framework for how to license the repurposed spectrum. The Technical Appendix sets forth each of the specific 600 MHz Band Plan scenarios based on the number of television channels cleared;[97] ultimately, the repurposed spectrum will be licensed according to one of these scenarios. We do not create a scenario for fewer than two sets of paired blocks or more than 12 sets of paired blocks. With respect to the former, the costs outweigh the benefits of offering only one set of paired blocks, given that we would need to clear five television channels in this scenario. We also decline to create scenarios for more than 12 sets of paired blocks, i.e., using more than a 144 megahertz clearing target.[98]

47. Further, we emphasize that we may not offer each scenario listed in the Technical Appendix in the forward auction, depending on the spectrum clearing targets we employ as part of the incentive auction.[99] We plan to address in further detail the scenarios associated with specific clearing targets (i.e., number of spectrum blocks offered at each stage) and how we will determine which specific scenarios to offer in the forward auction in the *Comment PN* and *Procedures PN*.[100] We show below two examples of the 600 MHz Band Plan scenarios set forth in the Technical Appendix.[101]

Figure 1. 84 megahertz scenario

Figure 2. 126 megahertz scenario

48. In the first example, 84 megahertz of television spectrum is repurposed. A total of seven 5+5 megahertz paired blocks are licensed for new, flexible use. An 11 megahertz guard band or "duplex gap" protects against harmful interference between 600 MHz uplink and downlink services, and a three megahertz guard band protects against harmful interference between 600 MHz downlink services and channel 37. Channel 37 itself, along with the three megahertz guard band, serves as a guard band between 600 MHz downlink services and television services, which occupy the UHF spectrum down from channel 36 down. In the second example, 126 megahertz of television spectrum is repurposed. Ten 5+5 megahertz paired blocks are licensed for new, flexible use. The duplex gap is 11 megahertz, there are three megahertz guard bands on either side of channel 37, and a nine megahertz guard band between 600 MHz downlink services and television services, which occupy the UHF spectrum from channel 29 down.

a. All-Paired, Down From 51 Band Plan

49. *Background*. In the *NPRM*, the Commission proposed to establish specific uplink and downlink bands that would generally be paired[102] to reduce potential interference with adjacent operations and to minimize interference between wireless operations.[103] The Commission sought comment on band

[97] *See* Technical Appendix § III (Band Plan).

[98] In fact, commenters generally focus on band plans of 120 megahertz or less. *See, e.g.*, Ericsson Reply at 18-21.

[99] *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions).

[100] *See* § I (Introduction).

[101] *See* Technical Appendix §§ III.B.6 (Seven Sets of Paired Blocks (84 megahertz repurposed)), III.b.9 (Ten Sets of Paired Blocks (126 megahertz repurposed)).

[102] The Commission contemplated using downlink only blocks to accommodate market variation in its original band plan proposal. *See NPRM*, 27 FCC Rcd at 12407-09, paras. 138-143.

[103] *NPRM*, 27 FCC Rcd at 12406, para. 135.

plans that fall into two categories: (1) "split" band plans, in which the uplink and downlink bands are separated by other services in addition to the duplex gap;[104] and (2) a contiguous "Down from 51" band plan, in which contiguous spectrum would be repurposed starting at channel 51 and expanding downward.[105] It also invited commenters to propose their own band plans.[106]

50. In the *Band Plan PN*, the Wireless Bureau sought additional feedback on the band plans, and in particular, how to implement certain variations of the Down from 51 band plan in order to accommodate market variation in constrained markets.[107] Under the "Down from 51 Reversed" band plan, the downlink band would begin after a guard band at channel 51 (698 MHz), followed by a duplex gap, and then the uplink band.[108] Under the "Down from 51 with TV in the Duplex Gap" variation, the uplink band would start at channel 51, followed by a duplex gap, and then the downlink band. Some television stations would be placed adjacent to the uplink band (and the duplex gap) in geographic areas where less spectrum is available (i.e., in constrained markets).[109] The Commission also sought further comment on whether it should permit Time Division Duplex ("TDD") operations in the repurposed spectrum.[110]

51. *Discussion.* We adopt the 600 MHz Band Plan with paired uplink and downlink bands, which will enhance the value of the 600 MHz Band, consistent with our central goal for the incentive auction. Commenters overwhelmingly support this approach.[111] The few commenters who oppose using paired spectrum blocks support adopting a TDD-only band plan, which does not require separate uplink and downlink spectrum bands.[112] We are unpersuaded that the benefits these commenters assert for allowing TDD technology in the 600 MHz Band—broad global adoption,[113] improved spectrum

[104] The split band plans include the "Down from 51 and 36" and "In from 51 and 21" band plans. *NPRM*, 27 FCC Rcd at 12402, 12422-23, paras. 126, 181. Under these "split" band plans, the uplink and downlink bands would not be adjacent to one another (separated by a duplex gap) unless we could repurpose at least 168 megahertz of spectrum.

[105] Under the "Down from 51" band plan, the uplink band would begin at channel 51, followed by a duplex gap, and then the downlink band. *NPRM*, 27 FCC Rcd at 12421, para. 178. Depending on the quantity of repurposed spectrum, the downlink band could be situated on both sides of channel 37. The TDD variation of the Down from 51 band plan requires no duplex gap. *See Band Plan PN*, 28 FCC Rcd at 7418-19.

[106] *NPRM*, 27 FCC Rcd at 12420, para. 177. In response, numerous commenters submitted their own band plan proposals, many of which are variations on these general frameworks. *See, e.g.*, Alcatel-Lucent Comments at 12-18; AT&T Comments at 31-40; Ericsson Reply at 16-29; Intel Reply at 4-6; NCTA Reply, Att. at 25-30; Qualcomm Comments at 4-20; RIM *Band Plan PN* Comments at 11-14; Sprint Comments at 21-26; T-Mobile Comments at 10-13; Verizon Comments at 7-14.

[107] *Band Plan PN*, 28 FCC Rcd at 7415-16.

[108] *Id.* at 7416.

[109] *Id.* at 7418. This variation differs from some commenter-proposed "Down from 51" band plans, which accommodate constrained markets by limiting the location of full power TV stations in channels 38-51. *See, e.g.*, Qualcomm Comments at 18 n.28 (recommends that only LPTV stations operate in the duplex gap).

[110] *Band Plan PN*, 28 FCC Rcd at 7418-19; *see also NPRM*, 27 FCC Rcd at 12423, paras. 183-84.

[111] *See, e.g.*, AT&T Comments at 18-19, Exh. A at 26; CCA Comments at 13; CEA Comments at 20; C Spire Comments at 6-7; Ericsson Reply at 17; Google/Microsoft Comments 32-34; Leap Comments at 5-6; MetroPCS Comments at 21; Mobile Future Reply at 5; Motorola Comments at 10; RIM Comments at 8; US Cellular Reply at 17-19; Verizon Comments at 6.

[112] *See* Sprint Comments at 22; C Spire *Band Plan PN* Comments at 3-8.

[113] Sprint Comments at 18. Sprint asserts that "significantly more bidirectional traffic is transmitted worldwide via TDD than via paired spectrum allocations." *But see* AT&T *Band Plan PN* Comments at 10 (stating that there is a "paucity of current TDD operations in the United States").

efficiency,[114] and more dynamic use of communications channels[115]—are sufficiently advantageous to adopt an unpaired, TDD framework for the 600 MHz Band. For example, although TDD operations do not require a duplex gap, TDD operations use five to 10 percent of their spectrum capacity as overhead for time domain duplex guard time intervals,[116] and therefore, are not necessarily more efficient than FDD operations.[117] Further, T-Mobile states that TDD has link budget constraints,[118] resulting in less uplink coverage at the cell edge than an FDD system.[119] Based on our examination of the record, FDD is better suited for the 600 MHz Band at the present time in light of current technology, the Band's propagation characteristics, and potential interference issues present in the Band. Therefore, we decline to adopt a TDD-based band plan.

52. We also decline to allow a mix of TDD and FDD use in the 600 MHz Band, because, as several commenters indicate, allowing both FDD and TDD operations in the 600 MHz Band would require additional guard bands and increase the potential for harmful interference both within and outside the Band.[120] We emphasize that our determination regarding the suitability of an unpaired, TDD framework is limited to the decision before us. Different characteristics of other bands, or advances in technology, may make an unpaired, TDD-compatible framework appropriate in other circumstances.

53. Although most commenters support our decision to offer paired spectrum blocks,[121] the record diverges on how to offer spectrum blocks if we can repurpose more than 84 megahertz, i.e., how to offer 600 MHz licenses below channel 37. Some commenters suggest that it would be beneficial to offer downlink-only blocks[122] because of the asymmetrical nature of broadband traffic patterns.[123] Other

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[114] C Spire *Band Plan PN* Comments at 7.

[115] Clearwire Comments at 6-8.

[116] RIM *Band Plan PN* Comments at 9-10 ("In a typical TDD system, transmit and receive intervals must be isolated by an amount of time equivalent to the transit time of radio signals for the largest cell size used by the system. This is the functional equivalent of the duplex gap in the FDD frequency space and represents a similarly unusable portion of the spectrum resource.").

[117] Further, although the duplex gap will not be used for licensed services under the 600 MHz Band Plan that we adopt, unlicensed operations will be permitted in the duplex gap so the spectrum will not lie fallow. *See* § III.C.2.b (Guard Bands). In addition, although TDD allows for tailored use of the communications channel, coordination and synchronization is required (unlike for FDD, which has dedicated uplink and downlink channels), which could delay deployment of service in the 600 MHz Band. T-Mobile Reply at 38.

[118] Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, at 1 (filed Sept. 23, 2013) (T-Mobile Sept. 23, 2013 *Ex Parte* Letter).

[119] T-Mobile Sept. 23, 2013 *Ex Parte* Letter, Att. at 4. T-Mobile argues that TDD is better suited for a band used primarily for capacity rather than the 600 MHz Band, which may be valued for coverage due to its propagation characteristics. *See also id*. at 2 (Explaining that the "greatest benefit of 600 MHz is its coverage characteristics" while TD-LTE is a better option in "capacity limited environments").

[120] *See, e.g.*, AT&T Comments at 19; Ericsson Reply at 16; Motorola *Band Plan PN* Comments at 4; T-Mobile Reply at 37. Indeed, even those commenters supporting TDD would prefer an all-paired FDD approach over a mixed FDD/TDD approach, given these complexities. *See* Letter from Richard B. Engelman. Director – Spectrum Resources, Government Affairs for Sprint, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 3-4 (filed Jan. 7, 2014) (Sprint Jan. 7, 2014 *Ex Parte* Letter).

[121] *See, e.g.*, AT&T Comments at 18-19, Exh. A at 26; CCA Comments at 13; CEA Comments at 20; C Spire Comments at 6-7; Ericsson Reply at 17; Google/Microsoft Comments at 32-34; Leap Comments at 5-6; MetroPCS Comments at 21; Mobile Future Reply at 5; Motorola Comments at 10; RIM Comments at 8; US Cellular Reply at 17-19; Verizon Comments at 6.

[122] Downlink-only blocks consist of unpaired spectrum blocks in which a licensee can operate using that spectrum only pursuant to the technical requirements specified for downlink operations. Commenters in the record refer to these "downlink-only" blocks as "supplemental downlink." In the *NPRM*, the Commission proposed to offer

(continued….)

commenters note that offering downlink-only blocks creates an easy way to accommodate market variation by varying the amount of downlink offered in a given market.[124] Although we recognize that broadband traffic patterns are currently asymmetrical and offering downlink-only blocks is one way to accommodate market variation,[125] we agree with other commenters that the benefits of offering paired spectrum blocks are greater than the benefits of offering downlink-only blocks in the 600 MHz Band.[126] Further, although some argue that offering downlink-only blocks would mitigate antenna performance issues by creating two separate bands, such an approach would reduce the overall spectrum utility as a result of the necessary frequency separation.[127]

54. In order to repurpose this spectrum, we must enhance the spectrum's value to potential bidders, as well as serve the public interest, and we find that offering paired blocks rather than downlink-only blocks best achieves these goals. To effectively use 600 MHz downlink-only blocks, a provider must not only have available uplink spectrum to pair it with, but that spectrum ideally should be below 1 GHz in order to take advantage of the superior propagation characteristics of the 600 MHz Band that allow for increased coverage.[128] At the same time, some commenters state that aggregating 600 MHz spectrum with another band below 1 GHz presents technical challenges; consequently, in practice, wireless providers may choose to aggregate 600 MHz downlink-only blocks with a high spectrum band, thus negating some of the coverage benefits of the 600 MHz Band that would be realized from using paired 600 MHz blocks.[129] Further, we agree with commenters that argue that paired blocks are more valuable than downlink-only blocks to new entrants.[130] Recent auctions also suggest that paired spectrum is more valuable to bidders than unpaired blocks.[131]

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unpaired downlink spectrum that could serve as supplemental downlink expansion for FDD operations. *NPRM*, 27 FCC Rcd at 12405, para. 133.

[123] *See, e.g.*, Alcatel-Lucent Comments at 25-27; CEA Comments at 20; Qualcomm *Band Plan PN* Comments at 9-11.

[124] Samsung *Band Plan PN* Reply at 3. *See also* AT&T Comments at 49-51; Qualcomm Comments at 16-18; T-Mobile Comments at 12. In addition, AT&T argues that by keeping uplink spectrum closer to the 700 MHz Band and using the lower portion of the 600 MHz Band for supplemental downlink reduces many interference risks. AT&T Reply at 15-16.

[125] As described in the Market Variation Section, we will determine precisely how we will accommodate market variation in a subsequent item after an additional opportunity for public input. *See* § III.A.2.d (Market Variation). Depending on how we choose to repack remaining television stations in the 600 MHz Band, we may offer impaired 600 MHz licenses that limit a licensee's use of either the uplink or downlink block, or both, in a specific license.

[126] *See, e.g.*, CCA *Band Plan PN* Comments at 15; CEA Comments at 20.

[127] *See* Technical Appendix § II.B (Mobile Antenna Considerations).

[128] *See, e.g.*, DISH *Band Plan PN* Reply at 3 ("Designating a portion of the 600 MHz band exclusively as SDL is an inefficient use of the spectrum given that it needs to be paired with other low-band uplink spectrum in order to fully utilize the 600 MHz spectrum's superior propagation characteristics."); *see also* T-Mobile *Band Plan PN* Reply at 10 (noting the "favorable propagation characteristics at 600 MHz . . . allow base stations to be separated farther apart"); Sprint Jan. 7, 2014 *Ex Parte* Letter at 1-2 ("Similarly, Sprint has opposed band plans that would result in large amounts of supplemental downlink (SDL), as that outcome would likely depress spectrum values and thus prospective auction revenue, while unduly advantaging carriers that have spectrally-proximate low-band spectrum to pair with it."). Many commenters mention that the superior propagation characteristics of the 600 MHz Band make it an ideal coverage band. *See, e.g.*, CCA Comments at 7.

[129] *600 MHz Band Plan Workshop Transcript* at 226-30.

[130] *See, e.g.*, T-Mobile Reply at 5; US Cellular *Band Plan PN* Reply at 13-15.

[131] *See Auction of 700 MHz Band Licenses Closes; Winning Bidders Announced for Auction 73*, Public Notice, 23 FCC Rcd 4572 (2008) (where paired, 700 MHz Lower A Block licenses garnered more than three times the revenue of unpaired, 700 MHz Lower E Block licenses). Results from recent international auctions also support this view.
(continued….)

55. We also agree with commenters that assert that offering downlink-only blocks in the 600 MHz auction may undermine competition. Because providers must pair downlink-only blocks with existing spectrum holdings, new entrants would not be able to use downlink-only blocks, thus limiting their utility.[132] In contrast, offering paired spectrum blocks will benefit all potential 600 MHz Band licensees. We also agree with commenters that assert that paired blocks will facilitate the deployment of networks by smaller carriers and new entrants by allowing them to obtain much-needed low frequency, paired spectrum.[133]

56. Further, offering downlink-only blocks would further complicate the auction design without a commensurate benefit. As explained above, downlink-only blocks are less valuable than paired blocks to bidders, and offering both paired and unpaired blocks would introduce additional differences among licenses in the forward auction and increase the amount of time the auction takes to close. As discussed in the *NPRM*, the Commission expressed the desire to offer generic blocks in order to reduce the time and, therefore, the cost, of bidder participation.[134]

57. Finally, our all-paired band plan generally has nationally consistent blocks and guard bands,[135] which will promote interoperability.[136] In contrast, offering downlink-only blocks could exacerbate interoperability concerns by separating the 600 MHz Band into two bands. If we license both unpaired and paired blocks, we would expect that the industry standards body would create separate bands for the paired blocks and unpaired blocks, as it has done previously.[137] If the 600 MHz Band were split into two separate bands, then some devices could support part, but not all, of the Band. Further, US Cellular raises concerns over the potential for wireless carriers using downlink-only blocks to configure their networks so as to create barriers to roaming.[138] Limiting the auction to paired blocks will help to

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See also Industry Canada: 700 MHz Spectrum Auction-Process and Results (available at http://news.gc.ca/web/article-en.do?nid=816869) (last visited Apr. 10, 2014); Ofcom (UK) 4G Auction Results (available at http://consumers.ofcom.org.uk/4g-auction/) (last visited Apr. 10, 2014).

[132] US Cellular *Band Plan PN* Reply at 13-15; Clearwire *Band Plan PN* Comments at 5-6.

[133] As MetroPCS explains: "[a]s a new entrant, having both uplink and downlink spectrum is an obvious necessity, and auctioning spectrum in unpaired blocks risks discouraging new entrants from bidding in the auction, lest they become stranded with a lone block of uplink or downlink spectrum." MetroPCS Comments at 21. *See also* C Spire Comments at 6-7; T-Mobile Reply at 5.

[134] *NPRM*, 27 FCC Rcd at 12378, para. 61.

[135] As discussed further in the § III.A.2.d (Market Variation), we will determine precisely how to offer licenses in constrained markets in the pre-auction process that follows the Order.

[136] In addition, uniform nationwide guard bands that are generally consistent across markets will allow for the most robust deployment of unlicensed networks and products. *See, e.g.*, CCIA Comments at 7 ("the U.S. economy needs the substantial, uniform, and nationwide allocation of spectrum for unlicensed use"); Google/Microsoft Comments at 31 ("the NPRM wisely proposes to design the 600 MHz band plan to make a substantial amount of spectrum available for unlicensed uses, including a significant portion that would be available on a uniform nationwide basis."); WISPA Comments at 29 ("With a nationwide footprint [for unlicensed use], there will be even greater incentive for entrepreneurs and companies to create new products, services and applications that will fuel innovation and competition and benefit the economy, objectives that are consistent with the public interest.").

[137] 3GPP has adopted standards for paired and unpaired blocks but has not combined the two. *See* 3GPP TS 36.101 V12.3.0 (*3GPP RF UE Standard*) at 23 (Table 5.5-1), *available at* http://www.3gpp.org/ftp/Specs/archive/36_series/36.101/36101-c30.zip (last visited Apr. 23, 2014).

[138] Letter from Leighton T. Brown, Counsel for US Cellular, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed Jan. 6, 2014).

ameliorate these concerns. It will also promote international harmonization, and in particular, should help to address cross-border issues with Canada and Mexico.[139]

58. *"Down from 51" Approach.* We conclude that the "Down from 51" approach we adopt, with contiguous uplink and downlink bands starting at channel 51, will provide greater technical certainty because of its technical advantages over other options and, therefore, will enhance the value of the 600 MHz Band for bidders and serve the public interest. In particular, a contiguous band plan will reduce the antenna bandwidth[140] for 600 MHz devices, which in turn will reduce the cost and complexity of such devices.[141] As a result, we decline to adopt any of the band plans in which the uplink and downlink bands are "split" because the antenna bandwidth would be much greater.[142]

59. Further, by placing the 600 MHz uplink band next to the 700 MHz uplink band and adopting generally consistent technical rules for the 600 MHz and 700 MHz Bands, we improve spectrum efficiency.[143] This continuity should also speed deployment of the 600 MHz Band and make it easier to develop devices for it.[144] Further, placing the uplink pass band at the upper end of the 600 MHz Band limits the potential effects of both harmonic interference and intermodulation interference.[145] Starting the 600 MHz uplink band at channel 51 also clears television operations out of channel 51, which should help spur deployment of the 700 MHz lower A Block.[146] This approach will provide greater certainty to WMTS operators regarding their operating environment as well,[147] and will likely result in greater spectrum efficiency than placing uplink operations adjacent to channel 37.[148] This approach also

[139] *See* § III.B.4 (International Coordination).

[140] The antenna bandwidth is the frequency separation between the highest and lowest frequencies over which the antenna meets a given performance threshold.

[141] As discussed in the Technical Appendix § II.B (Mobile Antenna Considerations), reducing the antenna bandwidth will reduce the cost and complexity of developing 600 MHz Band devices. If we repurpose a large amount of spectrum, however, the mobile antenna design issues will not prevent wireless providers from utilizing all of the repurposed spectrum.

[142] *See NPRM*, 27 FCC Rcd at 12422, para. 181.

[143] As described in § III.A.2.e (Guard Bands), no guard band is required between the 600 MHz uplink band and the 700 MHz uplink band, thus improving spectrum efficiency. Commenters generally oppose the Down from 51 Reversed plan because it requires an extra guard band between the 600 and 700 MHz Bands. *See, e.g.*, CEA *Band Plan PN* Comments at 4; Mobile Future *Band Plan PN* Comments at 3-4.

[144] *See, e.g.*, Qualcomm *Band Plan PN* Comments at 2 ("the straight DF51 band plan can be successfully and most readily integrated into existing smartphone and tablet form factors").

[145] Commenters argue that keeping the uplink farther up in the 600 MHz Band and will limit the possibility of harmonics interference. *See, e.g.*, AT&T *Band Plan PN* Comments at 7; Qualcomm *Band Plan PN* Comments at 4-7. *See* Technical Appendix § II.D (Harmonic Interference).

[146] Some Lower 700 MHz A Block licensees are unable to fully deploy wireless networks throughout their service area because they must protect incumbent television broadcast operations on channel 51. *See Promoting Interoperability in the 700 MHz Commercial Spectrum*, WT Docket 12-69, Report and Order and Order of Proposed Modification, 28 FCC Rcd 15122, 15152, para. 65 (2013) (*700 MHz Interoperability R&O*).

[147] As discussed in the Technical Appendix, although mobile handsets transmit at a lower power than mobile base stations and DTV broadcast towers, they may operate anywhere, including inside healthcare facilities, very close to WMTS equipment. The resulting in-hospital field strength of the mobile handsets could be greater than that of DTV broadcast facilities or a wireless base station, thus causing interference to WMTS equipment. *See* Technical Appendix § II.E.2 (Potential for Interference between 600 MHz Downlink and WMTS). In addition, as mobile handsets vary their distance from WMTS equipment, their field strength is also likely to vary, which would increase the complexity of operating a WMTS system.

[148] Either broadcast television or wireless base stations (rather than mobile operations) will operate adjacent to channel 37. *See* Technical Appendix § III.B (Specific Band Plan Scenarios). We note that Ericsson asserts that the (continued….)

simplifies the incentive auction design, which is critical to its overall success. We therefore adopt the "Down from 51" approach and decline to adopt the "Down from 51 Reversed" band plan.[149]

60. Very few commenters criticize the Down from 51 approach that we adopt in our 600 MHz Band Plan.[150] DISH complains that the Down from 51 band plans that commenters propose limit paired spectrum to the portion of the 600 MHz Band above channel 37, thereby restricting "the amount of spectrum realistically available for smaller operators."[151] The approach we are adopting, however, involves paired spectrum only, including below channel 37, so it increases the amount of spectrum available for all wireless providers. We decline to adopt J. Pavlica's proposal to first license to wireless broadband providers the VHF channels in the 54-72 MHz and the 174-216 MHz bands (channels 2, 3, 4, 7, 8, 9, 10, 11, 12, and 13).[152] UHF spectrum above 300 MHz is better suited for wireless broadband service because of its propagation characteristics as well as its shorter wavelengths, which allow for smaller radio components including antennas and filters.[153] In addition, the Spectrum Act limits the Commission's ability to repack the VHF channels,[154] which would hamper our ability to repack efficiently if we were to adopt Pavlica's band plan.[155]

b. 5+5 MHz, Interchangeable Spectrum Blocks

61. *Background*. In the *NPRM*, the Commission proposed to license the 600 MHz spectrum in five megahertz "building blocks."[156] Recognizing that licensing wireless spectrum in five megahertz blocks repurposed from six megahertz television channels might lead to "remainder" spectrum,[157] the Commission proposed to incorporate any remainder spectrum into the guard bands.[158] It also sought comment on alternative ways to make use of the remainder spectrum.[159] In addition, the Commission

(Continued from previous page)
minimum guard band size necessary to protect WMTS "would be at least 6 MHz wide on either side of Channel 37 . . . wherever uplink mobile operation is present." Ericsson *Band Plan PN* Comments at 8.

[149] We also recognize the concerns of commenters that the Down from 51 Reversed band plan potentially creates some more challenging interference scenarios. Alcatel-Lucent *Band Plan PN* Comments at 4-6; AT&T *Band Plan PN* Comments at 3-4, 7-10; Ericsson *Band Plan PN* Comments at 4-11; NCTA *Band Plan PN* Comments at 4-6; Verizon *Band Plan PN* Comments at 4-6.

[150] *But see* DISH Reply at 2; J. Pavlica Comments at 3.

[151] DISH Reply at 2.

[152] J. Pavlica Comments at 3.

[153] *See* U.S. Gov't Accountability Office, GAO-11-352, Spectrum Management: NTIA Planning and Processes Need Strengthening to Promote the Efficient Use of Spectrum by Federal Agencies at 2 (2011), available at http://www.gao.gov/assets/320/318264.pdf ("The spectrum most highly valued generally consists of frequencies between 300 megahertz (MHz) and 3 gigahertz (GHz), as these frequencies have properties well suited to many important wireless technologies, such as mobile phones, radio, and television broadcasting.").

[154] *See* Spectrum Act § 6403(g).

[155] We also note that the bands J. Pavlica identifies consist of only 60 megahertz of spectrum. Therefore, we would potentially need to dedicate three different spectrum bands to wireless broadband service if we could repurpose more than 60 megahertz of spectrum, significantly complicating design of a new band plan.

[156] *NPRM*, 27 FCC Rcd at 12403-04, paras. 127-30.

[157] Because we are converting six megahertz broadcast channels into paired five + five megahertz wireless broadband channels, a certain amount of spectrum may be left over. Any leftover spectrum that cannot be grouped into a paired five + five megahertz block is called "remainder" spectrum. *NPRM*, 27 FCC Rcd at 12419-20, para. 175.

[158] *NPRM*, 27 FCC Rcd at 12419, para. 175. Specifically, zero to five megahertz of spectrum may remain in a given geographic market. *See* § III.A.2.e (Guard Bands).

[159] *NPRM*, 27 FCC Rcd at 12419-20, paras. 175-76.

sought comment on licensing in six megahertz increments (the size of television channels).[160] The Commission proposed auctioning interchangeable blocks of equal size to allow for enhanced substitutability among building blocks and to provide more flexibility in its auction design choices.[161] The Commission also sought comment on auction design options that would facilitate the aggregation of larger contiguous blocks composed of multiple five megahertz building blocks.[162]

62. *Discussion.* We adopt the proposal to license in five megahertz blocks, which commenters overwhelmingly support, because these "building blocks" will allow for the greatest amount of flexibility and efficiency in the 600 MHz Band Plan. Specifically, we find that five megahertz blocks: (1) are the most compatible with current and emerging technologies;[163] (2) may be easily aggregated to form larger blocks;[164] (3) will maximize the number of licensed blocks in each market;[165] and (4) will allow for diverse participation in the auction.[166]

63. We agree with commenters that five megahertz building blocks are most compatible with current wireless technologies.[167] For example, numerous commenters state that five megahertz building blocks are most compatible with several current and emerging wireless broadband technologies, including LTE, LTE-Advanced, High Speed Packet Access + ("HSPA+"), and W-CDMA.[168] Further, because many current wireless broadband technologies operate with five megahertz blocks or blocks that are multiples of five megahertz, this block size facilitates aggregation.[169] Commenters also support our view that five megahertz building blocks will maximize the number of licensed blocks in each market.[170] Finally, licensing in five megahertz building blocks will allow auction participation by small, midsize, regional, and national carriers.[171] As Leap notes, using the smaller five megahertz bandwidth blocks will promote flexibility and allow auction participation by diverse carriers, particularly smaller carriers who may not need such large swaths of spectrum.[172]

64. We decline to license the 600 MHz spectrum using six megahertz blocks, a proposal which no commenters support, and which several commenters oppose.[173] Using six megahertz blocks

[160] *NPRM*, 27 FCC Rcd at 12404, para. 129.

[161] *NPRM*, 27 FCC Rcd at 12419, para. 175.

[162] *NPRM*, 27 FCC Rcd at 12404, para. 130.

[163] *See, e.g.*, C Spire Comments at 6; Leap Comments at 5; RIM Comments at 6; Verizon Comments at 15.

[164] *See, e.g.*, Motorola Comments at 13; RIM Comments at 7; Verizon Comments at 16.

[165] *See, e.g.*, C Spire Comments at 6; Mobile Future Reply at 5; RIM Comments at 6-7.

[166] *See, e.g.*, Leap Comments at 5; MetroPCS Comments at 17; US Cellular Reply at 17.

[167] *See, e.g.*, CCA Comments at 12; CTIA Comments at 20; MetroPCS Comments at 20; T-Mobile Comments at 14-15.

[168] *See, e.g.*, AT&T Comments at 18 n.6; CEA Comments at 18; Mobile Future Reply at 5. *But see* Letter from Peter D. Keisler, Counsel for AT&T, to Marlene Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269 at 2 (filed May 7, 2014) (asserting that "a 10 x 10 MHz block of spectrum is the minimum amount necessary to take full advantage of the performance characteristics of modern LTE wireless technology.").

[169] *See, e.g.*, Motorola Comments at 13; RIM Comments at 6.

[170] *See, e.g.*, Leap Comments at 5; MetroPCS Comments at 20 (MetroPCS explains that five megahertz blocks will result in issuing more licenses than six megahertz building blocks would because "[f]or each 30 megahertz of spectrum reclaimed from broadcasters, the Commission can auction six licenses, as opposed to merely five."). *See also* CCA Comments at 12.

[171] 47 U.S.C. § 309(j)(3)(B). *See, e.g.*, MetroPCS Comments at 19; Leap Comments at 5.

[172] Leap Comments at 5.

[173] *See, e.g.*, CTIA Comments at 20; MetroPCS Comments at 20; RIM Comments at 6; Verizon Comments at 15.

would strand spectrum and reduce the number of new 600 MHz licenses because most FDD technologies support five megahertz blocks.[174] Similarly, using six megahertz blocks might lead to inefficient use of the spectrum as each six megahertz block would typically accommodate only one active five megahertz LTE channel.[175] Converting six megahertz channels into 5+5 megahertz 600 MHz licenses could, in contrast, create extra blocks to license.[176] As explained further below, because we adopt a 600 MHz Band Plan with paired uplink and downlink bands, we also decline to adopt Sprint's proposal to license the spectrum using ten megahertz blocks to accommodate its band plan proposal for TDD operations.[177]

65. We also adopt the proposal to incorporate "remainder" spectrum, i.e., any excess spectrum remaining after converting six megahertz television channels to paired, 5+5 megahertz 600 MHz licenses, into the 600 MHz Band guard bands to help prevent harmful interference between licensed services.[178] A majority of commenters supports this approach.[179] As discussed below, we find that including these remainders in the guard bands is the best approach to support a straightforward auction design and help bolster innovation and investment by unlicensed devices in the guard band spectrum.[180] We agree with Google and Microsoft that "[s]oliciting separate bids for the remaining small spectrum slivers in the simultaneous forward and reverse auction will introduce needless complexity to the auction process."[181]

66. In our 600 MHz Band Plan, we create interchangeable, "generic" categories of spectrum blocks by establishing guard bands and technical rules to ensure a like operating environment among different blocks. Creating spectrum blocks that are as functionally and technically interchangeable as possible enhances substitutability among blocks. Offering interchangeable spectrum blocks allows us to conduct bidding for generic blocks, assigning specific frequencies later, which will speed up the forward auction bidding process.[182] Commenters generally support the proposal to offer interchangeable blocks but emphasize the importance of making them truly interchangeable.[183] Some commenters suggest that

[174] *See, e.g.*, Verizon Comments at 15; CTIA Comments at 20 (confirms the Commission's assertions in the *NPRM* that six megahertz blocks do not precisely map onto the channel size used for most wireless broadband technologies currently in the market, and as a result, could reduce the number of blocks auctioned).

[175] RIM Comments at 5.

[176] *See NPRM*, 27 FCC Rcd at 12404, para. 129 n.207.

[177] Sprint Comments at 22.

[178] *See* § III.A.2.e (Guard Bands).

[179] *See, e.g.*, CCIA Comments at 2 (strongly supports proposal to add remainder spectrum to the guard band); Google Reply at 7-8 (argues that adding the remaindered spectrum to the guard band is a technically reasonable approach to avoiding harmful interference and will "enable unlicensed technologies to increase the utility of this otherwise hard-to-use spectrum."). Other commenters support this approach provided it comports with the Spectrum Act's requirements and maximizes the amount of paired spectrum auctioned. *See, e.g.*, MetroPCS Comments at 21; TIA Comments at 9-10.

[180] *See* § III.A.2.e (Guard Bands). We also find that adding these remainders to the guard bands results in a guard band size that is technically reasonable to prevent harmful interference. *Id.*

[181] Google/Microsoft Comments at 43.

[182] In referring to "generic licenses" we are not referring to the actual licenses that will be assigned to winning bidders, but to standardized blocks of spectrum which will be used to represent quantities of licenses for a time during the bidding process. We emphasize that licensees will ultimately be assigned a license with a specific frequency assignment, and to the extent that bidders desire a specific frequency to meet their particular business plans, winning bidders will have the opportunity to bid for specific frequency blocks before they are assigned their licenses. *See* § IV.C.2.b (Forward Auction – Assignment Procedures: Determining Winning Bidders and Assigning Frequency-Specific Licenses).

[183] *See, e.g.*, AT&T Reply at 54; Qualcomm Comments at 5.

we group the spectrum blocks into different classes and treat each class as a separate category.[184] As explained below, we adopt rules that will allow us to group generic blocks into separate categories of licenses for purposes of the forward auction bidding.[185]

67. We also conclude that it is important for wireless providers to be able to aggregate 600 MHz Band spectrum blocks. The ability to aggregate spectrum by obtaining multiple spectrum blocks in the same service area, or licenses in multiple service areas, affords potential bidders significant flexibility to meet their coverage and capacity needs in accordance with their business plans. Commenters overwhelmingly support allowing licensees to aggregate spectrum blocks.[186] Specifically, they encourage us to create an auction process that allows bidders to aggregate contiguous frequency blocks within a service area[187] or across geographic areas[188] using a variety of auction design mechanisms, such as assignment round rules.[189] Under our rules, licensees will be able to aggregate 600 MHz Band spectrum in the forward auction,[190] as well as after the auction.[191] As a result of these rules, wireless providers have the ability to aggregate spectrum to meet their business needs.

c. Geographic Area Licensing

68. *Background*. In the *NPRM*, the Commission proposed to license the 600 MHz Band using a geographic area licensing approach.[192] Specifically, it proposed licensing this spectrum using Economic Areas ("EAs"),[193] delineated by the Regional Economic Analysis Division, Bureau of Economic Analysis, U.S. Department of Commerce and extended by the Commission.[194] The Commission also noted the statutory requirement to consider assigning licenses using a variety of

[184] For example, Alcatel-Lucent and AT&T support different classes to account for the differences between paired spectrum blocks and downlink only spectrum blocks. Alcatel-Lucent Comments at 18-19; AT&T Comments at 42-43.

[185] *See* § IV.C.2.a (Forward Auction – Bid Collection Procedures: Auction Format, Generic License Categories, Etc.).

[186] *See, e.g.*, CCA Comments at 12 (The Commission "should enable carriers to bid on multiple blocks in a market in order to obtain larger amounts of spectrum.").

[187] *See, e.g.*, Leap Comments at 5 ("the Commission should enable carriers to bid on multiple licenses in a market"); Verizon Comments at 46 ("winners of more than one 5 MHz generic block within an EA should be assigned contiguous spectrum within that EA").

[188] *See, e.g.*, CEA Comments at 19 (supports allowing carriers to bid on a package of licenses spanning several geographic areas).

[189] *See, e.g.*, AT&T Comments Exh. A at 34-36 (the Commission should establish clear rules so that winning bidders of multiple spectrum blocks will be licensed contiguous spectrum); Verizon *PEAs PN* Comments at 4-7 (advocates for packages). *See also* § IV.C.2 (Bidding Process).

[190] *See* § IV.C.2 (Bidding Process).

[191] *See* § VI.B.2.d (Secondary Markets). *But see MSH Report and Order* at § V.B.5 (setting forth limitations on the assignment, transfer, or leasing of 600 MHz Band licenses under certain conditions).

[192] *NPRM*, 27 FCC Rcd at 12409, para. 144.

[193] *NPRM*, 27 FCC Rcd at 12411, para. 148. The Bureau of Economic Analysis defines EAs as "one or more economic nodes—metropolitan areas or similar areas that serve as centers of economic activity—and the surrounding counties that are economically related to the nodes." Final Redefinition of the BEA Economic Areas, 60 Fed. Reg. 13,114 (Mar. 10, 1995). There are 172 EAs.

[194] *Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service ("WCS")*, GN Docket No. 96-228, Report and Order, 12 FCC Rcd 10785, 10900, App. B at § 27.6 Service areas (1997) (*Part 27 R&O*) (licensing Guam and the Northern Mariana Islands, Puerto Rico and the United States Virgin Islands, American Samoa, and the Gulf of Mexico as Commission-created EAs 173-176).

different geographic size service areas, and sought comment on how it should take account of this directive.[195] Further, it sought comment on whether and how to license areas outside of the continental United States, including the Gulf of Mexico.[196]

69. In response to the *NPRM*, commenters are split between those supporting EAs and those that argue for smaller service areas, specifically Cellular Market Areas ("CMAs"),[197] which are a combination of Metropolitan Statistical Areas ("MSAs") and Rural Statistical Areas ("RSAs").[198] On November 27, 2013, CCA[199] submitted an alternative proposed scheme for smaller service areas based on a new geographic area size that CCA calls Partial Economic Areas ("PEAs").[200] PEAs, as described by CCA, are a subdivision of EAs based on the CMA boundaries which "ensure that some licenses consist of large population centers while other PEAs consist of less populous areas."[201] As a result, PEAs are smaller than EAs, and separate rural from urban markets to a greater degree than EAs.[202] The Wireless Bureau issued a Public Notice seeking comment on CCA's proposed PEA licensing scheme.[203] In addition, the Wireless Bureau sought comment on other alternative geographic licensing approaches, such as RWA and NTCA's proposal.[204] On March 20, 2014, CCA, NTCA, RWA and the Blooston Rural Carriers ("PEA Coalition") submitted a revised, joint PEA proposal for use in the incentive auction ("Joint PEA Proposal"),[205] and Verizon filed its own PEA proposal ("Verizon PEA Proposal").[206]

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[195] *NPRM*, 27 FCC Rcd at 12410, para. 145. Section 6403(c)(3) of the Spectrum Act directs the Commission to "consider assigning licenses that cover geographic areas of a variety of different sizes."

[196] *NPRM*, 27 FCC Rcd at 12411-12, para. 150.

[197] CMAs are standard geographic areas used for the licensing of cellular systems and are comprised of Metropolitan Statistical Areas ("MSAs") and Rural Service Areas ("RSAs"). *See* 47 C.F.R. § 22.909; *Common Carrier Public Mobile Services Information, Cellular MSA/RSA Markets and Counties*, Public Notice, 7 FCC Rcd 743 (1992) (*CMA Public Notice*).

[198] *Wireless Telecommunications Bureau Seeks Comment On A Proposal To License The 600 MHz Band Using "Partial Economic Areas,"* GN Docket No. 12-268, Public Notice, 28 FCC Rcd 17255, 17255-56 (2013) (*PEAs PN*).

[199] CCA, the Competitive Carriers Association, states that it "represents the interests of more than 100 competitive wireless carriers, including rural and regional carriers as well as national providers." CCA Comments at 1.

[200] In its filing, CCA emphasizes that it still supports licensing by CMAs, but offers the PEA proposal as an alternative to the proposed EA regime. Letter from Rebecca Murphy Thompson, CCA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed Nov. 27, 2013) (CCA Nov. 27, 2013 *Ex Parte* Letter).

[201] CCA Nov. 27, 2013 *Ex Parte* Letter at 2.

[202] Pursuant to CCA's *ex parte* filing, it proposed 348 PEA licenses in the continental United States as compared with 170 EA licenses. *Compare* CCA Nov. 27, 2013 *Ex Parte* Letter, Att. *with* 47 C.F.R. § 27.6(a). CCA subsequently revised its proposed PEA boundaries. *See* Letter from C. Sean Spivey, Assistant General Counsel for CCA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Dec. 23, 2013) (CCA Dec. 23, 2013 *Ex Parte* Letter); CCA *PEAs PN* Reply at 9-10.

[203] *PEAs PN*, 28 FCC Rcd 17255.

[204] *Id.* at 17256-57. Under the RWA/NTCA proposal, there would be two phases of the forward auction. The Commission would conduct the reverse auction contemporaneously with the first phase of the forward auction during which forward auction bidders would bid on the basis of EAs, but would receive licenses covering only a portion of the EA – specifically, the MSA or MSAs (when there is more than one MSA) located within the EA. Once the first phase of the forward auction is completed, the FCC would hold the second phase of the forward auction for the remaining 429 RSAs. RWA/NTCA *PEAs PN* Comments at 10-11; Letter from Caressa Bennet, General Counsel for RWA, and Jill Canfield, Assistant General Counsel for NTCA to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Dec. 6, 2013).

[205] Letter from C. Sean Spivey, Assistant General Counsel for CCA, Jill Canfield, Assistant General Counsel for NTCA, Caressa Bennet, General Counsel for RWA, and John A. Prendergast, Counsel to Blooston Rural Carriers, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Mar. 20, 2014) (CCA/NTCA/RWA/Blooston

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70. *Discussion*. We adopt the proposal to implement a geographic licensing approach.[207] We conclude that a geographic licensing approach is well-suited for the types of fixed and mobile services that will likely be deployed in this band.[208] In addition, geographic area licensing is consistent with the licensing approach adopted for similar spectrum bands that support mobile broadband services.[209]

71. Further, we adopt PEAs as the service area for the 600 MHz Band licenses. PEAs offer a compromise between EAs and CMAs because they are smaller than EAs, yet "nest" (or fit) within EAs, and can be easily aggregated into larger areas, such as Major Economic Areas ("MEAs") and Regional Economic Areas ("REAs" or "REAGs").[210] And like CMAs, PEAs divide urban and rural areas into separate service areas. In short, this approach will encourage entry by providers that contemplate offering wireless broadband service on a localized basis, yet at the same time will not preclude carriers that plan to provide service on a much larger geographic scale. As a result, licensing by PEAs will best promote entry into the market by the broadest range of potential wireless service providers without unduly complicating the auction. As CCA notes, PEAs "address concerns regarding the unusual complexity of this particular auction while also retaining many of the benefits of small license areas."[211]

72. Commenters agree that PEAs should: (1) nest within EAs; (2) reduce the number of service areas (as compared to the 734 CMAs); (3) reflect Metropolitan Statistical Areas ("MSAs"); and (4) be constructed from counties.[212] Commenters disagree primarily over which version of MSAs we should use to create PEAs. CCA, NTCA, and RWA argue in favor of using the MSA boundaries that the

(Continued from previous page)
Mar. 20, 2014 *Ex Parte* Letter). The Joint PEA Proposal divides the United States and its territories into 416 PEAs and the parties emphasize that the proposal they submit is "without prejudice to their continued support for CMAs." Letter from C. Sean Spivey, Assistant General Counsel for CCA, Jill Canfield, Assistant General Counsel for NTCA, Caressa Bennet, General Counsel for RWA, and John A. Prendergast, Counsel to Blooston Rural Carriers, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed Mar. 11, 2014) (CCA/NTCA/RWA/Blooston Mar. 11, 2014 *Ex Parte* Letter).

[206] Letter from Tamara Preiss, Vice President, Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Mar. 20, 2014) (Verizon Mar. 20, 2014 *Ex Parte* Letter). Verizon argues in the alternative (Verizon Alternative PEA Proposal) that if we adopt the Joint PEA Proposal, we should modify some of the boundaries in the Joint PEA Proposal to "account for the expansion of some of the major metropolitan areas and associated population shifts." Letter from Tamara Preiss, Vice President, Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Apr. 29, 2014) (Verizon Apr. 29, 2014 *Ex Parte* Letter) at 2.

[207] *NPRM*, 27 FCC Rcd at 12409, para. 144.

[208] *See* § III.A.2.b (5+5 MHz, Interchangeable Spectrum Blocks).

[209] *See, e.g., Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No. 02-353, Report and Order, 18 FCC Rcd 25162, 25174 para. 30 (2003) (*AWS-1 R&O)*.

[210] *See* 47 C.F.R. § 27.6(a) ("Both MEAs and REAGs are based on the U.S. Department of Commerce's EAs. *See* 60 FR 13114 (March 10, 1995).").

[211] CCA *PEAs PN* Comments at 5; *see also* Public Service Wireless *PEAs PN* Comments at 4; Atlantic Telephone *et. al*. *PEAs PN* Comments at 4; Letter from Leighton T. Brown, Counsel for US Cellular, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att at 2 (filed May 7, 2014) (We support the "use of PEAs as the geographic license area size."); Letter from Dr. Apurva N. Mody, Chairman, WhiteSpace Alliance, to Marlene Dortch, Secretary, FCC, GN Docket No. 12-268 at 6 (filed May 7, 2014)("WSA believes that the Partial Economic Area[s] proposed by a coalition of rural interests presents a reasonable balance between the relatively large Economic Areas proposed in the Notice, and smaller geographic licensing areas that would be optimal.").

[212] *See* CCA Nov. 27, 2013 *Ex Parte* Letter; CCA/NTCA/RWA/Blooston Mar. 11, 2014 *Ex Parte* Letter; Verizon Mar. 20, 2014 *Ex Parte* Letter. Metropolitan statistical areas are geographic entities delineated by the Office of Management and Budget for use by Federal statistical agencies in collecting, tabulating, and publishing Federal statistics. United States Census Bureau, Metropolitan and Micropolitan Statistical Areas Main, https://www.census.gov/population/metro/ (last visited Apr. 9, 2014).

Commission uses for its current CMA boundaries,[213] updated with 2010 U.S. Census data for each county, because these boundaries have been "employed in numerous previous auctions, including Auctions 73 (700 MHz), 78 (AWS-1), and 92 (Lower 700 MHz)."[214] On the other hand, Verizon argues that we should adopt its proposal, which uses more recent MSAs, because they are "a much more accurate division of rural and urban areas."[215]

73. We adopt the PEA boundaries contained in the Joint PEA Proposal.[216] This approach will promote the simplicity and speed of the incentive auction, as well as our competitive goals. Specifically, the Joint PEA Proposal encourages broad participation by utilizing the MSA boundaries that the Commission currently uses.[217] Because these boundaries may more closely fit many wireless providers' existing footprints, they should provide a greater opportunity for wireless providers to acquire spectrum licenses in their service areas.[218] As Blooston notes, the Verizon PEA Proposal has "little in common with geographic areas where rural and competitive carriers currently offer wireless service."[219] In addition, Blooston argues that using the MSAs in the Joint PEA Proposal could increase service to rural areas as compared to Verizon's proposal.[220] Further, while the Joint PEA Proposal provides service areas small enough for smaller carriers to support,[221] the number of total service areas is low enough to reduce the time necessary to complete the incentive auction.[222] With respect to larger carriers, the Joint PEA

[213] *See CMA Public Notice*, 7 FCC Rcd 743.

[214] CCA Nov. 27, 2013 *Ex Parte* Letter at 2.

[215] Verizon Mar. 20, 2014 *Ex Parte* Letter at 3. Verizon contends that the MSAs used by the Commission are "badly outdated . . . and thus fail to reflect more than thirty years of population growth and shifts." *Id*. at 2. *See also* United States Census Bureau, Metropolitan and Micropolitan Statistical Areas Main, https://www.census.gov/population/metro/ (last visited Apr. 9, 2014).

[216] *See* CCA/NTCA/RWA/Blooston Mar. 20, 2014 *Ex Parte* Letter at 3. We direct the Wireless Bureau to issue a Public Notice announcing the specific counties contained in each PEA (and the corresponding PEA number), as set forth in the Joint PEA Proposal.

[217] CCA Nov. 27, 2013 *Ex Parte* Letter at 2 (stating that they "respect existing CMA [i.e., MSA and RSA] boundaries").

[218] *See Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, GN Docket No. 13-185, Report and Order, FCC 14-31, para. 49 (rel. Mar. 31, 2014) (*AWS-3 Report and Order)*. Letter from D. Cary Mitchell, Counsel for Blooston Rural Carriers, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed Apr. 10, 2014) (Blooston Rural Carriers Apr. 10, 2014 *Ex Parte* Letter) (CMAs "conform to the areas where many incumbent service providers already hold licenses and have wireless operations.").

[219] Blooston Rural Carriers Apr. 10, 2014 *Ex Parte* Letter at 2.

[220] *Id.* at 4 ("In the Rapid City area, Verizon's proposal would combine multiple tribal areas in EA 115 along the Nebraska border with large counties in northwestern Nebraska. This would result in a single rural service area that is far too large for rural and independent carriers to realistically bid or provide service, and companies that are interested in serving tribal lands (or the tribes themselves) would be precluded from bidding on a license that is so large. Moreover, including Custer and Fall River Counties in this large rural license, which have a significant economic nexus with Rapid City, would likely draw bidding from companies that have little or no interest in serving rural and tribal areas.").

[221] *See* CCA/NTCA/RWA/Blooston Mar. 20, 2014 *Ex Parte* Letter; *see also* CCA Comments at 1; RWA/NTCA *PEAs PN* Comments at 1; Blooston Rural Carriers Comments at 1, Att.

[222] As discussed in the Introduction, minimizing the number of licenses offered during the forward auction is important because the time necessary to conduct the bidding increases exponentially as the number of licenses increase.

Proposal "nests" within the EAs so it may facilitate spectrum aggregation during the auction and in the secondary market.[223]

74. We decline to adopt the Verizon PEA Proposal. First, rather than defining the boundaries for all PEAs, Verizon only defines those areas relating to MSAs.[224] Verizon clearly intended to provide the Commission with flexibility to consider a range of alternatives with respect to rural areas. However, implementing Verizon's PEA proposal, while respecting general principles of nesting within EAs and limiting the number of licenses in the auction, would create inefficient service areas for non-MSA-based service areas.[225] Further, adopting the Verizon PEA Proposal may diminish competitive carrier participation in the forward auction.[226] We disagree with Verizon that adopting the Joint PEA Proposal will lead to outdated service areas that are not based on objective criteria.[227] The Joint PEA Proposal creates PEA service areas by utilizing 2010 U.S. Census population and county boundary data; consequently, it takes into account current population data for the counties that are included in each PEA.[228] The PEA boundaries in the Joint PEA Proposal also are based on objective criteria.[229] We further decline to adopt the Verizon Alternative PEA Proposal, which modifies the Joint PEA Proposal "by adding specified counties to the PEAs representing some of the top markets."[230] Verizon's proposed modifications to the Joint PEA Proposal also have the potential to diminish competitive carrier participation in the forward auction.[231]

[223] CCA/NTCA/RWA/Blooston Mar. 11, 2014 *Ex Parte* Letter at 2.

[224] Verizon proposes 218 service areas but does not provide boundaries for areas outside the MSAs. Verizon Mar. 20, 2014 *Ex Parte* Letter at 3.

[225] For example, two counties in Georgia are "sandwiched" between the boundary for the Atlanta MSA and the boundary for the EA containing Atlanta. If we were to follow Verizon's principles, these two counties would form their own very small PEA, immediately adjacent to the much larger Atlanta MSA. In Maine, the MSA encompasses the middle of Maine and the non-MSA portion creates a "doughnut" around the MSA. These effects were most widespread in the original Verizon proposal, which included 218 MSAs. *See* Verizon Mar. 20, 2014 *Ex Parte* Letter at 3. The revised Verizon proposal focuses on fewer MSAs, but the resulting inefficiencies with respect to rural license areas are still significant. *See* Verizon Apr. 29, 2014 *Ex Parte* Letter.

[226] Letter from Rebecca Murphy Thompson, CCA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 1 (filed Apr. 11, 2014). RWA concurs, noting that that the Verizon PEA Proposal makes it "difficult (if not impossible) for small and rural wireless carriers to participate in the 600 MHz spectrum auction." Letter from Caressa D. Bennet, Counsel for RWA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed Apr. 11, 2014).

[227] *See* Verizon Mar. 20, 2014 *Ex Parte* Letter at 2.

[228] CCA/NTCA/RWA/Blooston Mar. 20, 2014 *Ex Parte* Letter at 2.

[229] Specifically, PEAs were created by: (1) having the service areas "nest" into EAs; (2) limiting the number of service areas to approximately 400, which will limit the reverse and/or forward auction implementation risks; (3) generally combining contiguous MSA and RSA service areas within each EA; (4) complying with the statutory requirements of § 309(j) of the Communications Act; (5) having more than 15,000 people in each PEA (with the exception of four service areas); and (6) combining smaller territories (including unusually shaped service areas such as "donut holes") into larger territories. *See* Letter from C. Sean Spivey, Assistant General Counsel for CCA, Jill Canfield, Assistant General Counsel for NTCA, Caressa Bennet, General Counsel for RWA, and John A. Prendergast, Counsel to Blooston Rural Carriers, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Apr. 16, 2014) (CCA/NTCA/RWA/Blooston Apr. 16, 2014 *Ex Parte* Letter). *See also* CCA *PEAs PN* Reply at 6; Letter from John Leibovitz, Deputy Chief, Wireless Telecommunications Bureau, FCC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 4 (filed Mar. 4, 2014); CCA/NTCA/RWA/Blooston Mar. 11, 2014 *Ex Parte* Letter at 2.

[230] Verizon Apr. 29, 2014 *Ex Parte* Letter at 1.

[231] The PEA Coalition asserts that adopting Verizon's revised PEA boundaries even in a limited number of areas (as in the Verizon Alternative PEA Proposal) "would create inefficiencies and complicate 600 MHz band licensing for (continued….)

75. Although most commenters support PEAs as an alternative or compromise solution, the nationwide wireless carriers prefer EAs as the license size for the 600 MHz Band, and the smaller and/or rural carriers prefer CMAs.[232] We decline to adopt EAs or CMAs as the licensing scheme for the 600 MHz Band. As discussed above, we need to create interchangeable spectrum blocks in order to permit substitutability among the spectrum blocks (i.e., "generic blocks") in the forward auction.[233] To accomplish this goal, we can adopt only one license size for the entire 600 MHz Band and cannot offer a mix of license sizes as we have done in previous auctions.[234] Under the PEA approach, there are 416 service areas,[235] which is significantly fewer than the 734 CMA service areas, but more than the 176 EAs. This will reduce the exposure risk to the nationwide carriers as compared to CMAs. In addition, PEAs nest into EAs, MEAs, and REAGs, so that nationwide carriers can aggregate licenses to create the service area they desire, allowing them to take advantage of economies of scale. PEAs separate out the urban and rural areas, which should provide for greater auction participation by rural providers and allow them to bid on a geographic area license that better matches their service area.

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the vast majority of bidders and competitive carriers that are not themselves nationwide carriers." CCA/NTCA/RWA/Blooston May 2, 2014 *Ex Parte* Letter at 3.

[232] *Compare* Verizon Comments at 60-61 ("EAs draw an appropriate balance between enabling the efficient deployment of nationwide and regional services, and the policy objectives set forth in Section 309(j) and the Spectrum Act, . . . [and] offer mobile providers flexibility in deployment and the ability to take advantage of economies of scale."); Sprint *PEAs PN* Reply at 4 ("EAs provide a reasonable balance for selecting a license size that accords with traditional markets of interest while not being so big as to exclude smaller providers."); AT&T *PEAs PN* Comments at 3 (EAs will encourage widespread geographic build out, including in rural areas, and provide licensees with sufficient flexibility to scale their networks); T-Mobile *PEAs PN* Reply at 2 (smaller license sizes will subject bidders to exposure risk) *with* RTG Comments at 2 (EAs would shut out rural companies in violation of § 309(j) because EAs often include densely populated urban areas and typically cover larger geographical areas than the rural areas that rural carriers serve); Letter from Ron Smith, President of Bluegrass Cellular, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed Jul 10, 2013) (if FCC adopts EAs, Bluegrass would "almost certainly be foreclosed from participating in the auction" because "it does not have the financial wherewithal to bid on four or five separate EAs encompassing five times the number of pops it currently serves."); Letter from Gregory W. Whiteaker, Counsel for Chat Mobility, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 3 (filed Aug. 8, 2013) (adopting EAs "would delay the deployment of service to rural areas because the few large entities able to bid on such licenses have little or no incentive to serve the rural areas included within the large geographic license areas."); NTCA Comments at 3-4 (licensing significant portions of the 600 MHz spectrum as MSAs/RSAs would serve the public interest); CCA *Band Plan PN* Comments at 7-10 (CMAs encourage broad participation, generate maximum auction revenue, and promote competition); US Cellular *PEAs PN* Comments at 11-12 (CMAs preserve opportunities for small and regional carriers and foster service to rural and underserved areas).

[233] *See* § III.A.2.b (5+5 MHz, Interchangeable Spectrum Blocks).

[234] *See, e.g.*, *AWS-1 R&O*, 18 FCC Rcd at 25175-25177 paras. 35-40; *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150, *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, *Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones*, WT Docket No. 01-309, *Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, WT Docket 03-264, *Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission's Rules*, WT Docket No. 06-169, *Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band*, PS Docket No. 06-229, *Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010*, WT Docket No. 96-86; Decalatory Ruling on Reporting Requirement Under Commmission Part 1 Anti-Collusion Rule, WT Docket No. 07-166, 22 FCC Rcd 15289, 15315-18, paras. 62-68 (2007) (*700 MHz Second Report and Order*); *AWS-3 Report and Order* at paras. 48-49.

[235] CCA/NTCA/RWA/Blooston Mar. 20, 2014 *Ex Parte* Letter.

76. We also decline to adopt broadcast Designated Market Areas ("DMAs"),[236] nationwide, REAG, or MEA licensing approaches. Some commenters suggest that the Commission consider matching licensing areas to broadcast DMAs to simplify auction procedures by aligning the geographic areas of the forward and reverse auctions.[237] We agree with commenters that assert that DMAs are not appropriate because they do not match wireless service footprints or existing FCC wireless service area designations.[238] Further, we find that DMAs, like EAs, do not sufficiently address the needs of smaller and rural wireless providers, given the number of licenses we would make available.[239] The Commission also sought comment on using nationwide and REAG service areas, but no commenters support using these service areas, and some commenters actively oppose them.[240] T-Mobile recommends that the Commission license by MEAs—a service area size larger than EAs—because the economically efficient size of wireless service is substantially larger than individual EAs, and MEAs will reduce transaction costs and help wireless companies achieve economies of scale.[241] T-Mobile notes that smaller licenses, such as PEAs, are manageable and would not create a significant exposure risk under certain conditions.[242] For the reasons discussed above, using smaller, PEA service areas strikes the appropriate balance and will allow both smaller and larger wireless carriers to obtain licenses that best align with their respective business plans.[243]

[236] Designated Market Area (DMA®) is a registered trademark of Nielsen Media Research, Inc. (Nielsen). Nielsen owns the copyright to the DMA listing.

[237] CCA Reply at 12; MetroPCS Comments at 18-19 (arguing that EAs are preferable, but DMAs might be another useful option).

[238] DMAs are the geographic areas in the U.S. used to measure local television viewing. The FCC does not use these broadcast areas to license wireless spectrum. RTG opposes the use of DMAs because broadcast viewing areas have no relationship to existing wireless licensing plans, and "[w]ireless licensing based on DMAs will have the unintended effect of allowing licensees to cherry-pick highly concentrated urban areas while leaving large rural areas unserved." Letter from Caressa D. Bennet, General Counsel, RTG, to Marlene H. Dortch, Secretary, FCC, GN Docket No 12-268 at 9 (filed Mar. 19, 2013). MetroPCS notes that "using DMAs only makes sense if there is a significant increase in the total number of licenses that would be available in the forward auction after re-packing. If not, it would not be worth introducing yet another license area into the already complicated wireless license area mix." MetroPCS Comments at 18-19.

[239] There are 210 DMAs compared to 172 EAs in the United States. *Compare* Nielsen, Local Television Market Universe Estimates, http://www.tvb.org/media/file/TVB_Market_Profiles_Nielsen_TVHH_DMA_Ranks_2013-2014.pdf (last visited Apr. 9, 2014) *with* 47 C.F.R. § 27.6.

[240] For example, CCA argues that "using large geographic areas would give significant and unwarranted advantages to the largest nationwide carriers at the expense of smaller carriers, and would risk leaving behind rural America . . . [and that] [l]arge geographic areas significantly reduce the number of potential bidders for licenses, reducing potential auction revenue as was the case in the Upper 700 MHz C Block." CCA Comments at 14. *See also* C Spire Comments at 7; Leap Comments at 5.

[241] T-Mobile Comments at 15-16.

[242] T-Mobile *PEAs PN* Comments at 2 ("while CCA's proposed licensing scheme [using PEAs] is not optimal, it may represent a reasonable compromise").

[243] AT&T and Verizon request that the Commission adopt package bidding, particularly if it adopts a geographic area license size smaller than EAs. Letter from Joan Marsh, Vice President, Federal Regulatory for AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 4 (filed Dec. 3, 2013) (AT&T Dec. 3, 2013 *Ex Parte* Letter); Verizon Mar. 20, 2014 *Ex Parte* Letter at 3. T-Mobile and others oppose permitting package bidding. *See* T-Mobile *PEAs PN* Comments at 1-2; CCA/NTCA/RWA/Blooston Mar. 11, 2014 *Ex Parte* Letter, at 3. Package bidding is discussed in § IV.C.2.a (Forward Auction – Bid Collection Procedures: Auction Format, Generic License Categories, Etc.).

77. *Licensing Outside the Continental United States*. The Commission sought comment on licensing of the 600 MHz Band outside the continental United States and in the Gulf of Mexico.[244] For Alaska, Copper Valley Wireless supports licensing Alaska on a CMA basis.[245] RWA (formerly RTG)[246] initially recommended that we license using Alaska Boroughs, which divide the state based on population density, and in any case, use service areas no larger than CMAs.[247] Subsequently, RWA (along with CCA, NTCA, and Blooston) filed the Joint PEA Proposal, which proposes to divide Alaska into four PEAs.[248] Recognizing that Alaska faces uniquely challenging operating conditions for deploying and operating networks,[249] adopting the Joint PEA Proposal endorsed by smaller and rural carrier associations should best address these concerns. The Alaskan PEA boundaries closely approximate the CMA boundaries in Alaska that providers support.[250] We note that to the extent bidders are interested in providing service in Alaska using smaller service areas than PEAs, they may use both pre- and post-auction mechanisms (such as bidding as a consortium and/or partitioning spectrum in a service area) to create the specific area they wish to serve.

78. For the Gulf of Mexico, we will follow the established policy and license the Gulf as a separate license[251] that will be comprised of the water area of the Gulf of Mexico starting 12 nautical

[244] *NPRM*, 27 FCC Rcd at 12411-12, para. 150.

[245] Copper Valley Reply at 1-2. Copper Valley, which serves 15,000 square miles in south Central Alaska, supports CMAs because licensing using these smaller areas will provide it "with the most meaningful opportunity to participate in the incentive auction." *Id*. We note that although Copper Valley states that it opposes PEAs, it opposes specifically CCA's original proposal to license Alaska as one single PEA, advocating that Alaska should be split into four (CMA) service areas. Copper Valley Reply at 4-5.

[246] The Rural Telecommunications Group (RTG) changed its name to the Rural Wireless Association (RWA) on September 17, 2013. Press Release, *RWA, RTG – The Rural Wireless Association Announces Name Change to RWA and New Directors* (Sept. 19, 2013), *available at* http://ruralwireless.org/2013/09/rtg-the-rural-wireless-association-announces-name-change-to-rwa/ (last visited Apr. 9, 2014).

[247] RTG (RWA) Comments at 6-7. As RWA describes, Alaska Boroughs divide the state based on population density, and are smaller than CMAs. RWA argues that smaller service areas would promote competition in Alaska and allow for greater penetration. *Id*.

[248] CCA/NTCA/RWA/Blooston Mar. 20, 2014 *Ex Parte* Letter at 2, Att.

[249] *Connect America Fund; A National Broadband Plan for Our Future; Establishing Just and Reasonable Rates for Local Exchange Carriers; High-Cost Universal Service Support; Developing a Unified Intercarrier Compensation Regime; Federal-State Joint Board on Universal Service; Lifeline and Link-Up; Universal Service Reform—Mobility Fund,* WC Docket Nos. 10-90, 07-135, 05-337, 03-109, CC Docket Nos. 01-92, 96-45, GN Docket No. 09-51, WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, 17829 at paras. 507–508 (2011); *aff'd In re: FCC 11-161*, No. 11-9900, 2014 WL 2142106 (10th Cir. May 23, 2014)..

[250] Alaska comprises four service areas under both the PEA and CMA licensing schemes. *Compare* Joint PEA Proposal *with CMA Public Notice*, 7 FCC Rcd 743. In Alaska, the only difference between the Joint PEA Proposal and CMAs is that the Joint PEA Proposal places the county of Yakutat Borough (FIPS 02282) into one service area rather than dividing it into two. CMAs 316 and 317 each include part of Yakutat Borough.

[251] Under the EA licensing scheme, the Gulf of Mexico is EA 176. 47 C.F.R. § 27.6. *See also AWS-1 R&O*, 18 FCC Rcd at 25177, para. 40; *Service Rules for Advanced Wireless Services in the 200-2020 MHz and 2180-2200 MHz Bands*, WT Docket No. 12-70, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16122-23, para. 51 (2012) (*AWS-4 Report and Order*), 27 FCC Rcd at 16122-23, para. 51; *NPRM*, 27 FCC Rcd at 12410, para. 145; *Service Rules for Advanced Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands*, Report and Order, WT Docket No. 12-357, 28 FCC Rcd 9483, 9502, paras. 44-45 (2013) (*H Block Report and Order*). We will similarly license the Gulf of Mexico as its own PEA, which the PEA Coalition proposes as PEA 222. CCA/NTCA/RWA/Blooston Mar. 11, 2014 *Ex Parte* Letter at Att.

miles from the U.S. Gulf Coast and extending outward.[252] Similarly, we will license Guam, the Northern Mariana Islands, Puerto Rico, the United States Virgin Islands, and American Samoa as we have in previous auctions, which is consistent with the Joint PEA Proposal.[253]

79. *Statutory Requirements*. We conclude that our action satisfies the Spectrum Act requirement that the Commission consider assigning licenses that cover geographic areas of a variety of different sizes.[254] Based on the extensive record developed in this proceeding, we have carefully considered assigning licenses using a variety of different geographic area sizes.[255] As stated above, however, we cannot offer a mix of license sizes as we have done in previous auctions without endangering our goal of repurposing spectrum through this auction: using one license size (PEAs) is essential to creating interchangeable spectrum blocks, which in turn are critical elements of the 600 MHz Band Plan developed to promote a successful incentive auction.[256] We note that various mechanisms are available to carriers that wish to serve larger or smaller geographic areas.[257]

[252] *See* 47 C.F.R. § 27.6(a)(2). We are establishing different performance benchmarks for the Gulf of Mexico because the performance benchmarks we adopt for the 600 MHz Band are measured by the percentage of the population in the service area. Determining "population" using the conventional methodology would be infeasible for the Gulf of Mexico because it is a body of water. *See* § VI.B.2.c.ii (Performance Requirements).

[253] *See* CCA/NTCA/RWA/Blooston Mar. 20, 2014 *Ex Parte* Letter at Att.; CCA/NTCA/RWA/Blooston Mar. 11, 2014 *Ex Parte* Letter at Att. In its accompanying map, the PEA Coalition proposes PEA 218 for Guam and the Northern Mariana Islands, PEA 219 for the Virgin Islands, PEA 220 for Puerto Rico, and PEA 221 for American Samoa. CCA/NTCA/RWA/Blooston Mar. 11, 2014 *Ex Parte* Letter at Att. Although there are no TV stations licensed in American Samoa and the Northern Mariana Islands, we are including these territories in the forward auction to the extent spectrum is available. This is consistent with the requirements of the Spectrum Act because the Commission can make "reassignments of the television channels as the Commission considers appropriate." Spectrum Act § 6403(b)(1)(B)(i).

[254] Spectrum Act § 6403(c)(3) ("the Commission shall consider assigning licenses that cover geographic areas of a variety of different sizes"). US Cellular argues that the Commission must provide a mix of small service areas pursuant to this provision. US Cellular Comments at 17-18. We disagree. The statute expressly requires us only to consider licensing using a variety of sizes, not to do so. *See, e.g., Melcher v. FCC*, 134 F.3d 1143, 1154-55 (D.C. Cir. 1998) (holding that requirement in § 309(j)(4)(D) of the Communications Act that the FCC "consider the use of tax certificates" for small businesses, rural telephone companies, and businesses owned by minority groups does not mandate such use, but merely "instructs the FCC to 'consider' that possibility").

[255] In the *NPRM*, the Commission sought comment on a wide range of geographic area sizes, including offering a variety of sizes. *NPRM*, 27 FCC Rcd at 12410, para. 145. Furthermore, in response to the comments regarding the *NPRM*, the Wireless Bureau sought comment on a new licensing scheme that, according to CCA, would "ensure that some licenses consist of large population centers while other[s] . . . consist of less populous areas." *PEAs PN*, 28 FCC Rcd at 17256 (citing CCA Nov. 27, 2013 *Ex Parte* Letter). We have considered adopting a variety of sizes, in particular, using a combination of CMAs and EAs. KSW, Sinclair, and US Cellular each advocate that we should adopt a combination of EAs and CMAs. *See* KSW Reply at 6; Sinclair Reply at 3-5; US Cellular Comments at 9-19.

[256] *See* § III.A.2.b (5+5 MHz, Interchangeable Spectrum Blocks).

[257] As described above, the rules we adopt for the 600 MHz Band will permit a wireless provider to deploy service seamlessly across adjacent geographic areas. Further, wireless providers will have additional opportunities using secondary market mechanisms. *See* § VI.B.2.d (Secondary Markets); *but see MSH Report and Order* at § V.B.5 (setting forth limitations on the assignment, transfer, or leasing of 600 MHz Band licenses under certain conditions). Moreover, PEAs "nest" within EAs and therefore can serve as building blocks for carriers who wish to create larger footprints. Carriers that seek license areas smaller than PEAs may use auction mechanisms (e.g., consortium bidding) and secondary market transactions (e.g., partitioning, disaggregating, and spectrum leasing) to acquire spectrum for their preferred geographic area. *See* 47 C.F.R. § 1.2107(g); § VI.B.2.d (Secondary Markets); *but see MSH Report and Order* at § V.B.5.

80. We also conclude that licensing the 600 MHz Band on a PEA basis is consistent with the requirements of section 309(j)[258] because it will promote spectrum opportunities for carriers of different sizes, including small businesses and rural telephone companies. Just as larger carriers can aggregate EAs into larger geographic areas, PEAs are small enough to allow bidders to acquire a limited coverage area—often only a few counties—which should enable small businesses and rural carriers to compete with larger carriers in these areas. Further, if bidders want to acquire licenses for smaller geographic areas, they can make use of the partitioning and disaggregation rules.[259] Although the use of smaller geographic service areas, such as CMAs, could potentially encourage participation by smaller providers and support greater variation in the amount of repurposed spectrum from area to area, on balance offering licenses for a large number of very small geographic service areas would be inconsistent with our auction design goals of simplicity and speed.[260] First, we must use fewer service areas because the time necessary to close the incentive auction increases dramatically as the number of licenses increases. As discussed above, we are designing the forward auction for speed.[261] Further, more service areas could complicate potential bidders' efforts to plan for, and participate in, the auction for related licenses, potentially affecting the success of the auction.[262] More service areas could also complicate subsequent service deployment.[263]

d. Market Variation

81. *Background*. Because the amount of UHF spectrum recovered through the reverse auction and the repacking process depends on broadcaster participation and other factors, the Commission explained in the *NPRM* that any band plan it adopted would have to accommodate variation in the amount of spectrum recovered in different geographic areas; otherwise, the amount recovered in most markets nationwide would be limited if less spectrum is recovered in certain markets.[264] The Commission sought comment on how to address potential variation in the amount of spectrum recovered in areas along the border with Canada and Mexico,[265] as well as whether and how to offer new 600 MHz spectrum blocks that are encumbered or "impaired" by potential co- or adjacent channel interference with domestic television services operating in nearby markets due to less spectrum being recovered in certain markets.[266] We define "impaired" spectrum blocks or "impaired" licenses as those in which a wireless provider is restricted from operating in the entire geographic boundary of a particular license area in order to prevent

[258] Under § 309(j)(4) the Commission, in prescribing regulations for assigning licenses by competitive bidding, shall "ensure that small businesses, rural telephone companies, and businesses owned by members of minority groups and women are given the opportunity to participate in the provision of spectrum-based services."

[259] Under the rules we adopt today, a group of wireless providers can form a consortium to jointly bid on a license that they can subsequently partition as they desire. *See* 47 C.F.R. § 1.2107(g); § VI.B.2.d.ii (Partitioning and Disaggregation). We note that in the *MSH Report and Order*, we indicated that we plan to consider in a Further Notice of Proposed Rulemaking possible changes to certain auction rules relating to joint bidding arrangements. *See MSH Report and Order* at § V.B.2.

[260] *NPRM*, 27 FCC Rcd at 12411, para. 147.

[261] *See* § I (Introduction).

[262] *See, e.g.*, AT&T Dec. 3, 2013 *Ex Parte* Letter at 2 ("a carrier might well decide that it makes no economic sense to invest in 600 MHz technology *at all* if it does not win 600 MHz spectrum rights in most of the geographic areas within its footprint").

[263] *NPRM*, 27 FCC Rcd at 12411, para. 147. *See also* Verizon *PEAs PN* Comments at 3 ("Given the smaller license size, licensees must manage significantly more potential co-channel interference along their service area boundaries.").

[264] *NPRM*, 27 FCC Rcd at 12406, para. 136.

[265] *Id.* at 12418, para. 172.

[266] *Id.*at 12419, para. 174.

harmful interference to remaining television operations in or near the 600 MHz Band; or conversely, those licenses in which a wireless provider may receive harmful interference from remaining television operations in or near the 600 MHz Band.[267] In the *NPRM*, the Commission also sought comment on what types of impaired blocks it should offer in the forward auction, if any, and how to incorporate any such offerings into the auction design. The Wireless Bureau sought further comment on how certain band plan approaches could best address market variation in constrained markets.[268] In addition, the Office of Engineering and Technology ("OET") released a Public Notice inviting comment on a methodology for predicting potential inter-service interference between television and licensed wireless services operating on the same or adjacent channels in nearby markets.[269]

82. *Discussion*. The 600 MHz Band Plan we adopt can accommodate market variation in order to avoid restricting the amount of repurposed spectrum that is available in most areas nationwide. We intend to offer a uniform number of 600 MHz spectrum licenses in most markets across the country, but the 600 MHz Band Plan will enable us to offer some impaired spectrum blocks, or alternatively, fewer spectrum blocks, in constrained markets where less spectrum is available. We find that accommodating market variation is necessary. If the 600 MHz Band Plan could not accommodate some market variation, we would be forced to limit the amount of spectrum offered across the nation to what is available in the most constrained market (the "least common denominator"), even if more spectrum could be made available in the vast majority of the country. By allowing for market variation in our 600 MHz Band Plan, we can ensure that broadcasters have the opportunity to participate in the reverse auction in markets where interest is high. As a result, more spectrum can be made available nationwide in the forward auction.

83. We recognize that there are certain advantages to having a generally consistent band plan. In particular, limiting the amount of market variation will limit the amount of potential co- and adjacent channel interference between television and wireless services in nearby areas ("inter-service interference").[270] Furthermore, limiting the amount of variation will help licensees achieve economies of scale when deploying their 600 MHz networks.[271] Therefore, we will accommodate market variation to a limited extent only.[272] In no case will we offer *more* spectrum in an area than the amount we decide to offer in most markets nationwide.[273] Rather, we will offer the same amount of spectrum nationwide in all

[267] As explained below, we will provide additional guidance in the pre-auction process as to these boundaries and wireless licensees' obligations when holding an impaired license. We emphasize that forward auction bidders will know when they are bidding on an impaired license, and plan to seek further comment on the specific process and approach for bidding on impaired licenses in the *Comment PN*.

[268] *See generally Band Plan PN*, 28 FCC Rcd 7414. Specifically, the Wireless Bureau sought additional comment on three variations of the Down from 51 band plan: (1) Down from 51 Reversed; (2) Down from 51 with TV in the Duplex Gap; and (3) Down from 51 TDD. *Id*.

[269] *See Office of Engineering and Technology Seeks to Supplement the Incentive Auction Proceeding Record Regarding Potential Interference Between Broadcast Television and Wireless Services*, GN Docket No. 12-268, Public Notice, 29 FCC Rcd 712 (2014) (*Inter-service Interference PN*).

[270] The *Inter-service Interference PN* addresses the potential interference scenarios between television and wireless services where co-channel operations are permitted in nearby areas. *See generally Inter-service Interference PN.*

[271] *See, e.g.*, Ericsson Reply at 11 (offering all markets with the same downlink band "facilitates device interoperability and promotes economies of scale by avoiding device fragmentation").

[272] The *Comment PN* will provide guidance and propose specific rules to address how market variation will work in the forward auction (e.g., how we will determine the amount of spectrum we offer generally; the degree to which we will accommodate constrained markets, etc.).

[273] As we note in § III.C (Unlicensed Operations), we expect that there will still be a substantial amount of spectrum available for use by TVWS devices in the post-auction television bands, particularly in areas outside of the central urban areas of the largest DMAs.

areas where sufficient spectrum is available. In constrained markets where less spectrum is available, we will offer impaired blocks or fewer blocks than we offer in most markets nationwide.

84. The decision to accommodate market variation raises a number of issues, including how to prevent inter-service interference consistent with the requirements of the Spectrum Act,[274] how much market variation to accommodate under different spectrum recovery scenarios, where to place television stations in the 600 MHz Band if necessary in constrained markets, and whether and how to offer impaired spectrum blocks in the forward auction. Here, we explain the process by which we will resolve these issues and establish rules and auction procedures related to inter-service interference. Specifically, following this Order, we plan to issue an order that establishes the methodology for preventing inter-service interference. That methodology will govern post-auction co- or adjacent-channel operation of television and wireless services, including operation of new 600 MHz licensees in these areas (i.e., additional rules for licensees that hold impaired 600 MHz licenses). We will issue that order concurrent with issuing the *Comment PN* inviting comment on final, specific auction procedures. This approach will ensure that potential bidders in both the forward and reverse auctions have a clear understanding about how we will protect against inter-service interference in the 600 MHz Band, and have an opportunity to comment on how such protection should be taken into consideration in the auction process.

85. The *Comment PN* will seek comment on aspects of market variation and inter-service interference that affect the incentive auction, such as how much market variation to accommodate under different spectrum recovery scenarios, where to place television stations in the 600 MHz Band in constrained markets, if necessary, and whether and how to auction impaired spectrum blocks. We will resolve these issues in the *Procedures PN*.[275] The approach we adopt will appropriately balance the costs and benefits of having a nationwide band plan versus accommodating market variation.

86. Although we defer establishing the methodology by which we will prevent inter-service interference so that we can do so based on a fully developed record with meaningful public input, we provide guidance on several matters in this Order. First, to prevent inter-service interference to television stations, 600 MHz licensees with impaired licenses may be required to operate within smaller boundaries than the entire area for which they hold a license.[276] We will provide forward auction bidders with sufficient information both before and after the incentive auction to determine whether they are bidding on, or hold, an impaired license. Licensees with impaired licenses will be limited to operation within the boundaries permitted under the inter-service interference rules we adopt ("permitted boundaries"). Thus, for example, licensees with impaired licenses will be allowed to operate at the power and out-of-band emission ("OOBE") limits authorized by our technical rules only to the permitted boundaries of the impaired licenses, even if the actual boundaries of their license areas extend further.[277] Likewise, such

[274] *See* § III.B.2 (Implementing the Statutory Preservation Mandate).

[275] Among other things, we anticipate seeking comment on whether to establish a threshold under which we would accommodate variation in no more than a certain percentage of top markets nationwide. For example, if the nationwide target amount were 126 megahertz and we were willing to accommodate variation of no more than 15 percent, then the threshold would be 85 percent of markets, or alternatively, 85 percent of the population nationwide.

[276] We are only restricting wireless providers from operating in areas where they are likely to cause harmful interference to broadcast operations. Nothing in our rules prevents a wireless provider from operating in a part of their service area in which they may be subject to, but are not likely to cause, harmful interference, even if they hold an "impaired license."

[277] We note that licensees with impaired 600 MHz licenses must operate within these "permitted boundaries" to protect against harmful interference to remaining television stations in or near the 600 MHz Band. Consequently, if a remaining television station affecting an impaired licensee's service area ceases operating, the 600 MHz licensee in that impaired area could then operate in its entire license area.

licensees will be required to meet the build-out requirements only for the area they are permitted to serve within each license area.[278]

87. Second, television stations operating on a co- or adjacent channel to a new 600 MHz licensee in a nearby market will be limited in their ability to expand their facilities following the incentive auction. In these markets, some broadcasters will be operating adjacent to or co-channel to wireless licensees. Such television licensees will not be permitted to expand their noise-limited service contours if doing so would increase the potential for interference to a wireless licensee's service area.[279] We recognize that there may be extraordinary circumstances beyond the control of a television licensee in which it must involuntarily relocate its facilities or cannot replicate its service area on its new channel after the repacking process without expanding its contour in the direction of the wireless license area. Because this type of modification would affect both the television licensee and the wireless licensee, we expect these cases will need to be evaluated on a case-by-case basis, and will carefully consider requests for waiver of our rules in such situations. We encourage television and wireless licensees to work cooperatively to find an equitable solution should this situation arise.

e. Guard Bands

88. *Background*. Section 6407(a) of the Spectrum Act makes clear that "[n]othing in [the new incentive auction authority,] as added by section 6402, or in section 6403 shall be construed to prevent the Commission from using relinquished or other spectrum to implement band plans with guard bands."[280] In order to protect against harmful interference between dissimilar adjacent operations, and in accordance with section 6407, the Commission proposed to create guard bands in which it would prohibit high power operations.[281] In addition to preventing harmful interference, the Commission reasoned that guard bands would help to ensure that wireless spectrum blocks adjacent to television operations would support wireless broadband services to the same level of performance as spectrum blocks adjacent only to other spectrum blocks used for wireless broadband service.[282] It also proposed to incorporate any "remainder" spectrum into the guard bands.[283] The Commission proposed to size the guard bands in accordance with the requirement of section 6407(b) that they "shall be no larger than is technically reasonable to prevent harmful interference between licensed services outside the guard bands."[284] In the *NPRM*, the Commission also sought comment on the size of the guard band between the wireless broadband uplink and downlink bands (commonly referred to as the "duplex gap").[285]

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[278] *See* § VI.B.2.c.ii (Performance Requirements).

[279] We note this limitation applies only to television stations whose operations affect new 600 MHz licensees. Other stations that seek to expand their service areas may follow the standard procedures in our rules. Further, we clarify that this restriction applies only to affected stations seeking to expand their service areas in the direction of a wireless license. Affected stations will not be prohibited from reducing their service contours in the 600 MHz Band, provided they are otherwise permitted to do so under our rules and policies. *See also* §§ III.B.2 (Implementing the Statutory Preservation Mandate), V.C.1 (License Modification Procedures).

[280] Spectrum Act § 6407(a).

[281] *NPRM*, 27 FCC Rcd at 12412, para. 152.

[282] *NPRM*, 27 FCC Rcd at 12412, para. 152.

[283] *NPRM*, 27 FCC Rcd at 12419-20, paras. 175-76.

[284] *NPRM*, 27 FCC Rcd at 12412, para. 152 (quoting Spectrum Act § 6407(b)).

[285] *NPRM*, 27 FCC Rcd at 12417, para. 167. The Commission noted that the size of the duplex gap relative to the width of the pass band is often considered more important than the absolute size because filter roll off is generally proportional to frequency. The Commission also noted that in determining the appropriate duplex gap size to protect against harmful interference, it may consider factors such as the pass band width relative to the center frequency of the pass band, the duplex spacing between the transmitted and received signals, and allowances for temperature and manufacturing variation in components. *See id.*

89. *Discussion*. As permitted by section 6407(a), we incorporate guard bands into our 600 MHz Band Plan to prevent harmful interference between licensed services. Commenters strongly support the use of such guard bands.[286] We adopt a guard band between television and wireless operations that ranges from seven megahertz to 11 megahertz, depending on the amount of spectrum cleared, as discussed below. We adopt a uniform duplex gap of 11 megahertz for every clearing scenario, and uniform three megahertz guard bands to protect against interference between licensed WMTS services on channel 37 and adjacent wireless services. The Spectrum Act specifically authorizes the FCC to implement band plans with guard bands, subject to a "technically reasonable" restriction.[287] We interpret the statute to affirm the Commission's discretion to employ guard bands in exercising its spectrum management authority.[288] Establishing these guard bands not only protects against harmful interference between the 600 MHz service and adjacent licensed services, but also helps to ensure that the 600 MHz spectrum blocks that we offer in the forward auction are as interchangeable as possible, consistent with our auction goals.[289] Guard bands also will bolster innovation and investment by unlicensed devices. In that regard, section 6407(c) specifically authorizes "the use of such guard bands for unlicensed use."[290]

90. As discussed above, the incentive auction presents the unique challenge of not knowing in advance how much spectrum will be repurposed, and the 600 MHz Band Plan we adopt is therefore flexible enough to accommodate different spectrum recovery scenarios. The guard bands are tailored to the technical properties of the 600 MHz Band under each scenario.[291] In some scenarios, converting six megahertz television channels to paired five megahertz blocks would leave "remainders" of spectrum smaller than six megahertz. Auctioning these remainders would be inconsistent with our decision to license the 600 MHz Band in paired five megahertz spectrum blocks,[292] and would needlessly complicate

[286] *See, e.g.*, Alcatel-Lucent Comments at 20; AT&T Comments at 22; AT&T Reply at 20-27; Cisco Comments at 11; Comcast Comments at 21; CTIA *Band Plan PN* Comments at 4; Motorola Comments at 12-13; Verizon Comments at 19-20; Verizon Reply at 2-4.

[287] Spectrum Act §§ 6407(a), (b).

[288] Title III of the Communications Act of 1934, as amended, 47 U.S.C. §§ 301, *et seq.*, "endow[s] the Commission with expansive powers," including "broad authority to manage spectrum . . . in the public interest." *Cellco P'ship v. FCC,* 700 F.3d 534, 541, 542 (D.C. Cir. 2012) (internal quotes and citations omitted). Determinations with respect to spectrum allocation policy have long been recognized to be precisely the sort that Congress intended to leave to the broad discretion of the Commission under § 303 of the Communications Act. *See Nat'l Ass'n of Regulatory Util. Comm'rs v. FCC,* 525 F.2d 630, 635-36 (D.C. Cir. 1976) (initial allocation of spectrum for land mobile radio service). The Spectrum Act reinforces the Commission's established authority by authorizing it to "implement and enforce" the Spectrum Act's provisions (including incentive auction authority) "as if this title is a part of the Communications Act of 1934." Spectrum Act § 6003(a). Nothing in § 6403(b) of the Spectrum Act "shall be construed to . . . expand or contract [that] authority, except as otherwise expressly provided." *Id.* § 6403(i)(1).

[289] *See* §§ III.A.2.b (5+5 MHz, Interchangeable Spectrum Blocks), IV.C.2.b (Forward Auction – Bid Assignment Procedures: Determining Winning Bidders and Assigning Frequency-Specific Licenses).

[290] Spectrum Act § 6407(c). The legislative history of § 6407 reinforces the statutory language. Section 6407 was designed as a compromise between competing versions of the legislation, some of which would have designated or reallocated spectrum for unlicensed use, and one of which did not (the version passed by the House). *Compare* S. 911, 112th Cong. § 303(a) (2011); H.R. 2482, 112th Cong. § 303(a); *with* H.R. 3509, 112th Cong. § 301 (2011), *with* H.R. 3630, 112th Cong., § 4103 (2011). Based on § 6407's language and legislative history, we reject EOBC's argument that the Spectrum Act requires that all repurposed spectrum, including guard bands, be auctioned. *See* EOBC Reply at 24-26.

[291] The Technical Appendix shows the size of the guard bands under each scenario. *See* Technical Appendix § III.B (Specific Band Plan Scenarios). We note that we may not use each of these scenarios in the forward auction. *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions).

the auction design.[293] Accordingly, such remainders are incorporated into the guard bands.[294] As a result, the guard band between television and 600 MHz downlink varies in size to some extent under different spectrum recovery scenarios.

91. Guard band size is subject to the statutory "technically reasonable" restriction we address below. Importantly, it also is limited by our goals for the incentive auction. The statute requires that the forward auction proceeds cover the costs of incentive payments to clear broadcasters from the 600 MHz Band and other identified costs.[295] The amount of spectrum available to generate such proceeds decreases with increases in guard band size. In other words, the bigger the guard bands, the less spectrum we can offer for sale in the forward auction.[296] Alternatively, we could seek to repurpose more spectrum, but that would require clearing more broadcasters, increasing the costs of incentive payments without increasing the amount of spectrum available in the forward auction to generate the necessary proceeds. Thus, in sizing the guard bands, we must be mindful of the objective of repurposing spectrum for new, flexible uses, which can be fulfilled only if the forward auction generates sufficient proceeds. Decreases in the amount of licensed spectrum available in the forward auction also may undermine competition among licensed providers in the 600 MHz Band, another important policy objective. The guard bands we establish in the 600 MHz Band Plan factor in all of these considerations.[297]

92. The guard bands meet the statutory requirement that guard bands be "no larger than is technically reasonable to prevent harmful interference between licensed services outside the guard

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[292] As described above, licensing the 600 MHz Band in five megahertz spectrum blocks will allow for the greatest amount of flexibility and efficiency in the 600 MHz Band Plan, will provide uniformity and utility, and will be the most compatible with current and emerging technologies. *See* § III.A.2.b (5+5 MHz, Interchangeable Spectrum Blocks).

[293] *See* Google/Microsoft Comments at 43 ("Soliciting separate bids for the remaining small spectrum slivers in the simultaneous forward and reverse auction will introduce needless complexity to the auction process."). *See also* § III.A.2.a (All-Paired, Down From 51 Band Plan). Specifically, by offering these remainders, we would have to offer additional types of licenses in the forward auction, which would increase the amount of time the auction takes to close and, therefore, the cost of bidder participation. For these reasons, we reject the argument that we should auction the guard band spectrum to the highest bidder based on its value for unlicensed use. *See* Letter from Peter Pitsch, Executive Director, Communications Policy, Intel, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Feb. 5, 2014).

[294] We note that commenters largely support this approach. *See, e.g.*, CCIA Comments at 2; CEA Comments at 24; Google Reply at 7 (asserting that it is technically reasonable for the remainder spectrum to be used as part of the guard bands because increasing separation distance between adjacent services: (1) reduces the likelihood of harmful interference; (2) improves the customer experience; and (3) reduces costs for carriers and consumers); Intel Reply at 21 (recommending adding remainder spectrum to the duplex gap "if the final band plan boundary conditions create remainder spectrum that would otherwise be wasted"); PISC Reply at 3 ("PISC is pleased to find a clear consensus among commenters supporting the Commission's proposal to designate the guard bands for unlicensed use and to add to the guard bands any 'remainder' spectrum that cannot be auctioned in standard 5 megahertz blocks.").

[295] *See* 47 C.F.R. § 6403(c)(2); § IV.A (Overview and Integration of the Reverse and Forward Auctions). The reserve price we adopt requires, among other things, that the forward auction proceeds cover such costs, as well as any Public Safety Trust Fund amounts needed for FirstNet. *See id.* (discussing final stage rule).

[296] *See* EOBC Reply at 24-26 (arguing that designating spectrum to unlicensed does not generate revenue to meet the Spectrum Act's stated goals and risks auction failure). The above-stated conversion process can magnify the impact of even small guard band size increases. For example, if the auction were to repurpose 84 megahertz of spectrum, a one-megahertz increase in duplex gap size (from 11 to 12) could mean making only six 5+5 megahertz paired blocks available in the forward auction instead of seven.

[297] The guard bands we adopt also take into account the 600 MHz Band OOBE and power limits, which mitigate the potential for harmful interference. *See* Technical Appendix § II.E (Effect of Frequency Separation on Inter- and Intra-service Interference (Guard Bands)).

bands."[298] We interpret "harmful interference" consistent with our rules, which define harmful interference as interference that "seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service."[299] Courts have held that the use of the statutory term "reasonable" "opens a rather large area for the free play of agency discretion."[300] In contrast, the term "necessary" has been read to refer to something "required to achieve a desired goal."[301] In that regard, we reject suggestions that the statute requires the Commission to restrict guard bands to the *minimum* size necessary to prevent harmful interference.[302] Congress knows how to draft provisions of this kind,[303] and did not use such language in section 6407. Rather, it left determination of the appropriate size of the guard bands to prevent harmful interference to the Commission's "reasonable" technical judgment. Establishing "technically reasonable" guard bands is thus not only a matter that Congress left to the Commission's discretion, but also the type of predictive judgment that lies at the core of the agency's expertise.

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[298] Spectrum Act § 6403(b).

[299] 47 C.F.R. § 2.1(c); *see also id.* §§ 15.3(m), 76.613(a). We interpret the statutory term "harmful interference" in accordance with the FCC's rules because neither the Spectrum Act nor the Communications Act defines the term, and "Congress' repetition of a well-established term generally implies that Congress intended the term to be construed in accordance with pre-existing regulatory interpretations." *Toyota Motor Mfg., Kentucky, Inc. v. Williams*, 534 U.S. 184, 193-94 (2002), *superseded by statute*, ADA Amendments Act of 2008, Pub.L. 110–325, 122 Stat. 3553 (2008); *see also McDermott Int'l, Inc. v. Wilander*, 498 U.S. 337, 342 (1991) ("In the absence of contrary indication, we assume that when a statute uses . . . a term [of art], Congress intended it to have its established meaning."). Although § 90.7 of the rules refers to a different definition of harmful interference, 47 C.F.R. § 90.7 ("specifically degrades, obstructs, or interrupts"), the Part 2 definition "shall be the definitive term or definition and shall prevail throughout the Commission's Rules." 47 C.F.R. § 2.1(a); *see InfoPET Identification Sys., Inc.*, 11 FCC Rcd 11944, 11947 at para. 9 (1996); *see also Northpoint Tech., Ltd. v. FCC,* 414 F.3d 61, 69 (D.C. Cir. 2005) (deferring to Commission construction of the same undefined statutory term, "harmful interference," by reference to the agency's own definition in 47 C.F.R. § 2.1).

[300] *Orloff v. FCC*, 352 F.3d 415, 420 (D.C. Cir. 2003) (interpreting "unjust" and "unreasonable" in 47 U.S.C. § 201). Indeed, the D.C. Circuit has held, in the context of applying another statutory standard of what is "reasonable" with respect to "the interference potential of [radio] devices," that such a statutory mandate reflects no more than the usual requirement that the agency have a rational basis for its technical judgment, which is entitled to judicial deference. *American Radio Relay League, Inc. v. FCC,* 617 F.2d 875, 879 (D.C. Cir. 1980) (applying 47 U.S.C. § 302a(a)); *see also American Radio Relay League, Inc. v. FCC,* 524 F.3d 227, 233 (D.C. Cir. 2008) (granting FCC "considerable deference" where a "highly technical question" is involved, such as harmful interference). Other courts have observed that the statutory term "reasonable" is "inherently ambiguous." *City of Arlington v. FCC,* 668 F.3d 229, 255, n.126 (5th Cir. 2012) (citing cases), *aff'd,* 133 S. Ct. 1863 (2013); *Alliance for Cmty. Media v. F.C.C.*, 529 F.3d 763, 777 (6th Cir. 2008). Facially ambiguous terms can have their meanings rendered unambiguous by reference to statutory structure and history, *see, e.g., Alliance*, 529 F.3d at 777, but the statutory structure and history do not suggest an intent to limit the FCC's predictive judgment regarding harmful interference.

[301] *See GTE Serv. Corp. v. FCC,* 205 F.3d 416, 423 (D.C. Cir. 2000) (citing *AT&T Corp. v. Iowa Utils. Bd.*, 525 U.S. 366, 389-90 (1999)).

[302] *See, e.g.*, TIA Comments at 9-10 ("'Remainder' spectrum, like all reclaimed spectrum save for guard bands minimally sized to avoid interference, must be auctioned."); Joshua Pratt, The 600 MHz Incentive Auction: A Tension of Law and Public Policy at 22-23 (filed Nov. 26, 2013), available at http://apps.fcc.gov/ecfs/document/view?id=7520959592 (Pratt *Ex Parte*); *see also* AT&T Reply at 24-25 (guard bands should be no larger than what is "technically needed," or than the size "needed," or "sufficient"); Letter from Mike Gravino, Director, LPTV Spectrum Rights Coalition, to Tom Wheeler, Chairman, William Lake, Chief, Media Bureau and Gary Epstein, Chief, Incentive Auction Task Force, FCC, GN Docket No. 12-268 at 2 (filed Apr. 28, 2014) (The Commission should "not create guard-bands which are larger than exactly what is needed to prevent interference between TV and the wireless services.").

[303] *See, e.g.*, 47 U.S.C. § 251(c)(6) (duty to provide for physical collocation of equipment "*necessary* for interconnection or access to unbundled network elements"); 47 U.S.C. § 353(d) ("The Commission shall, when it finds it *necessary* for safety purposes, have authority to prescribe the particular hours of watch on a ship of the United States which in accordance with this part is equipped with a radiotelegraph station.") (emphases added).

93. The record supports our conclusion that the guard bands we adopt are technically reasonable to prevent harmful interference. With respect to the guard band between television and wireless operations, which may be from seven to 11 megahertz, depending on the spectrum recovery scenario, most commenters support a size within that range.[304] With regard to the duplex gap, which is 11 megahertz, a number of device manufacturers and wireless carriers support a size of 10 to 12 megahertz.[305] Incorporating the "remainder" spectrum into the guard band between television and wireless operations enhances the protection against harmful interference to licensed services.[306] The three megahertz guard band in our Band Plan between WMTS on channel 37 and 600 MHz operations likewise is supported by examination of the record.[307]

94. The analysis in the attached Technical Appendix corroborates our conclusion that the guard bands in our 600 MHz Band Plan are technically reasonable to prevent harmful interference.[308] Guard bands employ frequency separation to protect against harmful interference between licensed services outside the guard bands; the degree of protection generally increases with the amount of separation. The extent to which frequency separation reduces the potential for interference between a

[304] *See, e.g.*, Ericsson Reply at 17 (arguing that the Commission should establish guard bands of at least six megahertz for low power TV (50 kW EIRP or lower) and a larger guard band for higher power stations to prevent interference); Google/Microsoft Comments at 39-41, App. at 5-6 (the Commission should implement a conservative guard band that is larger than six megahertz); Motorola Comments at 12-13 (asserting that guard bands wider than six megahertz, preferably around 10 megahertz, would help mitigate interference); Sony Comments at 6 (stating that a six to eight megahertz guard band should be sufficient). *But see* CCA Comments at 15-16 (stating that three megahertz is a sufficient guard band size); Comcast Comments at 30 (stating that "the Commission should allocate at least 20 megahertz of contiguous spectrum in the 600 MHz band – the minimum amount of spectrum generally considered necessary for providing robust Wi-Fi services – for unlicensed use."); Free Press *Band Plan PN* Reply at 2 ("[T]he Commission should make available at the very least a contiguous 20 megahertz guard band or duplex gap for unlicensed use within the 600 MHz band frequencies . . . .").

[305] *See, e.g.*, Alcatel-Lucent Comments at 21 ("The duplex gap between wireless uplink and wireless downlink should be between 10 and 12 MHz."); AT&T Reply at 21 ("the size of the duplex gap needed to avoid such adjacent-channel interference is 10-12 megahertz"); Qualcomm Reply at 18 ("A duplex gap of approximately 11 to 12 MHz is the minimum needed to avoid interference between mobile downlink and uplink. . . ."); Verizon Comments at 18 ("The [duplex] gap must be at least 10 MHz (and possibly larger, depending on the overall band design."). *But see* NCTA Reply at 3-7 ("a duplex gap of at least 20 MHz—is technically reasonable and is the best way to promote the objectives of the Spectrum Act and the public interest"). *See also* Technical Appendix §§ II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)), III (Band Plan).

[306] *See* Google Reply at 7 (asserting that it is technically reasonable for the remainder spectrum to be used as part of the guard bands because increasing separation distance between adjacent services reduces the likelihood of harmful interference, which improves the customer experience and reduces costs for carriers and consumers).

[307] *See* § III.D.1.b.ii (Interference Protections for Incumbent Services). We do not establish a guard band between the adjacent operations in the 600 MHz uplink band and the Lower 700 MHz A Block (698 MHz to 704 MHz). *See* Technical Appendix § II.E.4 (Potential for Interference between 600 MHz Uplink and 700 MHz Uplink). Commenters agree that because these two bands are both used for terrestrial uplink services, they are harmonized and do not require guard bands to prevent harmful interference. *See, e.g.*, Alcatel-Lucent Comments at 21(stating that no guard band is needed between 600 MHz uplink and Lower 700 MHz uplink); CEA *Band Plan PN* Comments (stating that the 600 MHz uplink block should be situated adjacent to the 700 MHz uplink block, eliminating any need for a guard band between those operations).

[308] *See* Technical Appendix § II.E (Effect of Frequency Separation on Inter- and Intra-service Interference). As discussed above in Section I (Introduction), we are committed to an open and transparent process for the incentive auction. To that end, we provide the Technical Appendix to give additional insight into the FCC's analysis confirming our determinations about the appropriate guard band sizes, among other technical issues. We address the appropriate guard band size between 600 MHz downlink and WMTS services on channel 37 in § III.D.1.b.ii (Interference Protections for Incumbent Services), with supporting analysis in the Technical Appendix. *See* Technical Appendix § II.E.2 (Potential for Interference between 600 MHz Downlink and WMTS).

transmitter and a receiver can be measured by a well-established relationship among transmitted power spectral density, receiver selectivity, and frequency separation between transmitter and receiver.[309] In the case of television and the 600 MHz downlink, the two specific interference cases are a television transmitter to a mobile broadband device, and a mobile broadband base station to a television receiver. Frequency dependent rejection ("FDR") values for these two cases at different degrees of frequency separation show significant differences in likely interference. Taken together, the results of these two interference cases corroborate our decision that the technically reasonable guard band size between television and the 600 MHz downlink is seven to 11 megahertz, depending on the particular band plan scenario.[310]

95. Transmit and receive filters often contribute significantly to interference protection, and accordingly we also consider the capabilities of mobile device filters in the case of television and the 600 MHz downlink. The transition band, or separation needed for significant filter rejection, can be as small as seven megahertz with reasonable cost, complexity, and size, but increasing the transition band size up to 11 megahertz reduces the filter cost, complexity, and size and enables a greater variety of filter technologies to be considered.[311] Consideration of this determination together with our FDR analysis confirms that a guard band size between television and wireless operations of seven to 11 megahertz is technically reasonable.

96. With respect to the duplex gap, many FDD technologies, including FD-LTE, allow simultaneous transmission and reception. Because the transmitter and receiver are co-located, however, there is a potential for self-interference (i.e., harmful interference within the device). For this reason, the FDD device contains a receive and a transmit filter designed to operate together to reduce the likelihood of such interference. The two filters depend on frequency separation, often referred to as the "duplex gap," to operate properly.[312] Factors that affect the impact of frequency separation are the transmitter's Out of Band Emissions ("OOBE") and filter capability.[313] With regard to the former, a duplex gap of up to 11 megahertz, depending on the spectrum recovery scenario, is reasonable to prevent third order intermodulation products adjacent to the transmit signal from overlapping the frequency region of the

[309] For a detailed description of this Frequency Dependent Rejection (FDR) relationship, *see* NTIA, Frequency Dependent Rejection Overview, http://www.its.bldrdoc.gov/publications/2498.aspx (last visited Apr. 10, 2014); *see also* DISA/DSO, Communications Receiver Performance Degradation Handbook, Doc. Ctrl. No. JSC-CR-10-004, at 28-31 (2010), *available at* http://www.ntia.doc.gov/files/ntia/publications/jsc-cr-10-004final.pdf ; Edward F. Drocella, et al., NTIA, Description of a Model to Compute the Aggregate Interference From Radio Local Area Networks Employing Dynamic Frequency Selection, TM-09-461, at 5-9 (2009), *available at* http://ntiacsd.ntia.doc.gov/msam/FDR/FDRoverview.htm. The FDR methodology compares the interference potential to a theoretical situation where all the transmitter power falls directly on the receiver's desired channel. For example, if a transmitted signal reaches a receiver at a power of -40 dBm, and the FDR is 50 dB, this means the interference is equivalent to -90 dBm in the receiver's channel. The FDR value can also be viewed as the amount of transmitted signal attenuation at the receiver, which depends on the frequency offset (separation) between the receiver and transmitter due to the receiver detuning and different receiver and transmitter bandwidth overlaps.

[310] *See* Technical Appendix § II.E.1 (Potential for Interference between Television and 600 MHz Services).

[311] *See* Technical Appendix §§ II.A (Mobile Filter Considerations), II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)).

[312] The duplex gap may also refer to all the frequencies between the two filters, and in this proceeding it has been used by commenters in several related but distinct senses, such as all frequencies between the uplink and downlink pass bands regardless of the filter arrangement. To avoid confusion, we refer to the spectrum between the uplink and downlink bands in the 600 MHz Band as a "duplex gap," which serves as a guard band between the 600 MHz uplink and downlink bands.

[313] In modern mobile broadband devices, the strongest OOBE is in the region of third order intermodulation products adjacent to the transmit signal, so the duplex gap needs to be large enough to prevent this region from overlapping the frequency region of the receive signal. *See* Technical Appendix § II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)).

receive signal.[314] With regard to filter capability, in order to be as large as the achievable transition band, and considering the high rejection needed to prevent self-interference, the duplex gap should be at least 11 megahertz.[315] Consideration of these two factors together confirms that the duplex gap in our 600 MHz Band Plan, which is 11 megahertz, is technically reasonable to prevent harmful interference.[316]

97. We reject arguments that the Commission should establish larger guard bands to facilitate their use by unlicensed devices.[317] For the reasons discussed above, doing so would threaten our ability to

[314] Intermodulation products are unintended transmissions that can be generated in radio components, and can be significant sources of out-of-band emissions. *See, e.g.*, CTIA Comments at 24-25 ("Intermodulation distortion occurs due to the interaction between two radio signals such that each affects the amplitude of the other signal, thereby distorting the received communication. The overall impact of the distortion will be driven by the magnitude of the two signals and it is additive, such that the more frequencies that are mixed together (and at higher powers), the more interference is generated."). *See* Technical Appendix § II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)). We reject Google and Microsoft's argument that the size of the duplex gap needs to be equal to the size of the pass band to address the intermodulation issue. Google/Microsoft Comments, App. at 4; *see* Technical Appendix § II.C.2 (User Equipment Self-Intermodulation).

[315] *See* Technical Appendix § II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)).

[316] A number of commenters support a duplex gap of 11 megahertz. *See, e.g.*, Letter from Joan Marsh, Vice President, Federal Regulatory for AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed May 9, 2014) ("AT&T supports a minimum 11 MHz duplex gap as essential to effective deployment of the new 600 MHz band."); Letter from H. Nwana, Executive Director, Dynamic Spectrum Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed May 7, 2014) ("[T]he duplex gap between uplink and downlink licensed operations must be 11 or 12 MHz at an absolute bare minimum to . . . ensure that licensed devices are protected from harmful interference."); Letter from Paul Margie, Counsel, Google, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed May 8, 2014) (expressing support for establishing a nationwide 11 MHz duplex gap); Letter from Michael Calabrese, New America Foundation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed May 6, 2014) ("The Order should find that a duplex gap of [at] least 11-12 MHz wide is technically reasonable."); Qualcomm Reply at 18 ("A duplex gap of approximately 11 to 12 MHz is the minimum needed to avoid interference between mobile downlink and uplink."); Letter from Dr. Apurva N. Mody, Chairman, WhiteSpace Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 3 (filed May 7, 2014) ("the duplex gap between uplink and downlink licensed operations must be a minimum of 11 or 12 MHz"). In addition, a number of commenters support a duplex gap that is a minimum of 10 megahertz. *See also* Alcatel-Lucent Comments at 21 ("The duplex gap between wireless uplink and wireless downlink should be between 10 and 12 MHz"); Letter from Rick Kaplan, Executive Vice President, Strategic Planning, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att at 8 (filed May 9, 2014) ("The duplex gap should be at least 10 megahertz.") Verizon Comments at 18 ("The [duplex] gap must be at least 10 MHz (and possibly larger), depending on the overall band design.").

[317] In addition to TV white space (TVWS) device access to any unused channels in the reorganized television bands, s*ee* 47 C.F.R. §§ 15.701-15.717 (Subpart H-Television Band Devices), unlicensed proponents argue that the Commission should make spectrum available for unlicensed use on a nationwide basis, including: (1) an expanded guard band separating television and commercial wireless services; (2) an expanded guard band or duplex gap separating wireless uplink and downlink services; (3) two unused television channels set aside for wireless microphone use; and (4) channel 37 on a shared basis with WMTS and RAS. *See* Google/Microsoft Reply at 5-6, 8-9; IEEE 802 Reply at 2; Motorola Mobility Comments at 14-15; Wi-Fi Alliance Comments at 3-4; WISPA Comments at 16-18. Commenters argue that 10-28 megahertz of spectrum in the 600 MHz Band should be identified for unlicensed use. *See* Comcast Comments at 41-44 (20 megahertz of contiguous spectrum for Wi-Fi use); Google/Microsoft Comments at 32 (duplex gap should be maximum amount of "usable" unlicensed spectrum taking into account technical and economic factors); IEEE 802 Reply at 2 (minimum of three six-megahertz channels for TVWS use); Wi-Fi Alliance Comments at 3 (more than six megahertz guard band is needed for TVWS device to meet out-of-band emission limits and avoid interference to adjacent band services); WISPA Comments at 18 (24 megahertz of contiguous spectrum above channel 21); WSA Comments at 25-26 (10-14 megahertz guard bands between LTE and broadcasting and 18-28 megahertz duplex gap). Over the course of this proceeding, their proposal has evolved into a request for four "usable" channels for unlicensed use. *See* Letter from Austin C.

(continued….)

meet our goals in the incentive auction.[318] Moreover, guard bands larger than those incorporated in our 600 MHz Band Plan would not satisfy the requirements of section 6407(b).[319] The statutory "technically reasonable" restriction was a compromise between one legislative proposal that would have required all repurposed spectrum to be licensed and other proposals that would have designated or reallocated repurposed spectrum specifically for unlicensed use.[320] That compromise permits the establishment of guard bands, and the use of such guard bands for unlicensed use, but requires that the guard bands be no larger than the Commission determines is technically reasonable for the specific purpose of preventing harmful interference between licensed services outside the guard bands. Thus, we reject suggestions that section 6407(c) implicitly requires us to size guard bands to facilitate unlicensed use without regard to their effect in preventing harmful interference.[321] Such arguments would effectively negate Congress's express directive in section 6407(b) regarding "size of guard bands." We also reject NCTA's argument that the duplex gap is not a "guard band" and, therefore, need not be sized in accordance with section 6407(b).[322]

f. Band Plan Technical Considerations

98. The 600 MHz Band Plan technical issues below are addressed in detail in the Technical Appendix. For a complete discussion of the issues and our conclusions, we refer readers to the Appendix.

(Continued from previous page)
Schlick, Director, Communications Law, Google, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Mar. 25, 2014) (seeking four "usable" six-megahertz channels for unlicensed use on a nationwide basis); Letter from Paul Margie, Counsel, Google, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Mar. 6, 2014) (seeking four "usable" six-megahertz channels for unlicensed use on a nationwide basis). By "usable" spectrum, these commenters mean the amount needed to accommodate six megahertz channels used by TVWS devices under the Part 15 rules, with additional spectrum on either side of the emission bandwidth to protect adjacent bands from harmful interference.

[318] *See* § III.A.1 (Background).

[319] One commenter, Google/Microsoft, submitted a technical analysis supporting a guard band of up to 12 megahertz between television and 600 MHz downlink services, and a duplex gap of up to 24 megahertz. *See* Google/Microsoft Comments at 37-42, App. We explain why we do not find this analysis persuasive in the Technical Appendix. *See* Technical Appendix § II.E.1 (Potential for Interference Between Television and 600 MHz Services).

[320] *See* n.292.

[321] *See* Free Press Reply at 7; NCTA Comments at 16-17. NCTA argues that "the Spectrum Act explicitly recognizes the importance of unlicensed spectrum in the wireless marketplace by specifically authorizing the Commission to permit the use of guard bands for unlicensed use and by otherwise recognizing the importance of unlicensed use of spectrum in parallel with the auction of spectrum for licensed uses," that "Congress expected the Commission to use that authority effectively and productively," and that Congress's "objective would be frustrated by the adoption of a band plan that hampered or limited the utility of those bands for that purpose." *Id.*

[322] *See* NCTA Comments at 11 (citing *NPRM*, 27 FCC Rcd at 12412, para. 152 & 12416, para. 166). NCTA's argument is based solely on the *NPRM* description of the duplex gap in the lead band plan proposal, not on an existing or proposed definition of the statutory term "guard band." *See id.* Contrary to NCTA's argument, interpreting "guard band" to include the duplex gap is consistent both with the statutory language, that the function of the duplex gap is "to prevent harmful interference between licensed services outside the guard bands," specifically 600 MHz uplink and downlink services, and with the common meaning of the term. Spectrum Act § 6407(b); AT&T Reply at 25-26 n.32 (defining guard band as "[a] narrow bandwidth between adjacent channels which serves to reduce interference between those adjacent channels") (quoting Newton's Telecom Dictionary 551 (26th ed. 2011)); Comcast Comments at 44 ("the duplex gap serves as a type of guard band"); Free Press *Band Plan PN* Reply at 2 n.5; Verizon Reply at 12 n.31 (characterizing duplex gap as "a guard band between the downstream and upstream channels" that is "required to avoid self-interference") (internal quotes and citations omitted); Cisco Comments at 11 n.19 (guard band includes allocation either "to separate adjacent transmit and receive bands within a given service" or "to separate bands of different services") (internal quotes and citations omitted).

(i) Pass Band Size and Mobile Filter Considerations

99. *Background.* In the *NPRM*, the Commission recognized that current technology limits the size of an FDD pass band to roughly four percent of the center frequency for a single duplexer, or filter, and a TDD pass band to 7.5 percent.[323] It noted, however that surface acoustic wave ("SAW") filters using alternative manufacturing processes with lithium niobate may support an FDD pass band of six percent.[324] The Commission sought comment on current filter technology, the actual limitations on filters, and why those limitations exist.[325] It also asked commenters to address the potential for future technologies that may support a wider pass band than what typically can be supported currently.[326] Finally, the Commission sought comment on how pass band size relates to the size of the guard bands, including the duplex gap.[327]

100. Many commenters agree that current technology limits the pass band to roughly four percent of the center frequency for a single duplexer.[328] Some commenters support wider pass bands that would require multiple filters to achieve, however. Commenters' views differ on whether we should adopt a pass band size using one or multiple filters.[329]

101. *Discussion.* The 600 MHz Band Plan we adopt has at most a 60 megahertz pass band size, which can be accommodated by using multiple filters. The specific size of the pass band for the 600 MHz Band Plan depends on the amount of spectrum we can ultimately make available in the forward auction. Based on the results of our technical analysis, we agree with the commenters that assert that the maximum pass band size for current technology is roughly four percent of the center frequency for a single filter. However, we also agree with commenters who point out that this need not limit the 600 MHz Band Plan pass band size, as multiple duplexers can be used.[330] Therefore, as discussed in the Technical Appendix,[331] filter pass band size is not a limit on the pass band size for our 600 MHz Band Plan.

(ii) Mobile Antenna Considerations

102. *Background*. Some commenters suggest that mobile antenna bandwidth limitations limit the amount of paired spectrum that can be offered in a single band.[332] For example, Qualcomm suggests that bandwidths of 70 megahertz or more may not be feasible in smart phones without using a tunable

[323] *NPRM*, 27 FCC Rcd at 12417-18, para. 169.

[324] *Id.* at para. 169.

[325] *Id.* at 12418, para. 170.

[326] *Id.* at para. 171.

[327] *Id*.

[328] *See, e.g.*, AT&T Comments at 18; Motorola Comments at 12; Qualcomm Comments at 14-15; RIM Comments at 14.

[329] The following commenters support a pass band size of 25 megahertz: Alcatel-Lucent Comments at 28; AT&T Comments at 18; Ericsson Reply at 13-14; Intel Reply at 4-16; Qualcomm Comments at 4; Samsung *Band Plan PN* Reply at 3-5; Verizon Comments at 11-14 (for its band plan with a lower clearing target). NCTA supports a pass band size of 30 megahertz. NCTA Reply, App. at 25-30. The following commenters support a pass band size of 35 megahertz: T-Mobile Comments at 10; Verizon Comments at 7-11 (for its band plan with a higher clearing target).

[330] Letter from Kathleen Ham, T-Mobile USA, Inc. and Kathleen Grillo, Verizon, to Ruth Milkman, Chief, Wireless Telecommunications Bureau and Gary Epstein, Chief, Incentive Auction Task Force, FCC, GN Docket No. 12-268 (filed Sept. 16, 2013).

[331] *See* Technical Appendix § II.A (Mobile Filter Considerations).

[332] *See, e.g.*, Qualcomm Reply at 24-25; RIM Comments at 8; T-Mobile Reply at 12; Verizon Comments at 14.

antenna or multiple antennas.[333] AT&T proposes limiting paired spectrum to 25+25 megahertz using a Down from 51 configuration because supporting larger amounts necessitates the use of larger antennas and poses engineering challenges."[334] Other commenters, such as Ericsson and T-Mobile, suggest that although there is some decrease in antenna performance when allowing for more paired spectrum in a single band, making more paired spectrum available is nonetheless preferable.[335]

103. *Discussion*. We will not limit the amount of paired spectrum we make available because of mobile antenna concerns. We agree with Ericsson, T-Mobile and others that although more paired spectrum in a single band decreases antenna performance to some extent, it is better nonetheless to make more paired spectrum available. For example, as set forth in the Technical Appendix, the propagation of the 600 MHz Band is such that even if repurposing a large amount of spectrum has a coverage impact, the coverage would still be as good as the 700 or 800 MHz Bands.[336] The relatively small potential costs of degradation in antenna performance are outweighed by the utility of repurposing spectrum. Further, these issues can be addressed using a tunable antenna or other antenna technologies.[337] Therefore, we will not limit the amount of paired spectrum we make available because of mobile antenna concerns.[338]

(iii) Intermodulation Interference

104. *Background.* Commenters raise two primary concerns about intermodulation causing harmful interference to mobile broadband users of the 600 MHz Band.[339] First, they argue that television stations should not be placed between the 600 MHz uplink and downlink bands ("TV in the duplex gap").[340] Second, they argue that in-band third order intermodulation products formed by the user equipment ("UE," e.g., mobile handset) transmission would combine with themselves and fall into the downlink pass band.[341]

105. *Discussion.* We will not limit the amount of spectrum available in the forward auction based on intermodulation interference concerns. As discussed in the Technical Appendix, we find that with appropriate frequency separation, placing television stations in the duplex gap will not cause harmful interference, should we decide to do so to accommodate market variation.[342] We also agree with Alcatel-

[333] *See* Qualcomm Comments at 6. Other commenters argue that tunable antennas are practical for wide deployment, however. *But see, e.g.*, Craig Sparks, Sprint, *600 MHz Band Plan Workshop Transcript* at 120-22.

[334] AT&T Comments at 30 ("[T]he extreme width of [the Down from 51 and 36 band plan's] duplex gap would necessitate the use of larger antennas and pose major engineering challenges").

[335] *See, e.g.*, Christian Bergljung, Ericsson, *600 MHz Band Plan Workshop Transcript* at 106-9; T-Mobile Reply at 18-20 (advocating for a 35x35 MHz pass band because it will create the most paired spectrum and arguing that the losses suffered by the antenna are manageable).

[336] *See* Technical Appendix § II.B (Mobile Antenna Considerations).

[337] *See, e.g.*, T-Mobile Reply at 18-20; *see also* Craig Sparks, Sprint, *600 MHz Band Plan Workshop Transcript* at 120-22.

[338] *See* Technical Appendix § II.B (Mobile Antenna Considerations).

[339] Intermodulation interference occurs when signals combine in a non-linear device, which generates intermodulation products on related frequencies, and one of these products interferes with a receiver.

[340] *See, e.g.*, Alcatel-Lucent Comments at 14-16; CEA *Band Plan PN* Comments at 3; Ericsson Reply at 4, 9-10, 17; Google Reply at 8-9; Motorola Comments at 9-10; NAB Comments at 6; TechAmerica Reply at 4; US Cellular *Band Plan PN* Comments at 3.

[341] *See, e.g.*, Google Reply at 8-9; Alcatel-Lucent Comments at 14-16. Commenters have also raised concerns about intermodulation causing interference to TV receivers, which is discussed in § VI.B.1.a (Out-of-Band Emission Limits).

[342] *See* Technical Appendix § II.C (Intermodulation Interference). As discussed above, we are not now deciding whether to place television stations in the duplex gap. *See* § III.A.2.d (Market Variation).

Lucent that a technically reasonable duplex gap, which we adopt as part of our 600 MHz Band Plan, will prevent in-band third order intermodulation products from falling in the downlink pass band.[343]

(iv) Harmonic Interference

106. *Background*. Harmonics are a form of intermodulation product that is generated by self-intermodulation of a signal in a transmitter, resulting in the signal appearing at multiples of the desired frequency.[344] Some commenters express concerns about harmonic interference from 600 MHz mobile devices interfering with mobile devices in other bands, such as the PCS band and the BRS/EBS band. Most of these commenters focus on interference within the mobile device, which is caused by simultaneous use of certain bands via carrier aggregation.[345] Others argue that mobile-to-mobile interference could occur between 600 MHz devices and devices in other bands,[346] and that using the 643-667 MHz Band for mobile uplink transmissions will result in harmonic interference.[347]

107. Not all commenters believe that the harmonic interference will result in harmful interference, however.[348] Alcatel-Lucent acknowledges that while harmonic interference will occur, the harmonics that are generated from base station emissions are manageable.[349] Sprint argues that potential third-harmonic conflicts already exist in the U.S., and "yet we have seen little evidence of such interference problems to date."[350] T-Mobile explains that the vast majority of the time, the device transmitter will operate with far less than 23 dBm power and, as a result, produce far less desensitization into the PCS receiver.[351]

108. *Discussion*. As discussed in the Technical Appendix, any potential harmonic interference created in the 600 MHz Band can be effectively mitigated so that it does not result in harmful interference.[352] The risk of mobile-to-mobile harmful interference through harmonic interference is minimal.[353] In addition, although we recognize that harmful interference within a device could occur in a carrier aggregation scenario, we agree with commenters who suggest that this potential can be mitigated in various ways.[354] Therefore, we find that we do not need to limit the amount of spectrum we offer in the 600 MHz Band due to the potential for harmonic interference.

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[343] Alcatel-Lucent Comments at 14-16.

[344] For example, given a frequency *f*, the harmonic intermodulation products appear at 2*f*, 3*f*, 4*f*, and so forth, and are progressively weaker.

[345] *See, e.g.*, Qualcomm Comments at 6-13 ("[I]t would be particularly challenging to support a 600 MHz uplink band that extends beyond 25 MHz in mobile devices that also support bands above 600 MHz.").

[346] *See, e.g.*, Alcatel-Lucent Comments at 13 ("Considering the body loss for both terminals, a new entrant's terminal transmitting, for example, at 650 MHz at 200 MWatts (23 dBm) can inject -26dBm into a nearby PCS terminal's receive antenna.").

[347] Alcatel-Lucent Comments at 3, 13-14; AT&T Comments at 19, 24-27; CTIA Comments at 26; Ericsson Reply at 31-32; Nokia Comments at 13-14; Verizon Comments at 14.

[348] Alcatel-Lucent Comments at 17; DISH Reply at 8-9; Sprint Comments at 25; T-Mobile Reply at 23-26.

[349] Alcatel-Lucent Comments at 17.

[350] Sprint Comments at 25.

[351] T-Mobile Reply at 24.

[352] *See* Technical Appendix §II.D (Harmonic Interference).

[353] *See* Technical Appendix §II.D (Harmonic Interference).

[354] *See* Sprint Reply at 18 ("With little additional low-band spectrum available, neither industry nor the Commission should preclude spectrally efficient, pro-competitive solutions simply because of harmonic issues that invite practical, technical solutions."); *see also* Technical Appendix §II.D (Harmonics Interference).

B. Repacking the Broadcast Television Bands

109. Repacking involves reorganizing television stations in the broadcast television bands so that the stations that remain on the air after the incentive auction occupy a smaller portion of the UHF band, thereby freeing up a portion of that band for new wireless uses.[355] In repacking, the Commission will exercise its longstanding spectrum management authority,[356] as it has in prior actions such as the digital television transition, as well as the specific grant of authority in the Spectrum Act.[357] The Spectrum Act imposes express requirements on that exercise of authority; in particular, it makes repacking "subject to international coordination along the border with Mexico and Canada" and requires "all reasonable efforts to preserve, as of the date of the enactment of this Act, the coverage area and population served of each broadcast television licensee, as determined using the methodology described in OET Bulletin 69."[358]

110. The selection of winning reverse auction bids will depend in part on the Commission's ability to assign television channels to the stations that are not relinquishing their spectrum usage rights. Because participation in the reverse auction is voluntary, the option for active bidders to stay in their pre-auction band must remain available.[359] To ensure this option is available, the feasibility of assigning a channel in the pre-auction band must be checked for each non-participating station and each active bidder before each auction round. The reverse auction and the repacking process are, therefore, interdependent; for the incentive auction to succeed, they must work together.[360]

111. Speed is critical to the successful implementation of the incentive auction.[361] If the reverse auction bidding takes an unreasonably long time to complete because of the time required to determine whether there is an appropriate channel for each station that has not relinquished its spectrum usage rights, then the viability of the auction as a whole will be threatened.[362] Our repacking methodology, therefore, must be capable of analyzing complex technical issues in a timely manner, that is, fast enough not to unduly slow down the bidding process. Certainty also is vital: because the reverse auction outcome depends on repacking decisions, the results of the repacking process cannot be tentative or indefinite after the auction is complete.[363]

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[355] *See* Spectrum Act § 6403(b)(1) (requiring the FCC, in order to "mak[e] available spectrum to carry out the forward auction," to "evaluate the broadcast television spectrum," and authorizing it, "subject to international coordination . . . ," to "make such reassignments of television channels as the Commission considers appropriate" and "reallocate such portions of such spectrum as the Commission determines are available for reallocation.").

[356] *See* n.288.

[357] *See* Spectrum Act §§ 6003(a), 6403(b).

[358] Spectrum Act §§ 6403(b)(1)(B), (b)(2). *See also id.* §§ 6403(b)(3) (no involuntary relocation from UHF to VHF), (g) (limitation on reorganization authority).

[359] Pre-auction bands, or home bands, include the lower VHF band (channels 2-6), the upper VHF band (channels 7-13), and the UHF band (channels 14-51).

[360] *See NPRM*, 27 FCC Rcd at 12359, para. 5.

[361] *See NPRM*, 27 FCC Rcd at 12378, para. 61 ("We believe that speed is important to the successful design of the incentive auction for a number of reasons, including the interdependence of the reverse and forward auctions.").

[362] Broadcast stations may drop out of the bidding or not participate in the first place if they must wait for days, weeks or even months to find out whether their bids are accepted. Excessively long reverse auction stages would also impose costs on bidders in the forward auction. Because closing the incentive auction requires completion of the final stage of both the forward and the reverse auction, the possibility of significant delay in the latter could discourage participation in the forward auction, as well. *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions).

[363] *See* Spectrum Act § 6403(e) (the FCC may not conduct more than one reverse auction or more than one repacking under §§ 6403(a)(1) and (b), respectively). As discussed below, after the auction is complete and any

(continued….)

112. Because our implementation of the repacking process is driven by the Spectrum Act's express requirements, as well as by auction design considerations, explaining our decisions requires an understanding of the repacking methodology's role in the reverse auction. Accordingly, we begin this Section with an overview of how the repacking process will work in the context of the reverse auction. We then address how we will make all reasonable efforts to preserve television stations' coverage areas and populations served pursuant to the statute's requirements. Next, we address which stations' coverage areas and populations served we will make all reasonable efforts to preserve, both pursuant to the requirements of the statute and as a matter of Commission discretion. Last, we address coordination with Mexico and Canada along our common borders.

1. Repacking Process Overview

113. Here, we briefly describe the repacking methodology we adopt and how it will work in the context of the reverse auction.[364] As an initial matter, we adopt an approach that incorporates elements of both procedures proposed in the *NPRM* to assign channels to television stations that will remain on the air.[365] During the reverse auction bidding process, we will undertake a "repacking feasibility check" to ensure that each station that will remain on the air after the incentive auction is reassigned to a channel that satisfies the statutory preservation mandate.[366] After the final stage rule is satisfied and bidding stops (but before the incentive auction concludes), channel assignments will be optimized and finalized.[367] As discussed below, this approach will enable rapid evaluation of bids during the reverse auction. This approach also will provide certainty that a channel that complies with the requirements imposed by the Spectrum Act and our rules is available for every station that remains on the air following the incentive auction.

114. Prior to the commencement of the reverse auction, the staff will determine the coverage area and population served as of February 22, 2012 (the date of the enactment of the Spectrum Act) of every television station whose coverage area and population served the Commission will make all reasonable efforts to preserve in the repacking process, using the methodology described in the Office of Engineering and Technology Bulletin No. 69 ("OET-69").[368] With respect to certain facilities we are exercising discretion to protect, we will determine the coverage area and population served as of dates appropriate to those facilities.[369] Based on this data, the staff will develop constraint files for each station

(Continued from previous page)
channel reassignments become effective, we will accept applications by individual stations to modify the channel assignments they received in the repacking process. *See* § V.C.1.b (Alternate Channel and Expanded Facilities Opportunities).

[364] The incentive auction is discussed in more detail below in § IV (The Incentive Auction Process).

[365] *See NPRM*, 27 FCC Rcd at 12374-75, paras. 45-46 (seeking comment on "integer programming algorithm" or optimization-based and sequential algorithm approaches to establishing channel assignments). This decision is discussed in detail in § IV.B.2.b (Reverse Auction – Bid Assignment Procedures: Determining Which Bids Are Accepted).

[366] *See NPRM*, 27 FCC Rcd at 12375, para. 46 (setting forth the sequential algorithm approach).

[367] *See NPRM*, 27 FCC Rcd at 12374, para 45 (setting forth the integer programming algorithm approach). Optimization techniques also will be employed during the initialization step of the reverse auction. *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions).

[368] *See* Spectrum Act § 6403(b)(2); OET-69 (Feb. 6, 2004), *available at* http://transition fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet69/oet69.pdf. The methodology described in OET-69 is addressed below in § III.B.2.b (OET-69 and *TVStudy*).

[369] The stations whose coverage area and population served we will make all reasonable efforts to preserve are set forth in § III.B.3 (Facilities to Be Protected).

using the approach set forth in the *Repacking Data PN*, with the exceptions noted below.[370] OET explained in the *Repacking Data PN* how such data could be processed for use in the repacking process.[371] Specifically, an "interference-paired" file will be produced that includes records for each station. The interference-paired file will include a list of all the other television stations that could *not* be assigned to operate on the same channel or on an adjacent channel with each particular station.[372] Additionally, a "domain" file will be produced that includes records for each station. The domain file will include a list of all the channels to which the station could be assigned considering "fixed constraints," that is, incumbents in the bands other than domestic television stations that are entitled to interference protection at fixed geographic locations and on specific channels.[373] The two files, collectively the "constraint files," will be used to check the feasibility of assigning permissible channels to stations that will remain on the air. The constraint files will enable the repacking methodology to rapidly evaluate during the reverse auction bidding process whether a channel could feasibly (that is, consistent with the preservation mandate of the Spectrum Act) be assigned to each station in light of the other stations that must also be assigned channels at that point during the auction.[374]

115. We adopt the approach to developing constraint files proposed in the *Repacking Data PN*, except that the determination of coverage area and population served, as required by the Spectrum Act, will not be calculated based on a single channel, or "proxy" channel, in each band.[375] Instead, we will calculate the coverage of a station and the interference between stations on every possible channel that could be assigned to the station during the repacking process.[376] Further, the data inputs and assumptions that appear in the *Repacking Data PN* will be updated to reflect the decisions adopted in this

[370] *See Incentive Auction Task Force Releases Information Related to Incentive Auction Repacking*, ET Docket No. 13-26, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 10370 (2013) (*Repacking Data PN*).

[371] The data included in the constraint files released in conjunction with the *Repacking Data PN* were based on preliminary assumptions and will not be used in the auction. *See id.* at 10374. As stated below, the data instead will be updated consistent with the decisions adopted in this Order.

[372] The interference-paired file will match the coverage area of a station to the degree that the area is populated.

[373] These incumbents include Canadian and Mexican television facilities or allotments, certain land mobile and radio astronomy facilities (RAS), as well as wireless medical telemetry (WMTS) devices.

[374] Consistent with the *Repacking Data PN*, in addition to the data required to carry out the statutory preservation mandate, *see* Spectrum Act § 6403(b)(2) (mandating "all reasonable efforts" to preserve coverage area and population served), constraint files will include data necessary to meet the requirements of §§ 90.903, 73.623(e), and 2.106 of the Commission's rules. *See* 47 C.F.R. §§ 90.303 (requiring distance-based protections between television stations and land mobile operations in channels 14-20 in certain markets), 73.623(e) (protecting land mobile licensees operating in variance with the specified locations and channels under waivers of § 90.303), 2.106 (protecting channel 37 allocation for RAS and WMTS, and protecting channel 17 in Hawaii only where it is allocated on a primary basis for common carrier control and repeater stations for point-to-point inter-island communications; currently there are no operating services on channel 17). Further, the files will include data required to protect Canadian and Mexican facilities or allotments in line with our international obligations.

[375] In the *Repacking Data PN*, the calculations for coverage and interference were made on a single channel in each of the three television bands (low VHF, high VHF and UHF) as a proxy for that band. *See Repacking Data PN*, 28 FCC Rcd at 10385. NAB objected to the use of the proxy channel, expressing concern that it might underestimate actual interference after the repacking process. *See* Letter from Rick Kaplan, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 21 (filed Sept. 5, 2013) (NAB Sept. 5, 2013 *Ex Parte* Letter); *see also* Letter from Rick Kaplan, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2-3 (filed Nov. 27, 2013) (NAB Nov. 27, 2013 *Ex Parte* Letter). Although the "proxy" channel approach was the only one available at the time of the release of the *Repacking Data PN*, further staff work has resulted in the development of an approach where calculating constraints on every possible channel, without relying on proxies, is possible.

[376] As a result, the constraint files will include a list of all the other television stations that could not be assigned to operate on the same channel or on an adjacent channel with a particular station for every channel in the three bands rather than a "proxy" channel.

Order.[377]

116. During the initialization step of the reverse auction, the initial "clearing target" for how much television spectrum will be repurposed through the reverse auction and the repacking process will be determined based on broadcast stations' collective willingness to relinquish spectrum usage rights at the opening prices announced by the Commission.[378] The clearing target will dictate the total number of remaining channels available for the repacking process.[379]

117. At the start of the reverse auction bidding process, broadcast stations will fall into two general categories: non-participating stations that will remain on the air after the incentive auction, and participating stations that may or may not remain on the air (including stations that may elect to change bands from UHF to VHF or high VHF to low VHF), depending on the reverse auction outcome. The repacking feasibility checker will ensure that every non-participating station can be assigned a television channel in its pre-auction band.[380] Each time a participating station drops out of the auction, the repacking feasibility checker will determine whether a channel is available for each individual station that continues to participate in the bidding.[381] The bidding will continue within a stage until every station has either dropped out of the auction or had its bid accepted. Final channel assignments will not be made during the bidding stage.

118. After the bidding in the reverse auction ends, the forward auction bidding will begin. As the forward auction bidding proceeds, whether the final stage rule is met will be evaluated.[382] If the rule has not been satisfied, a new stage of the auction will commence with a lower spectrum clearing target.[383] If the rule has been satisfied, the channel assignments for each station that will remain on the air will be optimized to ensure an efficient post-incentive auction channel assignment scheme, taking into consideration factors such as minimizing relocation costs. We will seek comment on the details of the channel assignment optimization in the *Comment PN*.

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[377] Specifically, the baseline list of the television stations that will be included in the files for preservation of their coverage area and population served will be updated to reflect the decisions set forth in § III.B.3 (Facilities to Be Protected). An updated baseline list of those facilities and their populations served will be published prior to the auction. International allotment or protected facilities will also be updated to reflect the result of international coordination efforts. *See* § III.B.4 (International Coordination).

[378] This process is discussed in detail in § IV.A (Overview and Integration of the Reverse and Forward Auctions).

[379] For example, a 126-megahertz clearing target would clear 21 of the 49 channels currently allocated for television service, and leave approximately 28 channels into which the remaining stations could be repacked. Constraints in certain television markets due to the presence of non-broadcast incumbents in the T-band (channels 14 through 20) or border constraints may impact the number of television channels available in those markets. The statute prohibits channel reassignments from the UHF to the VHF band except on a voluntary basis, Spectrum Act § 6403(b)(3), so any reassignments from UHF to VHF must be pursuant to voluntary relinquishments through reverse auction bids.

[380] This process is discussed in detail in § IV.B.2.b (Reverse Auction – Bid Assignment Procedures: Determining Which Bids are Accepted). The initial spectrum clearing target will be set such that a channel will be available to all non-participating stations that is consistent with the requirements of the Spectrum Act and our rules.

[381] If the dropping out of one participating station means that another participating station cannot feasibly be assigned a channel, then the latter station's bid will be provisionally accepted. *See* § IV.B.2.b (Reverse Auction – Bid Assignment Procedures: Determining Which Bids are Accepted).

[382] The final stage rule will be met when the forward auction has raised enough proceeds to satisfy the requirements that we establish. *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions). Forward auction bidding will continue as long as demand for wireless licenses in any area exceeds the number available in that area. *See* § IV.C.2 (Bidding Process).

[383] The staged structure of the reverse and forward auctions is discussed in detail below. *See* § IV.A (Overview and Integration of Reverse and Forward Auctions).

2. Implementing the Statutory Preservation Mandate

119. Below, we address the requirements of section 6403(b) of the Spectrum Act.[384] We first address the Spectrum Act's mandate that we make "all reasonable efforts" to preserve coverage area and population served of television stations as of February 22, 2012, as determined using the methodology described in OET-69. To fulfill the statutory mandate, we will use new software developed by OET, *TVStudy*,[385] to implement the methodology of OET-69.[386] We conclude that section 6403(b)(2) directs us to protect stations' existing coverage areas, and interpret "population served" to mean the specific viewers who had predicted access to a station's signal. We also adopt the proposal to permit channel assignments that would not increase interference from any one station by more than 0.5 percent.[387]

a. "All Reasonable Efforts"

120. The Spectrum Act gives the Commission broad discretion to "make such reassignments of television stations that the Commission considers appropriate" "[f]or purposes of making available spectrum to carry out the forward auction."[388] Congress imposed a qualification on this general mandate: "the Commission must make *all reasonable efforts* to preserve, as of the date of the enactment of this Act, the coverage area and population served of each broadcast television licensee, as determined using the methodology described in OET Bulletin No. 69 of the Office of Engineering and Technology of the Commission."[389]

121. As the Commission explained in the *NPRM*, "[w]hile the statute does not define the term 'all reasonable efforts,' that phrase is not uncommon: its meaning depends on the circumstances involved, and comports with the common meaning of the word 'reasonable.'"[390] AT&T argues that Congress's use of the term "reasonable" gives the Commission "great flexibility to perform repacking in light of the overarching goals of the Spectrum Act."[391] In this regard, courts have held that the statutory term "reasonable" is ambiguous and that its generality "opens a rather large area for the free play of agency discretion."[392] In contrast, broadcasters generally argue that the statutory language, structure and

[384] Spectrum Act §§ 6403(b)(1), (2).

[385] *See* § III.B.2.b (OET-69 and *TVStudy*).

[386] Spectrum Act § 6403(b)(2); *see also* OET-69. OET Bulletin 69 "provides guidance on the implementation and use of Longley-Rice methodology for evaluating TV service coverage and interference" in accordance with the Commission's rules. *Id.* at 1.

[387] We defer a decision on proposals to adopt an aggregate interference cap. *See* § III.B.2.d (Preserving Population Served).

[388] Spectrum Act §§ 6403(b)(1), (b)(1)(B)(i).

[389] *Id.* § 6403(b)(2) (emphasis added).

[390] *NPRM*, 27 FCC Rcd at 12393-94, para. 105 (citing cases).

[391] AT&T Comments at 76.

[392] *Orloff v. FCC*, 352 F.3d at 420 (interpreting "unjust" and "unreasonable" in 47 U.S.C. § 202(a). *See also Loveday v. FCC*, 707 F.2d 1443,1449 (D.C. Cir. 1983), *cert. denied*, 464 U.S. 1008 (1984) (explaining that "[a] variety of considerations, ranging from practical ones of administrative feasibility to legal ones, involving constitutional difficulties, support [the FCC's] view" that section 317 of the Communications Act, 47 U.S.C. § 317, which requires a broadcast licensee to "exercise reasonable diligence" to learn the identity of the sponsor of any paid matter transmitted over the airwaves, does not "require[] the exertion of every effort . . . to identify the real sponsors of paid material") (internal quotation marks omitted); *Wilder v. Virginia Hosp. Assoc.*, 496 U.S. 498, 519 (1990) (acknowledging that State had "substantial discretion" to choose among various methods of calculating reimbursement rates under Medicaid Act provision for "reasonable and adequate" reimbursement); *City of Arlington, Tex. v. FCC*, 668 F.3d 229, 255 (5th Cir. 2012) (interpreting "a reasonable period of time" in 47 U.S.C. § 332(c)(7)(B)), *aff'd* 133 S.Ct. 1863 (2013); *Capital Network Sys., Inc. v. FCC*, 28 F.3d 201, 204 (D.C. Cir. 1994) (court owed substantial deference to FCC's interpretation of "just," "unjust," "reasonable," and "unreasonable" in § (continued….)

history clearly reflect Congress's intent to protect them from any change in coverage area or population served in the repacking process.[393]

122. Consistent with the approach proposed in the *NPRM*, we interpret our "all reasonable efforts" obligation in light of the statutory context. Thus, in determining what is "reasonable," we agree with AT&T and other commenters[394] that we should take into account the other objectives in the Spectrum Act, including the goal of repurposing spectrum—an objective which clearly militates in favor of an efficient repacking method.[395] This reading is consistent with the rest of the Spectrum Act. Section 6403(a)(1), for example, directs the Commission to "conduct a reverse auction . . . *in order to make spectrum available* for assignment through a system of competitive bidding."[396] It is also consistent with Congressional intent.[397] We therefore find that the statute requires that we use all reasonable efforts to preserve each station's coverage area and population served without sacrificing the goal of using market forces to repurpose spectrum for new, flexible uses.[398]

123. Accordingly, we reject NAB's contention that section 6403(b)(2) of the Spectrum Act is a "hold harmless" provision that requires the Commission to identify "extraordinary" or "truly exceptional" circumstances before altering a station's coverage area and population served.[399] We note that courts have interpreted the phrases "all reasonable efforts" or "every *reasonable* effort" to "require[]

(Continued from previous page)
201 of the Communications Act mandating that any interstate communications charge, practice, classification, or regulation must be just and reasonable and declaring unlawful any that are unjust or unreasonable, because those terms are ambiguous).

[393] *See* Affiliates Associations Comments at 32; Comcast Comments at 12-13; Disney Comments at 34 ("any reduction in a station's service area due to additional interference effectively would amount to an involuntary relinquishment of spectrum rights and thus contravene Congress's mandate that the incentive auction process be voluntary."); NAB Comments at 18-21; NYSBA Comments at 21-22; Tribune Comments at 17; Univision Comments at 6.

[394] AT&T Comments at 77; AT&T Reply at 61-62; TIA Comments at 6-7; U.S. Cellular Reply at 15-16; Verizon Reply at 33; T-Mobile Reply at 89-91.

[395] *See Martin v. Monumental Life Ins. Co.,* 240 F.3d 223, 234 (3d Cir. 2001) (concluding that "best efforts" agreement can "be construed by reference to case law and surrounding facts" and should be read "in the context of the surrounding facts and circumstances."); *United Telecomm'ns, Inc. v. American Tel. & Comm'ns Corp.,* 536 F.2d 1310, 1319 n.7 (10th Cir. 1976) ("A 'best efforts' obligation . . . takes into account unanticipated events and the exigencies of continuing business . . . ."); *Mark Technologies Corp. v. Utah Resources Intern., Inc.,* 147 P.3d 509 (Utah Ct. App. 2006) (a "best efforts clause, like the one present here, creates an independent contractual obligation" of "diligence" that will "be measured subjectively in the context of the particular facts and circumstances involved."). Courts treat "all reasonable efforts" and "best efforts" interchangeably. *See, e.g., United Telecomm'ns, Inc.*, 536 F.2d at 1319 n.7 ("best efforts" obligation "requires only that . . . *all reasonable efforts* within a reasonable time to overcome any hurdles and accomplish the objective [be made]") (emphasis added).

[396] Spectrum Act § 6403(a)(1) (emphasis added).

[397] Specifically, the Joint Conference Report explained that "this legislation advance[s] wireless broadband service *by clearing spectrum for commercial auction*." *See* Joint Explanatory Statement of the Committee of Conference, H.Rep. 112-399 at 136 (emphasis added). Notably, the conference report does not identify preservation of broadcasters' coverage areas and populations served as a purpose of the law.

[398] *See* Raymond T. Nimmer, Jeff Dodd, Modern Licensing Law § 9.48 ("Here, then, is the irreducible minimum [required by an all reasonable efforts-type clause]: diligent, reasonable effort within reasonable time to overcome hurdles to the stated objective seems to establish the baseline duty."). *See U.S. v. Hayes*, 722 F.2d 723, 725 (11th Cir. 1984) (use of "some effort" rather than "all reasonable efforts" standard in assessing defense against contempt of court was abuse of discretion).

[399] NAB Comments at 19; *see also id.* at 20.

that a party make every reasonable effort, not every *conceivable* one."[400] Congress included the term "reasonable" in the statute because it anticipated that broadcasters' interests would not be the only interests that the Commission would have to consider in the repacking process. Had Congress instead intended to ensure the primacy of broadcasters' interests over all others, as NAB and others contend, Congress could have so specified.[401] It did not. Instead, it required the Commission to make "all reasonable efforts" to preserve their coverage areas and populations served,[402] a qualification that requires of the Commission a certain level of *effort* rather than a particular outcome. Accordingly, we do not believe the statute requires us to precisely and strictly preserve broadcasters' coverage areas and populations served without considering the other objectives in the Spectrum Act.

124. Nor does the legislative history support broadcasters' interpretation of section 6403(b)(2). Comcast claims that "[d]uring markup, Congress specifically rejected alternate language that could have allowed the auction and repacking process to permanently reduce broadcasters' existing coverage, as long as the process resulted in 'substantially similar' coverage."[403] Comcast's argument misses the mark. The cited legislative history informs our reading of "coverage area and population served" in section 6403(b)(2). As we explain below, we interpret those terms to require efforts to preserve service to those viewers who had access to a station's signal within its protected coverage area as of February 22, 2012—an outcome that is consistent with Congress' rejection of the term "substantially similar coverage."[404] By contrast, "the reasonableness requirement [in section 6403(b)(2)] by its plain terms is a measure of effort – i.e., the actions taken to achieve a goal – and not of the outcome itself."[405] As CEA explained in its comments, "[t]he question is not whether the Commission will protect broadcasters"; rather, "[t]he question is whether the Commission is obligated to protect *all* of the existing levels of service without considering the impact on the goal of spectrum clearing."[406] We agree with CEA that the answer to that question "is plainly no."[407]

125. We clarify, however, that we are not adopting a "balancing approach" that weighs the objective of preserving coverage area and population served against the Spectrum Act's general objective

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[400] *Bhd. of Maint. of Way Employees v. Union Pac. R.R. Co*., 358 F.3d 453, 458 (7th Cir. 2004); *see also Price v. Time, Inc*., 416 F.3d 1327, 1348 (11th Cir. 2005) (holding that a state shield law required a libel plaintiff to make "all reasonable efforts," "not every effort and not efforts for which there is a high probability of futility," to obtain the identify of a confidential informant before the court would force a journalist to disclose the informant's identity). Despite NAB's claim, *Raicovich* did not equate "all reasonable efforts" with "do everything feasible." *See* NAB *TVStudy PN* Reply at 5 (citing *Raicovich v. U.S. Postal Serv.*, 675 F.2d 417, 423-24 (D.C. Cir. 1982)); NAB Comments at 4-5 (filed Apr. 4, 2014) (NAB Apr. 4, 2014 Comments). The court used the latter phrase to describe "in general" Congress's goal in passing a comprehensive law pertaining to compensation and reinstatement of injured federal employees. *Raicovich*, 675 F.2d at 424. The "all reasonable efforts" language pertained to one provision of this comprehensive law describing the efforts an agency must undertake in placing employees injured for more than one year. The court never opined that such efforts required agencies to "do everything feasible" to place such employees.

[401] For example, Congress could have directed the Commission to simply "preserve," not to "make all reasonable efforts to preserve" broadcasters' coverage areas and populations served.

[402] Indeed, as Verizon points out, "NAB itself applies a more generous interpretation of the term 'reasonable' in the repacking reimbursement context." Verizon Reply at 34 (citing NAB Comments at 58-59). In the context of reimbursement, NAB advocates applying the word's "'ordinary, natural meaning, in keeping with settled principles of statutory construction'" – i.e., "'not extreme or excessive,' and 'moderate, fair.'" *Id.*

[403] Comcast Comments at 12-13.

[404] *See* § III.B.2.d (Preserving Population Served).

[405] T-Mobile Reply at 87.

[406] CEA Reply at 14, n.37.

[407] *Id.*

of repurposing spectrum.[408] Rather, the other objectives in the Spectrum Act inform our assessment of the degree of effort required to protect the coverage areas and populations served of broadcast licensees, that is, whether we have satisfied the "all reasonable efforts" mandate. This approach is consistent with the Supreme Court's directive that "[s]tatutory construction . . . is a holistic endeavor" such that "[a] provision that may seem ambiguous in isolation is often clarified by the remainder of the statutory scheme."[409] By way of example, efforts that would preserve broadcasters' coverage areas and populations served, but would prevent us from repurposing spectrum, would not be "reasonable" in the larger context of the Spectrum Act.[410] We therefore reject Comcast's view that section 6403(b)(2) requires us to "focus exclusively on preserving the integrity of broadcasters' existing coverage area and population served."[411]

126. Similarly, by taking into account the other objectives in the Spectrum Act, we are not "pretend[ing] that the word 'all' does not exist in the phrase 'all reasonable efforts.'"[412] "All" as used in section 6403(b)(2) modifies "reasonable"; it measures quantity of effort, but does not affect the degree of effort required by the statute. "All" therefore requires only that we make every *reasonable* effort to preserve broadcasters' coverage area.[413] Under our reading of the statute, the Commission could not satisfy its statutory obligation if it undertook only one of several reasonable actions to preserve broadcasters' coverage areas and populations served. "All," however, has no bearing on whether any particular effort is "reasonable" and thus does not require the Commission to ignore the other objectives of the Spectrum Act when conducting the repacking process.[414]

b. OET-69 and *TVStudy*

127. *Background.* OET Bulletin No. 69, which is titled "Longley-Rice Methodology for Evaluating TV Coverage and Interference," provides guidance on the implementation and use of the Longley-Rice propagation methodology for evaluating television coverage and interference.[415] The methodology described in OET-69 predicts a television station's coverage area and population served, both of which the Commission must make all reasonable efforts to preserve under the Spectrum Act. OET-69 specifically states that a computer program is necessary to implement the methodology.[416] That computer program takes certain inputs, including population data, geographical terrain data, and data

[408] *See* Comcast Comments at 12-13.

[409] *United Savings Ass'n of Texas v. Timbers of Inwood Forest Assoc., Ltd*, 484 U.S. 365, 371 (1988), cert. denied 129 S. Ct. 2821 (2009); *see also Alliance for Cmty. Media v. FCC*, 529 F.3d 763, 777-78 (6th Cir. 2008) ("[T]he detection of inherent ambiguity in words such as 'reasonable' and 'unreasonable' by other courts in other sections of the Communications Act does not terminate the analysis here, because such observations are divorced from the specific context of Title VI").

[410] *Cf. Rural Cellular Ass'n v. FCC*, 588 F.3d 1095, 1103 (D.C. Cir. 2009) (explaining that "it is hard to imagine how the Commission could achieve the overall goal of § 254 -- the 'preservation and advancement of universal service,' 47 U.S.C. § 254(b) -- if the USF is 'sufficient' for purposes of § 254(b)(5), yet so large it actually makes telecommunications services less "affordable," in contravention of § 254(b)(1)").

[411] Comcast Reply at 10; *see also* NAB Comments at 19.

[412] Comcast Reply at 9.

[413] *See Bhd. of R.R. Trainmen, Enterprise Lodge No. 27, v. Toledo P. & W. R.R.*, 321 U.S. 50, 57 (1944) (explaining "[i]t is wholly inconsistent with the section's language and purpose to construe it . . . to require reasonable effort by only one conciliatory device when others are available" when "[t]he explicit terms [of the section] demand 'every reasonable effort' to settle the dispute").

[414] Comcast Reply at 8.

[415] OET-69 at 1. The OET-69 methodology is used to predict coverage and population served when prospective licensees file new applications or existing stations file modification applications. *See* 47 C.F.R § 73.616(e)(1). The OET-69 methodology was also used in the DTV transition.

[416] OET-69 at 1.

about stations' transmission facilities, and applies the methodology described in OET-69 to generate a station's predicted coverage area and population served.[417] The computer program that implements OET-69 thus produces "output"—or more specifically, a description of a station's predicted coverage area and population served within its noise-limited contour.[418]

128. Subsequent to the *NPRM*, OET issued a Public Notice announcing that it had developed and was releasing a new computer program, called *TVStudy*, for performing interference analyses to calculate television stations' coverage areas and populations served using the methodology described in OET-69.[419] OET proposed to use this computer program to support the incentive auction. It sought comment on the program generally, as well as the identification of any errors, unexpected behaviors, or anomalous results produced in running the software.[420] In addition, OET requested comment on the implementation of various updates to inputs in the computer program, specifically: (1) population data, (2) terrain data, (3) treatment of inaccurate data in FCC databases, (4) treatment of antenna beam tilt, (5) calculation of depression angles, (6) the level of precision of geographic coordinates, (7) the establishment of a uniform calculation (cell) grid, and (8) the treatment of certain internal (Longley-Rice) warnings.[421]

129. The record reflects divergent views by industry stakeholders on the use of *TVStudy* in the incentive auction. NAB and several broadcasters strongly object to the use of *TVStudy* and the introduction of updated input values, claiming that there is no practical need for new software and that the proposed changes violate the Spectrum Act because they change the OET-69 "methodology."[422] On the other hand, commenters representing the wireless industry and equipment manufacturers applaud the release of *TVStudy* and the *TVStudy PN* proposals, arguing that relying on outdated computer software and data would undermine the FCC's ability to preserve broadcasters' coverage area and population served as of the date of the enactment of the Spectrum Act, in violation of the Spectrum Act's requirements and sound policy.[423]

130. *Discussion.* We will use *TVStudy*, the updated computer program that implements the methodology described in OET Bulletin No. 69, in the incentive auction. As discussed below, *TVStudy*'s capability to create and use a uniform nationwide grid for analysis of coverage area and population served is essential to the repacking process. In addition, the software previously used to implement OET-69 cannot support the incentive auction because it cannot undertake, in a timely fashion, the volume of interference calculations necessary to ensure that all stations that will remain on the air following the auction are assigned channels in accordance with the provisions of the Spectrum Act. Further, the proposed updates to the input values used in applying the OET-69 methodology allow for a more accurate analysis of each station's coverage area and population served as of the date of the enactment of the Spectrum Act and eliminate the use of input values that are now obsolete. Thus, with one exception that is explained below, we adopt the updated input values proposed in the *TVStudy PN*. We find that using

[417] *See id.* at 6, 11.

[418] *Id.* at 12; *see also* 47 C.F.R. § 73.622(e). This rule defines "noise-limited contour" as "the area in which the predicted F(50,90) field strength of the station's signal" exceeds specified levels.

[419] *See Office of Engineering and Technology Releases and Seeks Comment on Updated OET-69 Software*, ET Docket No. 13-26, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 950 (2013) (*TVStudy PN*). *See* n.473 for releases of updated versions of the *TVStudy* software.

[420] *TVStudy PN*, 28 FCC Rcd at 952.

[421] *Id*.at 952-55.

[422] *See generally* NAB *TVStudy PN* Comments; PTV *TVStudy PN* Reply; NAB Apr. 4, 2014 Comments.

[423] CEA *TVStudy PN* Comments at 10; *see also* CTIA *TVStudy PN* Reply at 3 ("The creation of a more updated and consistent software program to implement OET-69 is a logical step that will allow the Commission the ability to input the results into the overarching algorithm to be used as part of the incentive auction and repacking process").

TVStudy with updated input values to implement OET-69 will support the unique requirements of the incentive auction while satisfying our statutory obligation to make "all reasonable efforts" to preserve television stations' coverage area and population served as of February 22, 2012. Indeed, as discussed below, we find that the Spectrum Act not only permits us to use *TVStudy*, but—because the statute requires the Commission to make all reasonable efforts to preserve broadcast stations' coverage areas and populations served as of February 2012—requires us to update the software and data inputs necessary to implement the methodology set forth in OET-69 to predict coverage as of that date as accurately as possible.

131. The computer program previously used to implement OET-69 lacks the capabilities necessary to support a successful incentive auction. The Longley-Rice methodology described in OET-69 divides the area within a digital television station's noise-limited contour into approximately square "grid cells" to evaluate signal strength, or coverage, and any interference.[424] The computer program previously used to implement the OET-69 methodology generates station-specific grid calculations based on each station examined.[425] More specifically, the earlier software creates a new and unique grid for each station centered on the station's transmitting facilities. Signal strength and potential interference from other stations are calculated for each cell in that particular grid. Because each grid is unique to each station, however, no two station grids are typically the same, and signal strength and interference calculations for one station cannot be used to calculate coverage and interference for another station, even where they cover the same or portions of the same geographic area.[426] The cell-level data are not consistent from one station to another. Moreover, the earlier computer software lacks the capability to save grid calculations. Given these two limitations (i.e., the lack of uniform grid cells and the inability to save calculations), the earlier computer software would have to re-create an individual station's grid each and every time it has to analyze a possible channel assignment in the repacking process.[427] In other words, an individual station's grid may have to be re-created thousands of times before a determination is made as to which channel a station may be assigned following the auction.

132. In contrast, *TVStudy* has the capability to apply the OET-69 methodology to calculate signal strength and evaluate interference using a single, common grid of cells common to all television stations. Based on the data derived from the common grid, *TVStudy* can undertake pairwise interference analyses[428] of every station that will remain on the air after the incentive auction and generate data that

[424] *TVStudy PN*, 28 FCC Rcd at 951.

[425] Comments include references to the "old software" or "present software" implementing OET-69 without clarifying to which software they are referring. The Media Bureau uses *tv_process* software for the evaluation of individual broadcast station applications (for a new station or a modification), whereas OET used separate software to implement OET-69 during the DTV transition and for certain other large scale analysis projects. *tv_process* was never used and cannot be used in a context that requires calculations involving more than an individual station.

[426] For example, if two television stations, Station A and Station B, are in the same market and their coverage overlaps in certain areas, we cannot use Station A's grid to determine coverage and interference for Station B.

[427] Thus, despite NAB's claim, the old software is not a reasonable alternative. *See* NAB Apr. 4, 2014 Comments at 9. The old software implementing OET-69 is based "on source code and data from the 1990s and earlier." *TVStudy PN*, 28 FCC Rcd at 950. As any computer user knows, this is "ancient in software terms." *See* Letter from Julie Kearney, CEA, to Marlene H. Dortch, Secretary, FCC, ET Docket No 13-26, GN Docket No. 12-268 at 4 (filed Mar. 18, 2013). The old software cannot "be downloaded and installed on modern [computers]," and it does not take "advantage of the many advances in user interface design" since the software was developed. *Id.* at 5, n. 24. *See also* Brattle *TVStudy PN* Comments at 2 ("[T]he 2004 implementation of this methodology relies upon an archaic FORTRAN program and contain little to no documentation for multi-station interference calculations.").

[428] A pairwise or station-to-station interference analysis studies "pairs" of television stations on the same channel (co-channel) and on upper and lower adjacent channels to each other. The analysis provides grid cell level information on where the two stations provide service and where they are predicted to interfere with each other when operating on the same or an adjacent channel. The outputs of the analysis are inputs to the repacking constraint generation process.

identify combinations of stations that can (or cannot) co-exist on the same channel or adjacent channels. These data are used to generate the constraint files that will be employed in the repacking process.[429] Further, unlike the earlier software, much of the cell-level data produced by *TVStudy* are cached, or saved. Hence, the repacking methodology need not re-create a station's unique grid each time it examines a possible channel assignment, and the numerous interference calculations can be run in a much shorter period of time. These attributes of *TVStudy* (i.e., the common grid and caching) are essential to the timely analysis of feasible channel assignments.[430] Below we first address broadcasters' statutory and other arguments that we cannot use *TVStudy* or updated input values in applying the OET-69 methodology to preserve the coverage area and population served of stations in the incentive auction. We then address the specific updates to the input values associated with *TVStudy* that we adopt.

133. *Broadcaster Opposition.* NAB and several broadcasters broadly object to the use of *TVStudy* and the updated input values described above, asserting that any change to the computer software and data used by the Commission to implement OET Bulletin No. 69 in the past is a change to the "methodology of OET-69," and therefore, a violation of section 6403(b)(2) of the Spectrum Act.[431] NAB argues that when Congress directed the Commission "to preserve . . . the coverage area and population served of each broadcast television licensee, as determined using the methodology described in OET Bulletin 69," it not only included OET-69 but "the procedures—here, the software—for carrying it into effect."[432] According to NAB, the proposed software changes would violate section 6403(b)(2) of the statute by altering the OET-69 methodology itself.[433]

134. We disagree. We conclude that the statutory language allows the Commission to update the computer software and input values used to implement the OET-69 methodology while adhering to the methodology described in OET Bulletin No. 69. The statutory language is ambiguous, and it is reasonable to read it narrowly. Indeed, we find unreasonable NAB's interpretation, which would compel the Commission to rely on outdated computer software and data to implement that methodology.[434] Accordingly, we interpret the statutory phrase "methodology described in OET Bulletin No. 69" to refer to the particular procedures for evaluating television coverage and interference that are provided for in that bulletin, not the computer software or input values used to apply that methodology in any given

[429] *See* § III.B.1 (Repacking Process Overview).

[430] CTIA and CEA agree that *TVStudy* offers faster computations of television coverage and interference effects and is more capable of supporting the incentive auction than the previous software. *See* CTIA *TVStudy PN* Comments at 1-2; CEA *TVStudy PN* Comments at 2; *see generally* Comm. Tech. *TVStudy PN* Comments. While NAB claims that the earlier software was "fully capable of carrying out the tasks required for the incentive auction," NAB *TVStudy PN* Comments at 21, NAB's only support for this assertion is conclusory statements that it "conducted nationwide sample runs using *TVStudy* and the existing OET-69 methodology, and both runs took roughly the same amount of time." Decl. of Bruce Franca at para. 17, cited in NAB *TVStudy PN* Reply. *See* Letter from Rick Kaplan, NAB, to Marlene H. Dortch, FCC, ET Docket No. 13-26, GN Docket No. 12-268 at 2 (filed Apr. 26, 2013) (citing Comments of NAB *et al*., ET Docket No. 13-26 and GN Docket No. 12-268 (filed Mar. 21, 2013), Decl. of William R. Meintel at paras. 12-13). Notably lacking is a description of NAB's analysis—and specifically, whether it performed the pairwise interference analyses required by the repacking methodology we adopt—and the time it took to conduct those analyses using the old software as compared to *TVStudy*.

[431] NAB *TVStudy PN* Comments at 3; NAB Apr. 4, 2014 Comments at 5-7; *see generally* APTS *TVStudy PN* Reply; Sinclair *TVStudy PN* Comments; Block Stations *TVStudy PN* Comments.

[432] NAB *TVStudy PN* Comments at 3.

[433] NAB *TVStudy PN* Comments at iv.

[434] NAB's argument that there would have been no reason to refer to OET-69 unless Congress intended to prohibit software updates lacks merit. NAB *TVStudy PN* Comments at 5. As discussed, the Spectrum Act's requirement to use "the methodology described in OET Bulletin 69" assures the use of a well-established methodology for evaluating television coverage area and interference without locking in the use of outdated software or input values.

case.[435] Our interpretation is consistent with the common meaning of the word "methodology."[436] Distinguishing between a "methodology" and the "software" and "inputs" used for applying that methodology also is consistent with the ordinary meaning of the latter words,[437] as well as with common understanding. Courts have recognized similar distinctions between administrative methodologies and the computer programs and data inputs used to apply them.[438] Likewise, evaluating TV coverage and interference using the methodology described in OET-69 requires a computer program and data inputs, but they are tools for applying the evaluation procedure, not the procedure itself.[439]

135. Even though computer software and certain inputs that are necessary to implement OET-69 are referred to in OET-69, we find they are not part of the OET-69 "methodology." Examination of OET-69 itself bears out this distinction. OET-69 characterizes the computer program as a tool for applying the Longley-Rice propagation model, explaining that "[a] computer is needed . . . because of the large number of reception points that must be individually examined."[440] OET-69 also makes clear that

[435] Under our interpretation, the OET-69 methodology comprises (1) a specification for determining a contour that defines the boundaries of a station's coverage area, and (2) an algorithm for evaluating the availability of service within that contour, including the effects of interference from neighboring stations. The evaluation of service involves the use of the Longley-Rice propagation model, certain planning factors, electromagnetic properties of the environment, and parameters for describing a television station's transmission system. Planning factors describe television reception; for example, planning factors include antenna gain information for specific frequency bands, thermal noise levels, and system noise figure by band, etc. *See* OET-69 at 3, Table 3. Electromagnetic properties include the dielectric properties of earth and surface refractivity. The parameters that describe a television station's transmission system include effective radiated power, antenna pattern, antenna polarization and height of the radiation center above ground. *See* OET-69 at 6, Table 4.

[436] NAB *TVStudy PN* Comments at 3 & n.11 (quoting Webster's Third New International Dictionary of the English Language Unabridged at 1423 (1976) (defining "methodology" as "the processes, techniques, or approaches employed in the solution of a problem or in doing something: a particular procedure or set of procedures")). *See* CEA *TVStudy PN* Reply at 3 n.5 ("'Methodology' is defined by Webster's as 'a body of methods, rules, and postulates employed by a discipline**:** a particular procedure or set of procedures'") (quoting Merriam-Webster.com, http://www merriam-webster.com/dictionary/methodology).

[437] *Compare* n.436 and accompanying text (defining "methodology" as, *inter alia*, "a particular procedure or set of procedures") *with Dictionary.com Unabridged.* Random House, Inc. http://dictionary.reference.com/browse/computer program (accessed: Apr. 13, 2013) (defining "computer program" as, *inter alia*, "a sequence of instructions that a computer can interpret and execute*"); id.* http://dictionary.reference.com/browse/software (defining "software" as, *inter alia*, "the programs used to direct the operation of a computer, as well as documentation giving instructions on how to use them."); *id.* http://dictionary.reference.com/browse/input (defining "input" as, *inter alia*, "something that is put in . . . data to be entered into a computer for processing"). *See also* CEA *TVStudy PN* Reply at 2 ("There is no mystery or term of art in the phrase 'methodology described in OET Bulletin 69' – it means just that, and does not extend to implementing software such as *TVStudy* or any other aspect not included in the Bulletin itself."); *id.* at 3 ("The standard meaning of the term 'methodology' reflects that it is distinct from the implementation of that methodology, and thus the process of implementing the methodology of OET-69 is distinct from the methodology itself.").

[438] *See, e.g., Qwest Corp. v. FCC*, 258 F.3d 1191, 1195-98 (10th Cir. 2001)(reversing the FCC's decision establishing a high-cost universal service support "methodology," but upholding the FCC's adoption of a computer model and input values for estimating the costs of providing telephone service for the purpose of applying the methodology).

[439] *See* CEA *TVStudy PN* Comments at 11 ("The *TVStudy* software is fully consistent with the Commission's obligation under the Spectrum Act to 'us[e] the methodology described in' OET-69. It merely implements that methodology, using updated data that [are] more accurate and thorough and establishing certain parameters not specified in OET-69.").

[440] *See* OET-69 at 1; *see also id.* at 10 ("The FCC computer program . . . is complex, and many of its options are available only by recompilation for each case of interest. The individual installing it should have computer

(continued….)

the computer program for applying OET-69 is subject to change—for example, it refers to "the computer program now used by the Media Bureau to evaluate applications . . . as well as predecessors of that program," and to "[t]he Fortran code currently used by the Media Bureau to evaluate new proposals"[441] — and provides instructions on how to use different computer programs to apply the Longley-Rice model.[442] Indeed, OET-69 contemplates that others will utilize their own computer programs to implement the OET-69 methodology and provides suggestions for obtaining information on using the Longley-Rice model in doing so.[443] Moreover, as discussed below, the Commission's bureaus have used different computer programs to implement OET-69.[444] In contrast, the methodology itself has remained the same through multiple versions of OET Bulletin No. 69 (other than corrections and updated Internet references).[445] We further note that our rules distinguish between "the procedure set forth in OET Bulletin No. 69" and the inputs for applying it; for example, in evaluating post-digital TV transition allotments, the rules require the use of "the 2000 census population data" when calculating interference pursuant to the methodology in OET-69.[446] Thus, we agree with CTIA and others that *TVStudy* is merely an updated tool for implementing the methodology in OET-69.[447] Likewise, the updated input values that we adopt are not part of the OET-69 methodology within the meaning of the statute.

136. While NAB argues that the statutory phrase "methodology described in OET Bulletin 69" is "a term of art that was well established in 2012" to include the present software and input values,[448] NAB cannot point to a single instance of the FCC using, let alone defining, that phrase prior to enactment of the Spectrum Act. NAB does identify a number of decisions in which the Commission characterized use of specific Census and terrain data and treatment of "flagged" results as part of a "methodology."[449]

(Continued from previous page)
programming skills and experience as a system administrator of the computer system on which it is to be installed because linking the data files, which occupy 1.6 gigabytes of disk space, will be a site-specific task.").

[441] *See id.* at 8 n.1, 10-11. Indeed, *TVStudy* includes features and functions that were not available in the software previously used to implement OET-69, including for the use of a uniform global grid and a graphical user interface to aid in the set-up of analyses. These attributes are integral to our repacking efforts. NAB's cramped reading of the statute would prohibit the Commission from making these necessary upgrades to the software tools used to implement OET-69.

[442] *See id*. at 8 n.1, 10-11.

[443] *See* OET-69 at 5 ("Those desiring to implement the Longley-Rice model in their own computer program to make these calculations should consult NTIA Report 82-100, *A Guide to the Use of the ITS Irregular Terrain Model in the Area Prediction Mode*, authors G.A. Hufford, A.G. Longley and W.A. Kissick, U.S. Department of Commerce, April 1982. The report may be obtained from the U.S. Department of Commerce, National Technical Information Service, Springfield, Virginia, by requesting Accession No. PB 82-217977").

[444] *See* para. 146.

[445] *See* OET-69 at 1.

[446] 47 C.F.R. § 73.616(e)(1). NAB argues that the rule's requirement to use 2000 Census data "was . . . incorporated into the OET-69 methodology" and that "Congress is thus presumed to have intended the use of 2000 Census data as part of the OET-69 methodology." NAB *TVStudy PN* Comments at 10-11. But the rule simply requires use of 2000 Census data for a particular purpose. Indeed, the rule itself distinguishes between such data and "the procedure set forth in OET Bulletin No. 69." If Congress had intended the FCC to use 2000 Census data in the repacking, it could have referred to the FCC rule instead of OET-69.

[447] CTIA *TVStudy PN* Reply at 14; CEA *TVStudy PN* Comments at 2.

[448] *See* NAB *TVStudy PN* Comments at 4-5; NAB Apr. 4, 2014 Comments at 5-6. *See also* NAB *TVStudy PN* Comments at 5-6 (arguing that "Congress must be deemed to have intended use of OET-69 without modification" because the statute uses "an administratively defined term without modification").

[449] NAB observes that the Commission previously found that an 'assumption of service [in the case of flagged results] was appropriate' and that 'reconciling calculations using *a new methodology* with the table calculations based on different methodology is difficult and likely to result in uncertainty in the results and contested decisions.'" (continued….)

However, only one of those decisions referred specifically to OET-69. In that decision, the Commission did not define or describe the OET-69 "methodology" but rather used the term "methodology" colloquially to refer to inputs associated with application processing.[450] Accordingly, we reject NAB's argument.[451] The cases on which NAB relies no more prove that Congress understood "methodology described in OET Bulletin 69" to include specific software and input values than cases referring, for example, to terrain elevations as an "input" to the Longley-Rice propagation model prove the reverse.[452]

137. In addition to being consistent with the statutory language, our interpretation furthers the statutory requirement to "make all reasonable efforts to preserve, as of the date of enactment of this Act [February 22, 2012], the coverage area and population served of each broadcast television licensee" by allowing us to update the computer program and input values for applying the OET-69 methodology.[453] For example, updated inputs like the 2010 U.S. Census data more accurately reflect the latest population changes, which show an increase in population nationwide of approximately ten percent between 2000 and 2010, as well as changes in population distribution. Use of 2000 Census data, as NAB urges, would preserve television service as of year 2000 rather than as of the date of enactment of the Spectrum Act. Had Congress intended to prevent any updates to the software and input values used to implement the OET-69 methodology, it could have expressly directed the FCC to use the methodology described in OET-69, including the February 6, 2004 version of one of the Commission's computer programs implementing that methodology and the inputs used as of that date. Instead, Congress required "all reasonable efforts" to preserve each station's coverage area and population served as of February 22, 2012, a mandate that necessitates the use of updated software and inputs with greater utility and accuracy. In light of this mandate, we disagree with NAB that Congress was interested not in "the realities of population growth" but in "reduc[ing] coercive pressure on stations to give up their licenses."[454] We

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See NAB *TVStudy PN* Comments at 7-8 (quoting *Commission's Rules and Policies Reflecting the Conversion to Digital Television*, Report and Order and Further Notice of Proposed Rulemaking, 16 FCC Rcd 5946, 5972 (2001) (emphasis added)). *See also* NAB Comments at 9, 11 (citing *County of Los Angeles, California*, 23 FCC Rcd 18389, 18401 (2008), *Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, 23 FCC Rcd 4220, 4312 (2008), and *In re State of New York*, 22 FCC Rcd 22195, 22198 (2007), 11 (citing *Third Periodic Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television*, 23 FCC Rcd 2994, 3067 (2007) (*Third DTV Periodic Review*) (describing the adoption of 2000 Census data as "revis[ing] the OET 69 interference analysis methodology"), and *Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions*, 13 FCC Rcd 19112, at * 22 (1998)).

[450] *Third DTV Periodic Review*, 23 FCC Rcd at 3067; *see* CEA *TVStudy PN* Comments at 5 n.27.

[451] In any event, we note that NAB's argument is moot as to the treatment of flagged results because, for the reasons we explain below, we will not change the treatment of flagged results in *TVStudy*.

[452] The Commission has referred to terrain as an "input" into the Longley–Rice propagation model, Version 1.2.2, on several occasions in the past. *Amendment of the Commission's Rules to Establish New Personal Communications Services*, Memorandum Opinion and Order, 9 FCC Rcd 4957, Appendix D (1994) ("Terrain elevations used as input to the model should be from the U.S. Geological Survey 3–second digitized terrain database."); *see Amendment of Part 74 of the Commission's Rules with Regard to the Instructional Television Fixed Service*, Order and NPRM, 9 FCC Rcd 3348, para. 36 (1994).

[453] Spectrum Act § 6403(b)(2).

[454] *See* NAB *TVStudy PN* Comments at 11 ("Congress sought to reduce coercive pressure on stations to give up their licenses by adopting a fixed benchmark—OET-69 as of February 22, 2012—as a safeguard for broadcasters choosing not to participate in the incentive auction. In making that policy determination, Congress clearly favored predictability and industry experience over other considerations"). The Spectrum Act expressly provides that incentive auction participation for broadcasters is "voluntary." *See* Spectrum Act § 6403(a). Having so provided, Congress had no need to bar the FCC from accounting for "the realities of population growth" in the repacking process. *See also* § V.C.5 (Reimbursement of Relocation Costs).

cannot conclude that Congress intended to require us to maintain and somehow adapt an obsolete computer program that relies on inaccurate data—particularly given the threat that doing so could leave some viewers without television service.

138. Our reading is also consistent with other relevant statutory obligations and with Commission precedent. We have a well-established duty under the Administrative Procedure Act ("APA") to "analyze . . . new data" when faced with existing data that "are either outdated or inaccurate."[455] NAB's interpretation of section 6403(b)(2) is in direct conflict with our duty under the APA; it would require us to ignore new Census data despite significant population changes between 2000 and 2010, more accurate and updated terrain data, and corrected technical information. Consistent with its APA and other statutory obligations, the FCC has consistently relied on updated, accurate data and procedures when possible. In the Satellite Home Viewer Improvement Act of 1999 ("SHVIA"), for example, Congress directed the Commission to "take all actions necessary . . . to develop and prescribe by rule a point-to-point predictive model for reliably and presumptively determining the ability of individual locations to receive signals [of Grade B intensity]."[456] In implementing that statutory mandate, the Commission adjusted the Longley-Rice methodology for UHF stations but left VHF calculations essentially unchanged.[457] The D.C. Circuit upheld that decision, finding that the Commission acted reasonably because its chosen methodology increased the accuracy of the model.[458] NAB tries to distinguish SHVIA on the basis that it expressly requires the Commission to "establish procedures for the continued refinement of the application of the model by the use of additional data as it becomes available"—a provision which the Spectrum Act lacks.[459] We are not persuaded. The underlying purpose of SHVIA was to identify "unserved households" eligible for the rebroadcast of distant network signals—an inherently pro-consumer objective.[460] Similarly, in the Spectrum Act, Congress required us to make "all reasonable efforts" to preserve coverage area and population served as of February 22, 2012 – an obligation that depends heavily on having accurate data for that date. We cannot fulfill the statutory mandate using outdated data. The 2000 Census data that NAB advocates using fail to reflect the increase in predicted population served that 88 percent of full power stations have experienced since that time.[461]

139. NAB also objects that the proposed updates "are unlawful because they do not preserve broadcast licensees' coverage areas and populations served as predicted on February 22, 2012" — predictions which it asserts necessarily depend on calculations pursuant to OET-69, as it was implemented on that date.[462] On the contrary, we read the date in section 6403(b)(2) to modify the preservation mandate, not the reference to OET-69.[463] In other words, we read the statute to require us to preserve the actual coverage areas and populations served by broadcast stations on February 22, 2012, not (as NAB contends) to preserve the coverage areas and populations served as calculated by using the input

[455] *Dow Agrosciences LLC v. Nat'l Marine Fisheries Service*, 707 F.3d 462, 473 (4th Cir. 2013) (citing *Sierra Club v. EPA*, 671 F.3d 955, 966-968 (9th Cir. 2012)).

[456] P.L. No. 106-113, 113 Stat. 1501, *codified at* 47 U.S.C. § 339(c)(3).

[457] *EchoStar Satellite LLC v. FCC*, 457 F.3d 31, 33 (D.C. Cir. 2006).

[458] *Id.*; *cf. Costa de Oro Television, Inc. v. FCC*, 294 F.3d 123, 129 (D.C. Cir. 2002) (finding that "the Commission's conclusion that Longley-Rice maps are more accurate than Grade B contours is 'precisely the type of technical issue on which we defer to the Commission's expertise.'") (citing *Keller Comm'ns v. FCC*, 130 F.3d 1073, 1077 (D.C. Cir. 1997)).

[459] *See* NAB *TVStudy PN* Reply at 8 (citing 47 U.S.C. § 339(c)(3)(A)).

[460] *EchoStar*, 457 F.3d at 33.

[461] *See* para. 149.

[462] NAB *TVStudy PN* Comments at 12-14.

[463] Spectrum Act § 6403(b)(2) (requiring the FCC to try to "preserve, as of [February 22, 2012], the coverage area and population served of each [station], as determined using the methodology described in [OET-69].").

values and the version of the computer program implementing OET-69 in use by one of the Commission's bureaus on February 22, 2012. Use of the outdated computer program and input values would not fulfill our statutory mandate to preserve the "coverage area and population served" as of February 22, 2012, but rather the service provided long before the Spectrum Act's enactment.

140. We disagree with NAB that *TVStudy* redefines or reduces the coverage area of a significant number of stations in comparison with the earlier version of the OET-69 computer program.[464] OET took care in designing and developing *TVStudy* to ensure that it faithfully implements the OET-69 methodology, provides results that closely match those of the earlier computer software (notwithstanding updates that improve accuracy), and avoids bias that would systematically reduce broadcast stations' coverage areas and populations served. In support of its position, NAB, for example, predicts that station KMAX-TV in Sacramento, California, would suffer a 15 percent loss in the population served if we use *TVStudy* rather than the earlier OET software.[465] However, OET's analysis using *TVStudy* predicts that KMAX-TV will experience an eight percent increase in population served.[466] Further, OET's analysis using *TVStudy* and the updated inputs adopted in this Order shows that 88 percent of full power stations will experience an increase in population served, while only 12 percent show some decrease.

141. NAB also asserts that *TVStudy* departs from the OET-69 methodology because it considers LPTV stations and TV translators in its evaluation of service and interference analysis.[467] NAB is correct that *TVStudy* has the capability of studying the interference from LPTV and TV translators. However, NAB is incorrect in assuming that that option will be used in the repacking process.[468]

142. In addition, NAB claims OET "failed to conduct any cost-benefit analysis for its proposed changes."[469] According to NAB, "[t]he proposed changes to OET-69 and the attendant uncertainty w[ill] drive up the costs for broadcast licensees, as they scramble to acquaint themselves with the new methodology, without any countervailing benefit."[470] That is demonstrably not the case. The benefits of using *TVStudy* clearly outweigh the costs. As set forth above, use of *TVStudy* and the updated input values is essential to the repacking process and to fulfilling the statutory preservation mandate.[471]

143. Moreover, NAB's criticisms of OET's efforts to provide support for *TVStudy* are baseless.[472] Copies of *TVStudy* have been made available to the public continuously since its original

[464] NAB *TVStudy PN* Comments at 13, 16. NAB Apr. 4, 2014 Comments at 8 (claiming, without providing any supporting evidence, that *TVStudy* produces "wildly different results"). We also note that the existing coverage area and population served are greater when estimated by *TVStudy* for more than one-half of the stations that are eligible to participate in the incentive auction.

[465] *See* NAB *TVStudy PN* Comments at 13. *See also* para. 161.

[466] Our analysis indicates that KMAX-TV's terrain-limited population would increase from 6,385,375 persons (using 2000 U.S. Census data) to 6,944,172 persons (using 2010 U.S. Census data). Our analysis showing the eight percent increase was based on use of *TVStudy* with all of the updated input values proposed in OET's *TVStudy PN* except for the change in the error flag treatment.

[467] NAB *TVStudy PN* Comments at 14.

[468] LPTV and TV translators, having secondary status, will not be considered in determining the coverage area and population served of full power or Class A broadcast stations in the repacking process. *See* § III.B.3.d.iii (LPTV and TV Translator Stations).

[469] NAB *TVStudy PN* Comments at 21.

[470] NAB *TVStudy PN* Comments at 22.

[471] *See* § III.B.1 (Repacking Process Overview).

[472] *See* NAB Apr. 4, 2014 Comments at iv.

release in February 2013.[473] The *TVStudy* software was released in a form allowing it to be easily installed and run on inexpensive, commonly available consumer computers. While OET has corrected minor errors and improved the functionality of *TVStudy* since its original release,[474] OET has informed the public of these updates by releasing Public Notices, or (as announced in September 2013) through updates on the Commission's website.[475] Commission staff have provided and continue to provide ongoing support to users seeking to implement and utilize *TVStudy*, including participating in an online discussion forum (list-serve) open to the public.[476] As the developer of *TVStudy*, OET has provided support to users of the software by responding to inquiries on the listserv.[477] Thus, broadcasters have had ample opportunity to evaluate and familiarize themselves with the updated software and input values.[478] Accordingly, contrary to NAB's claims, there should be no uncertainty associated with the use of *TVStudy*.

[473] Updated versions of *TVStudy* were announced by public notice in April, July, August, and September 2013. *See Office of Engineering and Technology Releases Updated TVStudy Software*, ET Docket No. 13-26, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 5520 (2013); *Repacking Data PN*, 28 FCC Rcd 10370; *Office of Engineering and Technology Releases Updated TVStudy Software,* ET Docket No. 13-26 and GN Docket No. 12-268, Public Notice, 28 FCC Rcd 12327 (2013); *Office of Engineering and Technology Releases TVStudy Version 1.2.8 and Announces Future Updates Will Be Posted to the Web,* ET Docket No. 13-26 and GN Docket No. 12-268, Public Notice, 28 FCC Rcd 12979 (2013) (*TVStudy Update PN*). The most up-to-date version of *TVStudy* is posted at http://data fcc.gov/download/incentive-auctions/OET-69/.

[474] Despite NAB's concerns, these changes have been limited to minor error corrections or improved functionality. *See* NAB Apr. 4, 2014 Comments at iv, 2, 16. NAB is also mistaken when it claims that there is no publicly available record of the changes made to *TVStudy*. *See id.* at 13, 15. Since the original release of *TVStudy*, OET has maintained a change log on the Commission's website fully describing the changes and improvements made to *TVStudy*. *See* TVStudy Installation and Upgrade Guide, available at http://data fcc.gov/download/incentive-auctions/OET-69/ . While NAB takes issue with OET's removal from the website of previous versions of *TVStudy*, it was reasonable for OET to conclude that maintaining such versions on the website might lead to confusion. *See* NAB Apr. 4, 2014 Comments at 13. In any event, prior versions have always been, and will continue to be, available upon request.

[475] *See* n.474.

[476] Cavell-Mertz maintains the list-serve, Contact Information Redacted which industry professionals have been using for a number of years to communicate issues associated with the Commission's Consolidated Database System (CDBS) and its derivative databases. Contrary to NAB's claim, public release of the minor corrections and updates to *TVStudy* has not been limited to "private channels." *See* NAB Apr. 4, 2014 Comments at 12-13, 15. Rather, consistent with the announcement in the *TVStudy Update PN*, the two latest updates to *TVStudy* were released to the public on the Commission's website. OET made additional efforts to announce such updates on the list-serv, which is open to the public and subscribed to by broadcast engineering professionals.

[477] *See, e.g., Office of Engineering and Technology Releases Updated TVStudy Software*, ET Docket No. 13-26, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 5520 (2013) (announcing details of the listserv). Inquiries OET received by other means of communications were summarized and responses were also provided on the list-serve. We expect OET will continue to support *TVStudy* users by responding to inquiries after release of this Order.

[478] NAB's suggestion that the existing software should be used because it was used after the DTV transition ignores a fundamental difference between the DTV transition and the incentive auction. *See* NAB *TVStudy PN* Comments at 4. During the DTV transition, the Commission allowed most stations to select their post-transition channel. *See Second Periodic Review of the Commission's Rules and Policies Affecting the Conversion to Digital* Television, MB Docket No. 03-15, Report and Order, 19 FCC Rcd 18279, 18292 (2004). Interference analyses, where selectively used, only involved resolution of conflicts between individual stations. The DTV transition thus did not involve nearly as many interference analyses as the incentive auction, in which a far greater number of channel reassignments may be made by the Commission, so that the process did not demand as intensive or time-consuming computer analysis. Moreover, as described in § III.B.1 (Repacking Process Overview), there is a need for analytical speed in this context that was not present during the DTV transition.

144. NAB complains that *TVStudy* contains "scores of soft switches," which contain variables or inputs that can lead to different predictions of coverage area and population served depending on how the switches are set.[479] Most of these switches reflect variables that are not meant to be changed from their default values, were included in the software to maximize flexibility, and have not changed since the original release of *TVStudy*.[480] In the *TVStudy PN*, OET tentatively defined the eight soft switches for the inputs that we adopt today.[481] The release of this Order finalizes the variables or inputs associated with the key soft switches.[482] In addition, a Public Notice released by OET concurrently with the Order provides guidance regarding how to set the switches for the remaining variables or inputs.[483]

145. As interested parties continue to work with *TVStudy*, there may be further opportunities for OET to correct minor errors in, or to improve the functionality of, the software, consistent with this Order. Accordingly, OET may continue to make improvements and other changes to *TVStudy* after release of this Order that are necessary and appropriate to correct minor errors or improve functionality, provided such changes are consistent with this Order. However, we recognize the importance of finalizing *TVStudy* well in advance of the auction. We direct OET to finalize *TVStudy* no later than the release of the *Procedures PN*. We also direct OET to release a detailed summary of baseline coverage area and population served by each television station to be protected in the repacking process, and to provide an opportunity for additional public input.

146. NAB further argues that it is "arbitrary and capricious" for the Commission to utilize *TVStudy* only in the incentive auction context.[484] According to NAB, if we adopt *TVStudy,* "the result would be that on the very same day that the auction is commenced using [*TVStudy*], a person or entity could file an application for a new television station, yet be required by the Commission to use the [old software]."[485] This assertion lacks merit because we have not yet addressed whether *TVStudy* will be used for purposes other than the repacking process.[486] We note that, contrary to NAB's assumption, the Commission does not always use the same computer software to implement OET-69. The Commission's

[479] *See* NAB Apr. 4, 2014 Comments at iv; *see also id*. at 3, 8.

[480] Specifically, the majority of these parameters relate to interference protection requirements specified in the Commission's rules. *See generally* 47 C.F.R. §§ 73.600 *et seq.* (Subpart E – Television Broadcast Stations); *see also* 47 C.F.R. §§ 73.6000 *et seq.*(Subpart J – Class A Television Broadcast Stations); 47 C.F.R. §§ 74.700 *et seq.* (Subpart G – Low Power TV, TV Translator, and TV Booster Stations).

[481] In addition, the *Repacking Data PN* specified these inputs. *See Repacking Data PN*, 28 FCC Rcd at 10380–82, 10399–411.

[482] This Order finalizes the setting of the soft switches on population, terrain and certain technical inputs, *see* § III.B.2.b (OET-69 and *TVStudy*), and adopts decisions that affect the settings of other switches (e.g. our decision to include areas covered by DTS in the preservation mandate is reflected in one of the *TVStudy* switches). This order does not finalize certain parameters in *TVStudy* that relate to the treatment of allotments outside of the U.S. due to the ongoing negotiations with Canada and Mexico.

[483] *See* para. 182. Specifically, the Public Notice specifies how the switches were set in developing the data being released with the Public Notice.

[484] Letter from Rick Kaplan, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 3 (filed Apr. 19, 2013).

[485] *Id.; see also* NAB *TVStudy PN* Comments at 17-19; NAB Apr. 4, 2014 Comments at 18 (referring to 47 C.F.R. § 73.8000(d)(1), pertaining to incorporation of OET-69 by reference for purposes of 47 C.F.R. § 73.616).

[486] Reviewing courts have held that "the FCC is not required to address all problems 'in one fell swoop,' and may focus on problems depending on their acuteness," *Sorenson Comm'ns, Inc. v. FCC*, 567 F.3d 1215, 1222 (10th Cir. 2009) (citing *Nat'l Ass'n of Broadcasters v. FCC*, 740 F.2d 1190, 1207 (D.C. Cir. 1984)); *Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs.*, 545 U.S. 967. 1002 (2005) (*Brand X*) (affirming the FCC's decision to incrementally address the regulatory framework for different categories of facilities-based information service providers).

bureaus have used *different* software programs to implement OET-69: the Media Bureau has used *tv_process* to process applications for new stations and modifications, OET has used "FLR" for large-scale projects, like the DTV transition, and the International Bureau has used "V-Soft Probe" for international coordination efforts. Each type of software provides a different utility that serves the purposes for which it is used (i.e., licensing, interference and international coordination).

147. NAB and other broadcasters also raise procedural objections that lack merit. Because we are adopting *TVStudy* and updated input values in this Order, NAB's claim that the Commission itself must approve the use of *TVStudy* and updated input values is moot.[487] NAB also complains that the comment cycle was too short.[488] We disagree. The *TVStudy PN* allowed 45 days for comments and an additional 15 days for reply comments.[489] In addition, parties have had additional time to work with the updated software and inputs (and to submit *ex parte* filings) since the comment period closed.[490] While NAB claims that "formal" notice and comment procedures were required instead of Public Notices,[491] the purpose of the APA's notice and comment requirement has been fully satisfied by OET's issuance of the *TVStudy PN* and its publication in the Federal Register.[492] We have a robust record on the issues raised in the *TVStudy PN* and we have taken the comments and *ex parte* filings into account in adopting the use of *TVStudy* and the updated values in this Order.

148. *Use of 2010 U.S. Census Data*. Having addressed the broadcasters' statutory and other arguments that we cannot use updated software or input values in applying the OET-69 methodology, we turn to the specific updates to the input values associated with *TVStudy* proposed in the *TVStudy PN*. First, we adopt use of the latest available population data from the 2010 U.S. Census. The old software used population data from the 2000 U.S. Census or earlier. According to the 2010 U.S. Census, the country's population has grown 9.7 percent since the 2000 Census, an increase of 27.3 million people.[493] In addition, the distribution of the population across the country has shifted.[494]

149. NAB argues that we should continue to use 2000 Census data, claiming that its preliminary analysis of *TVStudy* with 2010 population data shows that 14 percent of broadcast licensees

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[487] *See* NAB *TVStudy PN* Comments at 17-19; *see also* NAB Apr. 4, 2014 Comments at 2, 11-12, 13, 18.

[488] NAB *TVStudy PN* Comments at 19.

[489] The broadcasting community participated extensively in this docket. In response to the *TVStudy PN*, ten parties submitted comments and ten parties submitted reply comments. Broadcasters, among other parties, also participated in several *ex parte* meetings with the Commission and its staff to discuss the issues raised in the *TVStudy PN*. NAB filed at least eight *ex parte* notices; CEA filed a letter in the record in response to NAB's *ex parte* filing of February 2, 2013. NAB also filed an additional set of comments in April 2014.

[490] In response to feedback received, OET has updated the original version of *TVStudy* on several occasions. *See* n.474. We note that other parties found the release of *TVStudy* timely. CEA, for example, noted that by releasing the software much earlier than the auction, OET is "wisely affording itself ample time before the auction to address any errors, unexpected behaviors, or anomalous results identified by interested parties who have run tests of the software." CEA *TVStudy PN* Comments at 2.

[491] NAB *TVStudy PN* Comments at 18-19; NAB Apr. 4, 2014 Comments at 14, 18-19.

[492] *Cf. Sagebrush Rebellion v. Hodel*, 790 F.2d 760, 764-65 (9th Cir. 1986) ("An agency's failure to provide notice and an opportunity to comment before taking action for which notice and comment were required by its enabling legislation, constituted harmless error because the agency had earlier provided notice and comment on almost identical issues in accordance with the notice and comment requirements of the National Environmental Protection Act"). *See also Appalachian Power Co. v. EPA*, 135 F.3d 791, 804 n.22 (D.C. Cir. 1998) ("if 'the purposes of notice and comment have been adequately served,' *Fertilizer Inst. v. EPA*, 935 F.2d 1303, 1311 (D.C. Cir. 1991)—we will find no procedural violation.").

[493] Population Distribution and Change: 2000 to 2010, United States Census Bureau, U.S. Department of Commerce (Mar. 2011) *available at* http://www.census.gov/prod/cen2010/briefs/c2010br-01.pdf.

[494] *Id*.

will experience a decrease in predicted population served.[495] Though our evaluation of *TVStudy* shows a similar apparent reduction, it also shows that *88* percent of full-service broadcasters will experience an increase in predicted population served.[496] Moreover, while NAB contends that "[t]hese changes are contrary to the Commission's statutory obligation to preserve 'population served,'"[497] NAB fails to acknowledge that using 2010 Census data, the most recent population data available, does not result in actual population loss but rather an accurate representation of a broadcast station's population served *as of 2010*. In other words, broadcast stations experiencing a "loss" in predicted population served were, in fact, serving a smaller population on February 22, 2012, than predicted using 2000 Census data because the 2000 Census data is outdated.

150. *Use of One Arc-Second Terrain Elevation Data.* We adopt use of terrain elevation data with a nominal resolution of one arc-second (approximately 30 meters) in most areas of the country. The one arc-second dataset, which is derived from smaller scale topographic maps with more granular elevation data than datasets used by earlier implementations of the OET-69 methodology, will allow for more accurate calculation of the effect of terrain on propagation of television signals.[498] The U.S. Geological Survey ("USGS") maintains a database with this terrain information, which is updated on a two-month cycle to integrate newly available and improved data.[499] The earlier software used to implement OET-69 relied on a terrain elevation database of three arc-second resolution (approximately 90 meters).[500] The USGS no longer distributes, maintains, or supports a three arc-second database, which also has a history of errors and no mechanism to check the validity of those errors or to correct them. We find no reason to continue using an obsolete database when there is an expert federal agency that offers up-to-date and more precise terrain data.

151. NAB opposes this change. According to NAB, OET-69 expressly requires use of a three arc-second database.[501] We acknowledge that OET-69 mentions that "the FCC computer program is *linked* to a terrain elevation database with values every three arc-seconds of latitude and longitude."[502] This is a descriptive statement about an input database, however, not a prescriptive element of the OET-69 methodology. We do not interpret the description of an input linked to the earlier software as a methodological requirement or a restriction against updating that software to incorporate more precise, accurate, and current data. [503]

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[495] NAB *TVStudy PN* Comments at 8-10.

[496] Our analysis was conducted using *TVStudy* (incorporating the changes adopted in this Order) with the 2010 Census data and the 2000 Census data. All other inputs remained constant.

[497] NAB *TVStudy PN* Comments at 11.

[498] *TVStudy PN*, 28 FCC Rcd at 953.

[499] *See* www.ned.usgs.gov (the National Elevation Dataset (NED) is a seamless dataset with the best available raster elevation data of the conterminous United States, Alaska, Hawaii, and the territorial islands). While USGS continues to update its NED, the Commission will be releasing a "snapshot" of the data it will be using in the auction as of a certain date to ensure consistent results.

[500] There have been a number of sources for three-arc-second databases; the Commission's three arc-second database was assembled from several different sources.

[501] NAB *TVStudy PN* Comments at 9.

[502] OET-69 at 6 (emphasis added).

[503] Commission precedent is consistent with our decision. *See Qualcomm Petition for Declaratory Ruling*, 24 FCC Rcd 13992, 13993, ¶ 1 n.4 (2009) (stating that the OET-69 methodology makes a service determination, in part, based on the elevation of terrain between the transmitter and each reception point); *Study of Digital Field Strength Standards and Testing Procedures*, ET Docket No. 05-182, Report to Congress on the Satellite Home Viewer Extension and Reauthorization Act of 2004, 20 FCC Rcd 19504, 19562, para. 132 (2005) (same).

152. NAB further maintains that switching from three to one arc-second terrain data will result in predicted losses in population served for 85.1 percent of all broadcast stations – results that NAB argues "simply cannot be squared with Congress's directive to preserve broadcast licensees' service populations, as calculated using the version of OET-69 in effect on February 22, 2012."[504] NAB did not provide any analytical information to support its calculations. By contrast, our analysis predicts that about one-half of the stations examined will maintain or slightly improve population coverage in comparison to what would have been predicted using the three arc-second terrain data, while one-half are predicted to experience a slight decrease in coverage.[505] Further, staff analysis shows that the results using the one arc-second terrain database are more accurate than those of the three arc-second database.[506]

[504] NAB *TVStudy PN* Comments at 9-10.

[505] Our analysis is based on publicly available data of all full power stations. It was conducted using *TVStudy* (incorporating the changes adopted in this Order) and the one arc-second terrain database and the three arc-second terrain database. A station-by-station comparison of population served when utilizing one arc-second versus three arc-second terrain data showed that these differences generally occur in areas where the terrain varies significantly over small distances. In such areas, the points analyzed for the one and three arc-second terrain data can result in differences in elevation, which affect the predicted propagation of signals. Our analysis of all full power stations shows that only two stations would experience terrain-limited population losses of greater than five percent solely due to the use of the one arc-second terrain data and 20 full power stations would experience gains of greater than five percent. Four full-power stations would experience interference-free population losses of greater than five percent and 22 full-power stations would experience gains of greater than five percent.

[506] In a separate study, we compared predicted field strength values applying *TVStudy* using one arc-second and three arc-second data to measured field strength values. The measured field strength data were of eight analog full power UHF television stations in New York, New York (WUHF-TV), Fresno, California (KJEO), Buffalo, New York (WBUF), Baton Rouge, Louisiana (WAFB-TV), Wilkes Barre, Pennsylvania (WBRE-TV), Springfield, Massachusetts (WHYN-TV), Philadelphia, Pennsylvania (WHYY-TV), and Madison, Wisconsin (WMTV), and were collected in the 1950s by the Television Allocations Study Organization (TASO). These data are publicly available. All other parameters in the study were held constant. The mean error between predicted and measured field strength values across all of the locations considered either decreased or remained constant in every case when one arc-second terrain data were used. The mean error between the TASO measurements and *TVStudy* for both terrain databases is shown in the table below:

	Mean Error, dB	
Station	1 arc-sec	3 arc-sec
KJEO	0.10	0.15
WAFB	10.5	10.9
WBRE	13.2	15.0
WBUF	14.1	14.7
WHYN	16.5	17.0
WHYY	11.9	13.7
WMTV	7.37	7.37
WUHF	10.2	11.6

See A. D. Ring & Associates, "Field Strength Measurement Survey for AMST – Fresno, California," [KJEO, TV Channel 47], Aug. 1, 1958; A. D. Ring & Associates, "Field Strength Measurement Survey for AMST – Philadelphia, Pennsylvania," [WHYY-TV, TV Channel 35], Aug. 15, 1958; A. D. Ring & Associates, "Field Strength Measurement Survey for AMST – Baton Rouge, Louisiana," [WAFB-TV, TV Channel 28], Nov. 18, 1957; A. D. Ring & Associates, "Field Strength Measurement Survey for AMST – Buffalo, New York," [WBUF, TV Channel 17]; Oct. 24, 1958; A. D. Ring & Associates, "Field Strength Measurement Survey for AMST – Springfield, Massachusetts," [WHYN-TV, TV Channel 40], Mar. 6, 1959; A. D. Ring & Associates, "Field Strength Measurement Survey for AMST – Wilkes-Barre, Pennsylvania," [WBRE-TV, TV Channel 28], Sept. 24, 1957; A. D. Ring & Associates, "Field Strength Measurement Survey for AMST – Madison, Wisconsin," [WMTV, TV

(continued….)

153. *Antenna Beam Tilt Values.* We adopt use of actual beam tilt data, as those data are specified by the licensees and shown in the Commission's Consolidated Database System ("CDBS"), instead of an across-the-board-assumed downtilt figure. This will allow for a more accurate depiction of the predicted coverage of, and interference from, each television station. As the *TVStudy PN* recognized, the computer program previously used to implement the OET-69 methodology ignores this input from CDBS and instead uses the same electrical beam tilt for every location, regardless of the actual beam tilt value, which can result in a coverage projection that may effectively "miss" some of the population served.[507] In contrast, *TVStudy* uses the actual amount of electrical downtilt as specified by the broadcast licensees in CDBS, generating a more accurate model of coverage and interference effects and therefore better implementing the methodology in OET-69.

154. NAB claims that OET-69 expressly requires the use of a standard beam tilt to determine transmitting antenna patterns.[508] This argument lacks merit. OET-69's Table 8 represents a "typical" vertical pattern shape for a transmitting antenna, not a beam tilt angle.[509] In industry practice, the shape of an elevation pattern is held relatively constant, while beam tilt angle is adjusted to correspond with the maximum depression angle in any direction to maximize coverage.[510] Broadcast licensees are assumed to have chosen the appropriate beam tilt angle that maximizes their coverage. The *TVStudy* software only offsets the tabulation in Table 8 so that the maximum value (antenna beam tilt value) matches the value in CDBS, which is the actual value as inputted by the licensee. [511]

155. *Coordinates, Depression Angles, and Incorrect Data.* Instead of continuing to truncate or round geographic coordinates to the nearest second, as was the practice in earlier versions of software implementing OET-69, we adopt use of full-precision data in coverage and population served projections.[512] By increasing the precision of geographic coordinates, *TVStudy* eliminates rounding errors and provides at least three additional orders of precision. NAB opposes this change because it estimates that it will decrease predicted population served for 37.3 percent of stations and increase predicted

(Continued from previous page)
Channel 33], Feb. 5, 1958; Daniel B. Hutton, "Report on Mobile Field Strength Measurements, New York City UHF-TV Project," [WUHF-TV, TV Channel 31] FCC Report No. R-6302, Feb. 12, 1963.

[507] *TVStudy PN*, 28 FCC Rcd at 953.

[508] NAB *TVStudy PN* Comments at 10.

[509] OET-69 at 13. The old OET-69 software employed by OET does not provide an elevation pattern specifically for Class A stations. In our analyses using *TVStudy* for the incentive auction, we will treat elevation patterns for Class A stations the same as those of full power stations, including use of the antenna beam tilt data in CDBS.

[510] *See* NAB Engineering Handbook, Chapter 6.8 (10th Edition 2007).

[511] Commission precedent is not inconsistent with our decision. *See* n. [449] and accompanying text. When it referred to "default vertical antenna patterns inherent in the OET-69 methodology" in a 2006 decision, the Commission was summarizing reply comments filed in response to a Petition. *Qualcomm Incorporated Petition for Declaratory Ruling*, WT Docket No. 05-7, Order, 21 FCC Rcd 11683, 11690, para. 14 (2006) ("*Qualcomm Order*"). It clearly had no intention of defining the scope of the "OET-69 methodology" for general purposes. Later in that same decision, the FCC used the term "methodology" in connection with two other departures from OET-69 that it approved for purposes of the Petition, but not in connection with the use of an actual vertical antenna pattern. *Compare Qualcomm Order*, 21 FCC Rcd at 11692, para. 18 (use of part 27 D/U ratios and accounting for the effect of multiple transmitters) *with id*. at 11694, para. 21 (use of actual vertical antenna patterns). While the Commission in the *Third DTV Periodic Review* declined to use actual vertical antenna patterns based solely on concerns with "time and resources," it never stated that using actual vertical antenna patterns would change the OET-69 "methodology." *Third DTV Periodic Review*, 23 FCC Rcd at 3071, para. 166. The Commission declined to use actual vertical antenna patterns in a section entitled "Post-Transition Interference Standards and Analysis Methodology," but the title of the general section does not imply that the Commission viewed actual or default vertical patterns as part of the OET-69 "methodology."

[512] *TVStudy PN*, 28 FCC Rcd at 954.

population served for 38.1 percent of stations.[513] We find NAB's argument unpersuasive; there is no technical or computational basis to intentionally reduce the numerical precision of the geographic coordinates used to calculate station coverage and population served as of February 22, 2012.[514] As discussed above, the FCC has a well-established statutory obligation to address known inaccuracies in existing data.[515] Therefore, we adopt the proposal set forth in the *TVStudy PN*.[516]

156. For the same reasons, we adopt the *TVStudy PN* proposal to correct the previous software's error in calculating depression angles. Some versions of the computer program previously used to implement OET-69 erroneously calculated depression angles based on the antenna height above ground, rather than the height above mean sea level, which, as the *TVStudy PN* recognized, can cause the radiated power toward the cell under study to be incorrectly calculated.[517] This can result in an incorrect representation of a station's coverage area and population served.[518] Nevertheless, NAB objects to the correction of this error because it results in an estimated decrease in population served for 12.2 percent of stations and an estimated increase in population served for 22.1 percent of stations. Again, we disagree that the Spectrum Act requires us to disregard software improvements that increase the accuracy of predictions.

157. The *TVStudy PN* also recognized that there may be instances where the information entered into the FCC's broadcast station database, CDBS, may not be fully accurate. This could lead to incorrect results when the values in that database are used to predict coverage and interference.[519] While OET sought comment on methods to detect and correct inaccurate data, the commenting parties did not address this issue.[520] As discussed below, full power and Class A stations will be required to certify the accuracy of the information in CDBS prior to the incentive auction.[521]

158. *Longley-Rice Error Warnings or "Flags" Treatment.* We decline to adopt an alternative treatment of results that are flagged as "unusable or dubious" by the Longley-Rice algorithm underlying the OET-69 methodology.[522] Currently, the assumption is that the cells with such warning flags have coverage, even if surrounding cells are predicted to lack coverage or are subject to interference.[523]

159. NAB opposes any change in the treatment of the error flags, claiming it would change the OET-69 methodology, in violation of the Spectrum Act, and result in loss of coverage area for the majority of the broadcast stations.[524] By contrast, CEA contends that treatment of the flags is not part of the OET-69 methodology, and that providing the Commission flexibility in the treatment of such flags

[513] NAB *TVStudy PN* Comments at 12.

[514] *TVStudy PN,* 28 FCC Rcd at 954.

[515] *See* para. 138.

[516] *See also* CEA *TVStudy PN* Comments at 6.

[517] *TVStudy PN*, 28 FCC Rcd at 954.

[518] This error mostly impacted stations on short towers located at high elevations (e.g., mountains).

[519] Examples of incorrect data include negative values for beam tilt, swapped values for mechanical beam tilt and orientation, missing maximum values for directional antenna patterns, missing or incorrect directional antenna flags, and ERP values entered in dBk instead of kilowatts.

[520] *See TVStudy PN*, 28 FCC Rcd at 954.

[521] *See* n.615.

[522] *TVStudy PN*, 28 FCC Rcd at 954.

[523] *Id*.

[524] NAB *TVStudy PN* Comments at 7.

will allow us to better fulfill the objectives of the Spectrum Act.[525] In a similar vein, CTIA argues that the current assumption that a "flagged" cell receives television service overestimates broadcast licensees' coverage areas, an outcome that will "hamstring the Commission's ability to efficiently and effectively manage the repacking process."[526]

160. We are not persuaded that a change in the underlying assumption of error warnings or "flags" is necessary or appropriate at this time. As noted in the *TVStudy PN*, error warnings have been treated differently depending on context.[527] For example, the presence of an error "flag" is ignored in applying the methodology of OET Bulletin Nos. 72 and 73.[528] That assumption is consistent with the purpose of OET-72 and OET-73, which were designed to identify whether service is available at a *specific location* (household).[529] OET-69 is designed to predict service availability within *a station's coverage area generally*, at points that are not specific households but are intended to be representative of a surrounding area or cell. The assumption of coverage in that context is consistent with the Commission's traditional assumption that service is available throughout a station's coverage area and that broadcasters locate and configure their transmitters to maximize coverage. Thus, despite the fact that the current treatment of error warnings may overestimate coverage areas, we find no compelling reason to change our treatment of the Longley-Rice error flags at this time. Further, we do not believe that assuming service for cells with error flags will significantly impact our ability to efficiently repack television stations, because this assumption does not increase the coverage area that we must make all reasonable efforts to preserve. Accordingly, we will continue to assume coverage where Longley-Rice error warnings appear.

161. On May 8, 2014, NAB filed a 129-page submission purporting to demonstrate that *TVStudy* "produce[s] flawed results" by comparing *TVStudy* and "the existing OET-69 software."[530] Despite the fact that OET first publicly released *TVStudy* over 15 months ago, NAB filed on the eve of the Sunshine period, limiting analysis of its submission and depriving interested parties of an opportunity for comment.[531] Nonetheless, analysis indicates that NAB's submission is flawed. First, NAB used the wrong legacy software for its comparison. NAB maintains that "the version of OET-69 in existence on February 22, 2012 (understood to include OET Bulletin 69 and its implementing software)" must be used in the repacking process.[532] NAB does not specify *which* of the legacy software programs for applying the OET-69 methodology in use as of that date it believes must be used.[533] If Congress had intended to require the use of particular software, however, presumably it would have required the use of OET's

[525] CEA *TVStudy PN* Comments at 14; *see also TVStudy PN*, 28 FCC Rcd at 955.

[526] CTIA *TVStudy PN* Comments at 8-9.

[527] *TVStudy PN*, 28 FCC Rcd at 954-955.

[528] CEA *TVStudy PN* Comments at 13.

[529] OET-72 and OET-73 were designed to implement the Satellite Television Extension and Localism Act of 2010 (STELA). STELA was enacted to ensure the satellite delivery of network television programming to specific viewers that *cannot* receive that programming from their local television station by means of an outdoor or indoor antenna. *See* Satellite Television Extension and Localism Act of 2010, Pub.L. 111-175, 124 Stat. 1218 (2010). OET Bulletin No 72 is available at http://transition fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet72/oet72.pdf; OET Bulletin No. 73 is available at http://transition fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet73/oet73.pdf.

[530] NAB Comments, ET Docket No. 13-26, GN Docket No. 12-268 at 1, 3 (filed May 8, 2014) (NAB May 8 filing) at 1, 3.

[531] *See* 47 C.F.R. § 1.1203(a), (c).

[532] NAB Comments at 4-5.

[533] *See* para. 146 (explaining that the Commission's different bureaus have used different software programs to implement the OET-69 methodology).

"FLR" software (which has been publicly available on OET's website for years), as the statute refers specifically to OET as the originator of OET-69.[534] Yet NAB apparently used a version of the Media Bureau's application processing software for its comparisons to *TVStudy*.[535] Second, NAB used the wrong input values for its comparison. NAB maintains that it used "the settings OET actually proposes to use."[536] NAB used such settings selectively, however, skewing the results of its comparison. For example, NAB maintains that use of *TVStudy* results in a loss of population served for approximately 52 percent of stations studied, yet NAB failed to update Census data reflecting an increase in the U.S. population between 2000 and 2010.[537] OET's analysis using the settings OET proposed to use (and that we adopt in this Order) results in a population increase for 88 percent of full power stations.[538] Third, NAB is mistaken that *TVStudy* must be flawed because it does not replicate the results produced by earlier software for applying OET-69.[539] The various legacy software programs used by the Commission's different bureaus do not always produce identical results: identical results are unnecessary when the software is being used for different purposes. *TVStudy* is not designed to produce the identical results produced by earlier software, although it does produce very similar results.[540] *TVStudy* is configured differently from earlier software so that it can support the repacking process using the most up-to-date and accurate information and technical evaluation capabilities and, therefore, necessarily does not produce exactly the same results.[541]

c. Preserving Coverage Area

162. *Background.* As stated above, the Spectrum Act requires that the Commission make "all reasonable efforts to preserve . . . the coverage area . . . of each broadcast television licensee, as determined using the methodology described in OET Bulletin 69."[542] The term "coverage area" is not defined in the Spectrum Act, OET-69 or our rules. In the *NPRM*, the Commission proposed to interpret "coverage area" to mean a full power station's "service area," as defined in section 73.622(e) of our rules.[543] Noting that the rules governing Class A stations do not define a "service area" for such stations, the Commission proposed to use a Class A station's "protected contour" — the area within which it is

[534] *See* Spectrum Act § 6403(b)(2). Further, OET used "FLR" for all of the Commission's analyses of broadcast television stations' coverage areas and populations served during the DTV transition.

[535] *See* NAB May 8, 2014 filing, Declaration of Willliam R. Meintel at para. 7.

[536] NAB May 8 filing at 7.

[537] *See id.* at 5.

[538] *See* para. 140. We also note that NAB treated Class A stations differently from full power stations, which resulted in the largest discrepancies between the results produced by the earlier software and *TVStudy*. Further, in generating its comparison of *TVStudy* and the legacy software program using old input values, NAB used the wrong parameters relating to treatment of Class A stations, minimum antenna height above average terrain (HAAT), the number of terrain radials used to determine HAAT, Census Block coordinate rounding, treatment of DTS stations, and treatment of the digital antenna pattern field in the Commission's CDBS database. These errors appear to explain most of the apparent "losses" in coverage area and population in that comparison. *See* NAB May 8, 2014 filing, Att. A.

[539] *See* NAB May 8, 2014 filing at 4.

[540] *See* para. 140.

[541] There are differences between *TVStudy* and FLR that would be expected to produce different results even when the input parameters are set consistently. For example, *TVStudy* automatically corrects for obvious errors in the license data base; the FLR and Media Bureau software has no such capability. The terrain grid sizes can be set to be identical, but the programs use different compilations of the underlying 3 arc-second terrain data.

[542] Spectrum Act §§ 6403(b)(1)(B), (b)(2). *See also id.* §§ 6403(b)(3) (no involuntary relocation from UHF to VHF), (g) (limitation on reorganization authority).

[543] 47 C.F.R. § 73.622(e).

protected from interference under our rules — as its "coverage area" for purposes of the repacking process.[544]

163. As discussed above, in the repacking process some stations may be reassigned to different channels. When a station is assigned to a different channel, its technical facilities (transmit power and antenna pattern) must be modified to preserve its coverage area, because radio signals propagate differently on different frequencies.[545] With such modifications, there may be some small differences in the specific geographic areas served within the station's noise-limited or protected contour, even though the total geographic area within the station's contour remains the same. These differences are due to the varying propagation characteristics of different channels, which can change the degree to which areas within a station's contour are affected by terrain loss. The Commission proposed to use replication software to calculate the power and antenna pattern adjustments necessary to reproduce, or "replicate," a station's coverage area on its channel for post-auction operation.[546] It further proposed to allow a station assigned to a new channel to continue to use its existing antenna pattern, and to adjust its power level so that the coverage area on the new channel would be the same in total square kilometers as before the repacking process, without regard to terrain losses, instead of using the calculated antenna pattern.[547] The Commission also asked whether it would be consistent with the Spectrum Act to consider a station's signal to be receivable at all locations within its noise-limited or protected contour (depending on whether it is a full power or Class A station) for purposes of replication.[548]

164. *Discussion.* We adopt the proposal to interpret the statutory term "coverage area" consistent with the definition of "service area" in OET-69 and section 73.622(e) of the Commission's rules with regard to full power stations.[549] Accordingly, we will consider a full power station's coverage area to be the geographic area within its noise- limited F(50,90) contour where the signal strength is predicted to exceed the noise-limited service level.[550] Consistent with the methodology in OET-69, areas within a station's noise-limited contour where its signal strength is below the noise-limited signal strength

[544] *See NPRM*, 27 FCC Rcd at 12390, para 99. A Class A station's protected contour is different from, and generally smaller than, the noise-limited contour that defines the "service area" within which a full power station is protected from interference under our rules. *See* 47 C.F.R. § 73.6010.

[545] A broadcast signal transmitted on one channel will cover a slightly different area from a signal transmitted on a different channel at the same location using the same technical facilities (*e.g*., antenna pattern, antenna height, and ERP). For a station on a new channel to replicate its existing coverage area, its transmission facilities must be adjusted to specify a new antenna pattern and/or Effective Radiated Power (ERP). "Replicate" in this context means to reproduce a station's existing noise-limited contour on a different channel.

[546] *NPRM*, 27 FCC Rcd at 12391, para. 100. Replication would only be performed for stations assigned to new channels after the auction. Stations remaining on their existing channels after the auction would not need to change their operation. The replication software is incorporated into *TVStudy*.

[547] *NPRM*, 27 FCC Rcd at 12391, para. 100. It may not be possible to build an antenna that achieves the antenna pattern calculated for the station by *TVStudy*.

[548] *NPRM*, 27 FCC Rcd at 12391, para. 102.

[549] *See NPRM*, 27 FCC Rcd at 12388, paras. 93-94; OET-69 at 1; 47 C.F.R. § 73.622(e)(1). The commenters that address the definition of coverage area support the proposal to interpret the statutory term "coverage area" to mean a full power station's "service area" as defined in § 73.622(e) of the Commission's rules. *See* Harris Comments at 7; NAB Comments at 23.

[550] 47 C.F.R. § 73.622(e)(1). This rule defines "noise-limited contour" as "the area in which the predicted F(50,90) field strength of the station's signal" exceeds specified levels. *Id.* Within this contour, service is considered available at locations where the station's signal strength, as predicted exceeds specified levels using the Longley-Rice methodology in OET Bulletin No. 69. 47 C.F.R. § 73.622(e)(2). "Noise" in this definition refers to background noise from thermal sources and from within typical TV receivers themselves, not to interference from other television stations. *See* OET-69 at 3-5 (distinguishing between "evaluations of service coverage and interference").

level, which typically occurs due to terrain obstructions or other propagation factors, will not be considered to be part of the station's coverage area.[551] As requested by KAZN and UVM, the coverage areas of full power stations that operate distributed transmission systems ("DTS") using multiple transmitters will be determined in accordance with the definition of authorized service area and method for determining DTS "authorized service areas" in sections 73.626(b), (c) and (d) of the rules.[552] Further, it is appropriate to use a DTS station's authorized service area as currently set forth in our rules as the definition of the coverage of such stations. While OET-69 does not specifically address DTS stations, we find that considering a DTS station's service area to be the combined coverage of its transmitters, as limited by the maximum distances specified in the rules, is consistent with that methodology.[553]

165. As proposed in the *NPRM*, we will make all reasonable efforts to preserve Class A stations' protected contours.[554] We disagree with commenters who argue that we must protect the entire area covered by Class A stations' signals, i.e., the noise-limited contour within which viewers may be able to receive the signal.[555] Because our rules only protect Class A stations' protected contours from interference, defining their coverage areas as their noise-limited contours would provide these stations with greater interference protection after the repacking process than they enjoy today.[556] In the absence of an explicit statutory directive, we find no basis to do so.[557] Our approach makes our interpretation of the statutory term "coverage area" consistent for full power and Class A stations, both of which will enjoy protection in the repacking process for the same area that now receives interference protection under our rules.[558]

166. In preserving a station's coverage area, we will replicate that station's contour on its new channel.[559] As noted earlier, OET-69 sets forth the methodology for determining the contours that define

[551] *See* OET-69 at 7.

[552] 47 C.F.R. § 73.626(b), (c), and (d); UVM Reply at 12-13; KAZN Reply at 2-3. Those rules define the authorized service area of a DTS station as the area encompassed within the combined noise-limited signals of all of a station's DTS transmitters, subject to a maximum service area limit that corresponds to a pre-defined radius or contour that could be served from a single transmitter.

[553] In contrast, we will not include areas within a full power station's noise-limited contour that are served by replacement translators in a station's coverage area, as requested by the Affiliates Associations, NAB, and others. *See* Affiliates Associations Comments at 39-41, Bahakel Comments at 3, Belo Comments at 15-16, Bonten Comments at 10, Cox Media Comments at 4-5, Gray TV Comments at 7-8, NAB Comments at 33, Tribune Comments at 15, Disney Comments at 14 and WGAL Comments at 14-15. We address this issue in § III.B.3.d.iii (LPTV and TV Translator Stations).

[554] *NPRM*, 27 FCC Rcd at 12390, para. 99; *see also* 47 C.F.R. § 73.6010.

[555] *See* Affiliates Associations Comments at 25; Casa Comments at 3-4; Dispatch Comments at 4-5; Dispatch Reply at 7-8; Bonten Comments at 9-10; Bonten Reply at 8-9; Raycom Reply at 10.

[556] 47 C.F.R. §§ 73.6010, 73.6012.

[557] *See National Cable & Telecommunications Ass'n v. Brand X Internet Servs.*, 545 U.S. 967, 993 (2005) (noting presumption that Congress is aware of "'settled judicial and administrative interpretation[s]'" when it enacts a statute) (quoting *Commissioner v. Keystone Consol. Industries, Inc.,* 508 U.S. 152, 159 (1993)); *Hernstadt v. FCC*, 677 F.2d 893, n.22 (D.C. Cir. 1980) ("Congress is presumed to be cognizant of, and legislate against the background of, existing interpretations of law.").

[558] We note that, for purposes of this proceeding, the coverage area of Class A stations does not include areas within the protected contour of the Class A station where the signal is predicted to fall below the level needed for reception of service due to terrain obstructions. This clarification brings the definition of "coverage area" for Class A stations in line with the definition for full power stations and the principles of OET-69.

[559] Replication of coverage area was also adopted in the context of the DTV transition. *See Advanced Television System and their Impact Upon the Existing Television Broadcast Service*, MM Docket No. 87-268, Sixth Report and Order,12 FCC Rcd 14588,14605, para. 29 (1997). In the DTV transition, the Commission replicated stations' (continued….)

the boundaries of a station's coverage area.[560] As proposed in the *NPRM*, we adopt the "equal area" approach for replicating the area within the station's existing contour as closely as possible using the station's existing antenna pattern.[561] Assuming a station maintains its other existing technical parameters, i.e., location, antenna height and antenna pattern, we will permit the station to adjust its power on the new channel until the geographic area within the station's noise-limited or protected contour (depending on whether the station is full power or Class A) is equal to the area within the station's original contour on its pre-auction channel. This approach will allow stations to preserve their existing coverage areas using antennas that are practical to build, so that stations will be able to actually construct their new facilities.[562]

167. In the *NPRM*, we proposed to make all reasonable efforts to preserve the existing coverage area of stations whose operations exceed the limits on antenna height above average terrain ("HAAT"), but not the absolute limits on effective radiated power ("ERP"), recognizing that a number of full power stations operate licensed facilities pursuant to a waiver of HAAT and ERP limits.[563] We adopt the proposal to protect in the repacking process the existing coverage areas of stations operating under a waiver of the HAAT or antenna height limits. As requested by several commenters, we will also protect the existing coverage areas of stations that operate under a waiver of ERP limits.[564] In addition, we will make all reasonable efforts to preserve the existing coverage areas of stations that operate above the HAAT and/or ERP limits pursuant to section 73.622(f)(5), except that such operations will not be protected to the extent that they exceed the maximum power limits specified in the Commission's rules without regard to HAAT.[565] Stations licensed pursuant to a waiver of the applicable ERP limit will be permitted to continue operations at power levels up to the existing authorized ERP.[566]

168. To the extent that a broadcaster participates in the auction through a UHF-to-VHF or a high-VHF-to-low-VHF bid, we will make all reasonable efforts to preserve its coverage area and population served. However, because these stations will be relocating to a different band, we anticipate that it may be difficult for them to maintain their antenna pattern on the new channel.[567] Accordingly, as discussed in Section V.C.1.a, we will allow successful UHF-to-VHF and high-VHF-to-low-VHF bidders

(Continued from previous page)
analog coverage areas on a second channel for DTV service. *See id.* The Commission noted that this approach would ensure broadcasters would have the ability to reach the audiences they served at that time and viewers would have access to the stations that they received over-the-air at that time. *See id.* at 14605. Replication was based on appropriate propagation models and technical planning factors that were later incorporated in OET-69. *See Advanced Television System and their Impact Upon the Existing Television Broadcast Service*, MM Docket No. 87-268, Sixth Further Notice of Proposed Rulemaking, 11 FCC Rcd 10968, 11002, para. 82 (1996).

[560] *See* OET-69 at 1-3.

[561] *See NPRM*, 27 FCC Rcd at 12391, para. 100; *see also Repacking Data PN*, 28 FCC Rcd at 10389.

[562] *See* Affiliates Associations Comments at 27 (contrasting with "facilities predicated on a theoretical antenna pattern that is impracticable, or even impossible, to build").

[563] *NPRM*, 27 FCC Rcd at 12391, n. 157. *See* 47 C.F.R. § 73.622(f). Our records indicate that, as of February 22, 2012, there were 16 licensed VHF stations operating pursuant to a waiver of the applicable ERP limit. There are also numerous licensees as of that date that operated with increased HAAT and/or ERP pursuant to 47 C.F.R. § 73.622(f)(5).

[564] *See* Bonten Comments at 9-10; Comcast Comments at 17, n.45; Disney Comments at 32-34.

[565] *See* 47 C.F.R. § 73.622(f)(5).

[566] *See* 47 C.F.R. § 73.622(f)(4). Our records indicate that no station has been granted a waiver of the 1,000 kW ERP limit.

[567] The number of antenna patterns manufactured for VHF channels is significantly smaller than for UHF channels. Review of one antenna manufacturer's online catalog shows nearly four times as many antenna azimuth patterns available at UHF than at VHF. *See, e.g.*, http://www.eriinc.com/Catalog/Antennas.aspx.

to request alternative facilities that may result in increases in their coverage areas, as long as the increases do not cause interference to other stations.[568]

169. Although broadcasters generally support our decision to permit stations assigned to new channels to continue to use their existing antenna patterns with power adjustments,[569] the Affiliates Associations contend that we should not consider a station's signal to be receivable at all locations within its noise-limited contour, thereby ignoring terrain losses.[570] They argue that because the effect of terrain on signal reception is the *sine qua non* of the OET-69 model, ignoring terrain losses and assuming that a station's signal is receivable at all locations within its noise-limited contour would eviscerate the statutory requirement to preserve coverage areas using the OET-69 methodology.[571] They acknowledge that there inevitably will be some changes in coverage area due to channel reassignments, but contend that the Commission can only satisfy the preservation mandate in the statute if it limits such changes to no more than 0.5 percent.[572] The Affiliates Associations alternately propose that the Commission allow stations "flexibility in specifying alternative facilities that increase a station's coverage area if that is necessary to fully preserve the coverage area and population served of a station following repacking."[573]

170. While we agree that the goal of the repacking process should be preservation of stations' pre-repacking coverage areas, we emphasize that, as the Affiliates Associations acknowledge, it may not be physically practical or possible for some stations to build modified facilities that result in less than a 0.5 percent change in the geographic area served within the original contour.[574] Because radio signals propagate differently on different frequencies, the signal of a station reassigned to a different channel will generally not be receivable in precisely the same locations within a station's contour as it was in its original channel. Instead, there may be signal losses due to terrain in different areas within the contour.[575] Such losses are unavoidable, so exact replication of coverage within a station's contour is not always attainable under the laws of physics. We also note that the Affiliates Associations have mischaracterized the proposal to preserve stations' coverage areas in the repacking process. We are not assuming that "coverage area" includes all of the area within a station's contour (i.e., that a station's signal is receivable at all locations within the contour). Rather, we will adhere to the OET-69 methodology, which considers variations in signal availability resulting from terrain losses, when determining the "coverage area" and "population served" that must be preserved in the repacking process.[576] Thus, we will not include areas where a signal is not receivable due to terrain losses in the coverage area to be preserved.

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[568] *See* § V.C.1.a (Construction Permit Application Filing Requirements). As provided in § V.C.5 (Reimbursement of Relocation Costs), UHF-to-VHF and high VHF-to-low VHF stations are not entitled to reimbursement for the costs of moving to another band.

[569] Affiliates Associations Comments at v; Comcast Comments at 17; Anon. Broadcaster 1 Comments at 4-5.

[570] Affiliates Associations Comments at 29-30.

[571] Affiliates Associations Comments at 29-30.

[572] Letter from Wade H. Hardgrove *et al.*, Counsel for Affiliates Associations, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 3 (filed Mar. 18, 2014) (Affiliates Associations' Coverage Area *Ex Parte*).

[573] *See id.*

[574] Affiliates Associations Comments at v and 28.

[575] The terrain obstacles remain the same in a geographic area, but the physics of propagation over or around those obstacles include a frequency-dependent component. Given that we will be recovering channels from 51 down, most television stations that are assigned new channels will have new channels that are lower in the band, with better propagation than their current channels.

[576] Specifically, as discussed in § III.B.2.d (Preserving Population Served), we acknowledge the terrain losses experienced on a station's original channel when we determine the "population served" to be preserved. We make all reasonable efforts to preserve the "population served" in a station's coverage area. The definition of coverage area for both full power and Class A stations does not include areas that are lost to terrain. *See* paras. 164-165.

171. We decline to adopt the proposals advanced by the Affiliates Associations. First, we do not interpret the Spectrum Act to prohibit anything greater than a *de minimis* change in a station's coverage area. Rather, as discussed above, we agree with T-Mobile that "the reasonableness requirement [in §6403(b)(2)] by its plain terms is a measure of effort—i.e., the actions taken to achieve a goal—and not of the outcome itself."[577] Hence, the demand that the outcome of the repacking process be no more than a 0.5 percent change in the geographic area served, finds no support in the statute.

172. Nor does the Spectrum Act require us to expand stations' contours to account for terrain losses. As stated above, we adopt the "equal area" approach for replicating the area within a station's contour using the station's existing antenna pattern. This approach is designed to allow a station to use its existing facilities, allowing for some adjustments, to serve the same geographic area on the channel to which it is reassigned in the repacking process. The Affiliates Associations support our approach,[578] but seem to demand that we go even further by expanding a station's contour to compensate for terrain losses resulting from propagation differences on the reassigned channel are predicted to reduce the coverage area *within* the contour.[579] While not entirely clear, the Affiliates Associations seem to demand that we preserve the same square kilometers of coverage, not a station's actual coverage area prior to repacking. Such an approach finds no support in the Spectrum Act, which specifically directs us make "all reasonable efforts to *preserve* . . . the coverage area . . . of each broadcast television licensee, as determined using the methodology described in OET Bulletin 69."[580] Consistent with our approach to preserving population served,[581] we interpret the statute to direct us to make all reasonable efforts to protect the geographic area that a station actually served as of February 22, 2012. This approach, which is consistent with our efforts to replicate coverage areas during the digital transition,[582] is designed to ensure that after the repacking process, broadcasters will continue to reach the same viewers, and that viewers will continue to have access to the same stations. Expanding contours, as the Affiliates Associations' request, would thus be inconsistent with the statute, because it would not maintain the *status quo*; to the contrary, it would expand the geographic area that a station actually serves. The Affiliates Associations' proposal could provide the station with a "windfall" in the form of new viewers or, as discussed below, require us to undertake costly efforts to extend interference protection to areas with no viewers. We do not believe that either of these outcomes was intended by the Spectrum Act.[583]

173. Second, expanding contours in the repacking process is not practical or realistic, because it would compromise the repacking process and, ultimately, the success of the auction. Allowing contour extensions during the repacking process will make it more difficult to repack stations efficiently.[584] We would face the same problem if we were to prohibit any channel reassignment that resulted in anything greater than a *de minimis* change in the geographic area served. Reducing the number of potential

[577] T-Mobile Reply at 87.

[578] Affiliates Associations Comments at 27.

[579] Affiliates Associations' Coverage Area *Ex Parte* at 3.

[580] Spectrum Act §§ 6403(b)(1)(B), (b)(2). *See also id.* §§ 6403(b)(3) (no involuntary relocation from UHF to VHF), (g) (limitation on reorganization authority).

[581] *See* § III.B.2.d (Preserving Population Served).

[582] *See* n.559.

[583] Our rejection of the Affiliates Associations' proposal to expand contours to compensate for terrain losses will have no effect on existing television viewers. That will be addressed through our separate effort to preserve a station's "population served," described in § III.B.2.d (Preserving Population Served).

[584] This is because expanding a station's contour will create greater interference potential between that station and other stations, and require the Commission to protect a larger geographic area from interference. As a consequence, stations on the same channel, and adjacent channels, would have to be spaced farther apart. That, in turn, would effectively limit the number of potential channels to which a station could be reassigned.

channels significantly limits the Commission's flexibility to assign channels in the repacking process, increasing the potential costs of clearing the spectrum and decreasing the likelihood of a successful auction outcome.[585] We interpret the statute to require that we make all reasonable efforts to preserve each station's coverage area and population served without sacrificing the goal of a successful incentive auction.[586] As set forth below, we are adopting a number of measures that will effectively address broadcasters' concerns without compromising the auction.[587] Under these circumstances, we need not adopt the proposals advanced by the Affiliates Associations to meet the statutory mandate.[588]

174. Third, broadcasters' concerns regarding the potential for substantial new terrain losses are exaggerated. The majority of UHF stations will be assigned to channels that are lower in the band than their original channels, because under the 600 MHz Band Plan the Commission will be seeking to repurpose UHF spectrum contiguously from channel 51 down, meaning that stations being reassigned to new channels within the UHF band generally will be assigned to channels lower in the band. Such stations are likely to experience *decreases* rather than increases in coverage lost to terrain within their contours due to the superior propagation characteristics of their lower frequencies.[589]

175. Finally, we are adopting a number of measures to effectively address the Affiliates Associations' concerns. For those stations that may experience a loss of coverage due to terrain, we are adopting several measures that will allow them to remedy such losses. Specifically, broadcasters will be able to file initial construction permit applications that expand their coverage area by up to one percent, as long as they do not cause new interference to any other station.[590] In addition, if a station is dissatisfied with its new channel assignment due to terrain losses, it may seek alternative transmission facilities on a different channel, provided a channel is available and the alternative facilities meet all existing technical and interference requirements and serve the public interest.[591] Further, if a licensee wishes to provide service to a specific area that had service on its pre-auction channel but lacks service on its new channel,

[585] Limiting the number of potential channels to which a station can be reassigned increases the likelihood that the Commission will have to accept bids at higher prices in the reverse auction to ensure that it will have channels available for those stations that wish to remain on the air. *See* § IV.B.2.b (Reverse Auction – Bid Assignment Procedures: Determining Which Bids Are Accepted). Further, limiting the number of potential channels could require the Commission to reassign stations that are not participating in the reverse auction to channels above the clearing target. This would create an impairment that reduces the amount of spectrum available in the forward auction, which would reduce auction proceeds. *See* § III.A.2.d (Market Variation). Contour expansions likewise could create or worsen impairments to wireless blocks to be auctioned.

[586] *See* § III.B.2.a ("All Reasonable Efforts").

[587] *See* para. 1755.

[588] *See, e.g., WildEarth Guardians v. Pub. Serv. Co. of Colorado*, 690 F.3d 1174, 1186-87 (10th Cir. 2012) (explaining that while "[i]t is possible [a utility] could have done more" to achieve Clean Air Act compliance, "doing so would have resulted in significant costs and delay" such that it was reasonable for the utility "to work towards . . . compliance while continuing construction"); *Grand Trunk Western R.R. Inc. v. Bhd. of Maint. of Way Employees*, 497 F.3d 568, 572 (6th Cir. 2007) (holding that "it would not be reasonable to require [the union] to engage in a third round of direct negotiations that are unlikely to succeed where two previous rounds of direct negotiation and mediation have failed"); *Price*, 416 F.3d at 1347-48 (11th Cir. 2005) (holding that it was unreasonable to require a libel plaintiff need not depose seventeen individuals to identify a confidential informant when deposing four the women from whom he was most likely to discover the identity).

[589] *See, e.g.*, William C.Y. Lee, *Mobile Communications Engineering*, 2nd Ed., New York: McGraw-Hill, 1997, Chapter 4, "Path Loss over Hilly Terrain and General Methods of Prediction." Path loss over a knife-edge obstruction is given by Equations 4.17 and 4.24, and the Fresnel parameter, ν (the Greek letter nu) includes a frequency-dependent component such that terrain losses increase with increasing frequency and decrease with decreasing frequency.

[590] *See* § V.C.1.a (License Modification Procedures).

[591] *See* § V.C.1.b (Alternate Channel and Expanded Facilities Opportunities).

it could use DTS, for example, to provide that coverage.[592] This approach will allow us fulfill our statutory duty to make "all reasonable efforts" to preserve broadcast licensees' coverage area and population served, as required by section 6403(b)(2) of the Spectrum Act.[593]

d. Preserving Population Served

176. *Background.* Channel reassignments, in combination with stations relinquishing their spectrum usage rights as a result of the reverse auction, may change the interference relationships among stations. Those relationships, in turn, may affect television stations' populations served. Existing interference to the stations that remain on the air will be eliminated by stations that go off the air. Likewise, new channel assignments generally will eliminate interference that was caused by the previous assignments. At the same time, new channel assignments could create a potential for new interference between nearby stations on the same channel or a first adjacent channel.[594]

177. In the *NPRM*, the Commission proposed to interpret the statutory term "population served" to mean the persons who reside within a station's service area at locations where service is not subject to interference, as specified in OET-69 and section 73.616(e) of the rules.[595] Section 73.616(e) provides that the population served within a station's service area "does not include portions of the population within the noise-limited service contour of that station that are predicted to receive . . . masking interference from any other station."[596] With regard to new interference, this rule provides that an application for a new or modified station will not be accepted "if it is predicted to cause interference to more than an additional 0.5 percent of the population served by another . . . DTV station."[597]

178. The Commission further proposed three options for fulfilling the statutory mandate to make all reasonable efforts to preserve "population served." Option 1 seeks to preserve service to the same total number of viewers but not necessarily the same viewers, allowing reassignments that would reduce a station's total population served as of February 22, 2012 by no more than 0.5 percent.[598] Option 2 seeks to preserve service to the same viewers, allowing interference from reassignments only in previously affected areas or if any newly interfering station, considered alone, would reduce a station's

[592] In contrast, increasing a station's contour as proposed by the Affiliates Associations may not address losses to specific viewers resulting from terrain. Increasing the contour would only increase the sum of the population served by adding viewers that did not receive service before.

[593] Courts have repeatedly held that it is reasonable for the agency to rely on a waiver process to address any unforeseen shortcomings that might arise in specific instances. *See Vt. Pub. Serv. Bd. v. FCC*, 661 F.3d 54, 65 (D.C. Cir. 2011) (finding a waiver process provided a reasonable means to update stale line count data used in a model for determining universal service support); *Rural Cellular Ass'n v. FCC*, 588 F.3d at 1104 (discussing, with approval, a waiver process used to provide certain wireless carriers additional support should an interim cap render support insufficient); *Rural Cellular Association v. FCC*, 685 F.3d 1083, 1095 (D.C Cir. 2012) (same); *Alenco*, 201 F.3d at 622 (finding a single carrier's reduced rate of return under an operating expenses cap "at most . . . presents an anomaly that can be addressed by a request for a waiver").

[594] Interference can occur between television signals on the same channel (co-channel) or on the channels immediately above and below (first adjacent channels) the desired signal. The standards for determining whether interference occurs to full power and Class A television stations from other full power and Class A stations are set forth in §§ 73.623(c) and 74.793 of the rules, respectively. *See* 47 C.F.R. §§ 73.623(c), 74.793(b), (c), (d). Full power stations are protected from interference within their noise-limited contours, whereas Class A stations are protected within their "protected contours."

[595] *NPRM*, 27 FCC Rcd at 12388, para. 94.

[596] 47 C.F.R. § 73.616(e).

[597] *Id.*

[598] *NPRM*, 27 FCC Rcd at 12392, para. 103. The Commission's existing rules treat 0.5 percent as "no new interference" because 0.5 percent is equivalent to zero when rounded to an integer value. *See id*.

population served by no more than 0.5 percent.[599] Likewise, Option 3 seeks to preserve service to the same viewers, allowing new interference up to 0.5 percent between stations that interfered with one another as of February 12, 2012, as well as new interference up to two percent between stations that did not interfere with one another previously.[600] Option 3 allows "replacement interference" only from the specific station that caused interference previously, as opposed to any station.[601]

179. *Discussion.* As proposed in the *NPRM*, we interpret the statutory term "population served" to mean the persons who reside within a station's coverage area at locations where service is not subject to interference from another station or stations, as specified in OET-69 and section 73.616(e).[602] Commenters do not specifically address the *NPRM* proposal, although they express views on how the Commission should make all reasonable efforts to preserve each station's population served in the repacking process.[603] We will consider a station's "population served" to be the population within the station's coverage area, as that term is defined above, less any portions of the areas where interference from other stations is present as of February 22, 2012.[604] Also, we adopt Option 2, proposed in the *NPRM*, to fulfill the statutory mandate to preserve "population served" as of February 22, 2012. Thus, we will preserve service to the same specific viewers for each eligible station, and no individual channel reassignment, considered alone, will reduce another station's population served on February 22, 2012 by more than 0.5 percent. This approach is consistent with the standard for evaluating interference from new or modified television operations in section 73.616(e) of the rules.[605] As noted above, the 0.5 percent level is considered to be no interference at integer precision.

180. Option 2 will best fulfill our mandate to make "all reasonable efforts" to preserve broadcast licensees' populations served as of the date of enactment of the Spectrum Act, for the following reasons. First, we agree with NAB and other broadcasters that section 6403(b)(2) of the Spectrum Act's charge that we "make all reasonable efforts to preserve . . . the population served of each broadcast television licensee" directs us to protect service to the specific viewers who had access to a station's signal as of February 22, 2012. Interpreting the preservation mandate to refer to existing viewers as of this date seems most consistent with the statutory language and legislative history, as well as Commission precedent. The statute's use of the word "preserve" suggests that the goal is to maintain the *status quo*, not to replace some viewers with others. That interpretation is reinforced by Congress's rejection of a bill that would have established a goal of substantial equivalence rather than preservation,[606] as well as another bill that would have required the FCC to preserve "interference levels with respect to [each]

[599] *Id*. at 12394, para. 106.

[600] *Id*. at 12395, para. 107.

[601] *Id*..

[602] OET-69 at 5; 47 C.F.R. § 73.616(e).

[603] *Compare* NAB Comments at 18-21, 24 (maintaining that Congress intended to protect the specific viewers who currently receive service from a station," and to prohibit increased interference except in exceptional circumstances), Affiliates Associations Comments at 32 (same); Comcast Comments at 12-13 (same); NYSBA Comments at 21-22 (same); Tribune Comments at 17 (same); Univision Comments at 6 (same), *with* AT&T Reply at 62-63 (arguing that the statute does not require or even permit the Commission to maintain coverage area and population served in all but "extraordinary circumstances" if such rigidity would risk decreasing the spectrum reallocated to mobile broadband uses.); CTIA Reply at 46-47 (same). We address our interpretation of the statutory preservation mandate in § III.B.2.a.

[604] *See* paras. 164-165.

[605] We note that 47 C.F.R. § 73.616(e) does not limit the amount of new interference from multiple stations under the 0.5 percent standard.

[606] *See* Comcast Comments at 8 (citing Wireless Innovation and Public Safety Act of 2011, H.R.3509, 112th Cong. §302(b)(3)(B)(2011)).

licensee's signal" rather than population served.[607] Further, the Commission historically has been concerned with avoiding disruption of service to existing viewers.[608] Thus, while Option 1 would provide greater efficiencies because it takes into account overall reductions in interference that result when broadcast stations relinquish all of their spectrum usage rights,[609] we decline to adopt it because it would not preserve service to existing viewers as of February 22, 2012.

181. Second, Option 2 best satisfies our auction design needs. Specifically, Option 2 can accommodate pairwise interference analyses.[610] Option 1 would require analysis of interference relationships on an aggregate rather than a pairwise basis. While Option 3 permits greater new interference than Option 2 (i.e., two percent per station versus 0.5 percent per station), it is unduly restrictive because it does not allow any "replacement" interference, making repacking less efficient.[611] Accordingly, Option 2 provides the most protection to television stations' existing populations served consistent with our auction design needs.

182. Even though NAB recommends the adoption of Option 2 as the standard for "all reasonable efforts," it also urges the Commission to cap the amount of total additional interference at one percent, and allow no new interference to stations that are currently experiencing ten percent or more interference within their service areas.[612] According to NAB, these interference caps are necessary because, while an individual station can only cause a maximum addition of 0.5 percent interference under Option 2, "stations repacked during the incentive auction process . . . would likely receive interference from multiple stations" which, in the aggregate, could "lead to significant viewer losses."[613] Contemporaneously with the release of this Order, OET, and the Wireless, Media, and International Bureaus will be releasing a Public Notice inviting comment on a staff analysis of the potential impact of aggregate interference on television stations as a result of the repacking process. We defer a decision on NAB's proposal until the record is fully developed on the requested cap. We will resolve the issue in a subsequent Order that will be released no later than the release of the *Comment PN*, and well in advance of the incentive auction.

3. Facilities to Be Protected

183. In this Section, we address which broadcast facilities we must make all reasonable efforts to preserve in the repacking process, as well as those we elect to protect as a matter of discretion. A broadcaster may have one or more of the following types of facilities: licensed; authorized (i.e., facilities that are not yet licensed but are authorized in a construction permit); and applied-for (i.e., facilities that are requested in a pending application for a construction permit).[614] The discussion that follows addresses

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[607] Public Safety Spectrum and Wireless Innovation Act, H.R. 2482, 112th Cong., § 303(a)(2), adding new § 47 U.S.C. § 309(j)(8)(F)(iii)(III)(bb)(CC).

[608] *See, e.g., Amendment of Section 73.622(i), Post-Transition Table of DTV Allotments, Television Broadcast Stations (Fond du Lac, Wisconsin),* Memorandum Opinion and Order, 26 FCC Rcd 12712, 12714-15 (2011) (technical changes "that would result in a loss in television service are generally considered *prima facie* inconsistent with the public interest, unless outweighed by countervailing factors").

[609] *NPRM*, 27 FCC Rcd at 12392, para. 103.

[610] *See* § III.A (Repacking Process Overview).

[611] Under Option 3, locations where interference was formerly caused by stations that went off the air or changed channels cannot be permitted to occur from other stations.

[612] NAB Comments at 20-21. *See* Tribune Reply at 17 (supporting NAB's proposals); Broadcast Networks at 7 (same).

[613] NAB Comments at 29.

[614] We note that we technically do not "protect" specific "facilities" in the repacking process. A broadcaster that is reassigned to a different channel in the repacking process will have to modify its facilities in order to operate on its

(continued….)

our interpretation of the statutory preservation mandate as well as our discretionary protection decisions with regard to each of these types of facilities. We conclude that protecting certain facilities in addition to those the statute requires us to protect will serve the public interest. We also explain our decision not to extend protection to certain other categories of facilities.[615]

a. Mandatory Protection of Full Power and Class A Facilities

184. *Background.* Section 6403(b)(2) of the Spectrum Act directs the Commission, in making any reassignments or reallocations under section 6403(b)(1)(B), to "make all reasonable efforts to preserve, as of the date of enactment of [the] Act, the coverage area and population served of each broadcast television licensee." A "broadcast television licensee" is defined as the "licensee of—(A) a full-power television station; or (B) a low-power television station that has been accorded primary status as a Class A television licensee" under section 73.6001(a) of the Commission's rules.[616] In the *NPRM*, the Commission tentatively concluded that section 6403(b)(2) mandates all reasonable efforts to preserve full power and Class A facilities (1) licensed as of February 22, 2012; or (2) for which an application for a license to cover was on file as of February 22, 2012.[617]

185. *Discussion.* We adopt the tentative conclusion that section 6403(b)(2) mandates all reasonable efforts to preserve the "coverage area and population served" reflected in full power and Class A facilities (1) licensed as of February 22, 2012, the date of enactment of the Spectrum Act; or (2) for which an application for a license to cover was on file as of February 22, 2012. We also adopt the tentative conclusion that the scope of mandatory protection under section 6403(b)(2), which is limited to "broadcast television licensees," defined by the Spectrum Act as full power and Class A stations only, excludes LPTV and TV translator stations.[618] We interpret this mandate to apply to full power and Class A broadcasters that do not participate in the reverse auction and full power and Class A broadcasters that participate in the reverse auction but do not submit a winning bid. We also interpret this statutory mandate to apply to full power and Class A broadcasters that submit a winning bid to move from a UHF to a VHF channel or from a high VHF to a low VHF channel.[619]

(Continued from previous page)
new channel. Rather, we use the term "facilities" as shorthand for the "coverage area and population served" of licensees that we make all reasonable efforts to preserve in the repacking process.

[615] To ensure a stable, accurate database, and to facilitate the repacking process, we will require all full power and Class A television stations to verify and certify to the accuracy of the information contained in CDBS with respect to their protected facilities. Prior to the start of the incentive auction, the Media Bureau will issue a Public Notice announcing each station's protected facility. All full power and Class A stations will be required to submit a form (to be developed by the Media Bureau following the release of this Order) specifying any changes to the information contained in CDBS and certifying to the accuracy of the information in CDBS or provided on the form for their protected facility. We delegate authority to the Media Bureau to announce by Public Notice the deadline and procedures for filing the form.

[616] Spectrum Act §§ 6001(6), 6403(a)(1).

[617] *NPRM*, 27 FCC Rcd at 12397, para. 113. The Commission also tentatively concluded that § 6403(b)(2) does not prohibit us from granting protection to additional facilities where appropriate. *Id*. We discuss our exercise of discretionary authority below.

[618] *Id.* at 12399, para. 118*;* Spectrum Act §§ 6001(6), 6403(a)(1); *see also* paras. 238-39 (explaining that LPTV and TV translator stations are not entitled to the protections afforded by § 6403(b)(2) because they are not "broadcast television licensee[s]" as defined in § 6001(6)).

[619] *See* § IV.B.1.b (Reverse Auction Bid Options). It is reasonable to interpret the preservation mandate as applying to such successful bidders. If such bidders were not covered by the mandate, stations likely would be less willing to submit UHF-to-VHF or high-VHF-to-low-VHF bids, thereby undermining our goal of allowing market forces to determine the highest and best use of spectrum.

186. We conclude that section 6403(b)(2) requires all reasonable efforts to preserve only facilities that were in operation as of February 22, 2012. The statutory mandate to make all reasonable efforts to "preserve" coverage area and population "served" as of a date certain (February 22, 2012) clearly reflects a Congressional intent to protect or maintain facilities operating on this date. This interpretation is consistent with the arguments of NAB and other broadcasters that section 6403(b)(2) directs us to protect service to the specific viewers who had access to a station's signal as of that date,[620] and with the Commission's historical concern with avoiding disruption of service to existing viewers.[621] The full power and Class A facilities that were in operation as of February 22, 2012 are facilities that were licensed on that date[622] or for which an application for a license to cover an authorized construction permit was on file. Under the Commission's rules the filing of a license to cover application, which is the last step in the process before the Commission issues a license, provides the applicant with the right to provide a broadcast television service to the public.[623] Thus, even if a facility was not licensed as of February 22, 2012, it is reasonable to assume that the facility was in operation as of that date if an application for a license to cover was on file.[624] Accordingly, we agree with commenters who argue that we must protect these facilities.[625]

187. We reject claims that section 6403(b)(2) mandates protection of facilities authorized in construction permits as of February 22, 2012.[626] As discussed above, we interpret section 6403(b)(2) to require all reasonable efforts to preserve only the coverage area and the population that a full power or Class A station was actually serving as of February 22, 2012, not the coverage area and population authorized to be served by a station at some point in the future. While facilities authorized in a construction permit are protected from interference under Commission rules,[627] the grant of a construction permit standing alone does not authorize operation of those facilities.[628] Rather, operations are

[620] *See* § III.B.2.d (Preserving Population Served).

[621] *See id.*

[622] A license requires the licensee to broadcast; a license will be revoked if the station is silent for any consecutive 12-month period, and a station must seek approval to discontinue operations in excess of 30 days. *See* 47 U.S.C. § 312(g); 47 C.F.R. §§ 73.1635(a)(4), 73.1740(c), 73.1750.

[623] Upon completion of construction of the facility authorized in its construction permit, a permittee may operate the facility pursuant to program test authority provided that an application for a license to cover is filed within 10 days. *See* 47 C.F.R. § 73.1620(a)(1) (automatic program test authority). Full power and Class A permittees operating under program test authority must operate "in strict compliance with the rules governing broadcast stations," which include a minimum operating schedule. 47 C.F.R. §§ 73.1620(d), 73.1740(a)(2), 73.6001(b).

[624] Through comments filed in this proceeding, the Commission is aware of one station, KTNC-TV, Concord, California, that had a license application on file on February 22, 2012, but was unable to operate according to the technical parameters set forth in that application. We will exercise our discretion, however, to protect the facilities specified in the pending license application. *See* para. 223.

[625] *See, e.g.*, ACTBN Comments at 2–3; UCC Comments at 2–5; Dispatch Comments at 1–2; Univision Comments at 12–13.

[626] *See* Affiliates Associations Comments at 20–22; CCB Comments at 2–3; Channel 32 Comments at 4–5; Cox Media Comments at 6–7; Disney Comments at 15–16; KAZN Comments at 7–9; Parker Comments at 3–4; Tribune Comments at 20–21; 4 NY Broadcasters Comments at 3–4; *see also* Comcast Comments at 15–16; CTI Comments at 2–3.

[627] *See* 47 C.F.R. § 73.623(h).

[628] The Communications Act provides that a "construction permit" authorizes "construction" of a station for the transmission of signals by radio, whereas a "license" authorizes "use" of that station. *Compare* 47 U.S.C. § 153(13) *with* 47 U.S.C. § 153(49); *see also Cedar Rapids Television Co. v. FCC*, 387 F.2d 228, 230-31 (D.C. Cir. 1967) (upholding Commission decision declining to consider a facility authorized in a construction permit as "actual television operations").

permissible only upon completion of construction of the facilities authorized, provided the Commission is notified and an application for a license to cover is filed within 10 days.[629]

188. Some commenters contend that, if Congress intended its preservation mandate to apply to "licensed facilities" only, it would have used that terminology in section 6403(b)(2). Instead, these commenters note, section 6403(b)(2) refers expressly to "broadcast television licensee[s]" and not to "licensed facilities."[630] We do not, however, interpret section 6403(b)(2) as limiting our mandatory preservation obligation to facilities for which a license had been granted as of February 22, 2012. Rather, we interpret it to require all reasonable efforts to preserve actual operations as of February 22, 2012. Such operations were permissible on that date only for facilities for which a license had been granted or that were subject to a pending license to cover application.

189. We disagree with commenters who argue that failing to interpret section 6403(b)(2) broadly to mandate protection of facilities authorized in construction permits would frustrate the purposes of the Spectrum Act, one of which, they claim, is to hold harmless those broadcasters not participating in the reverse auction.[631] Commenters also claim that failure to protect such construction permits would undermine Congress's goal to ensure that viewers receive a reliable over-the-air digital signal following the DTV transition.[632] We reject these arguments. First, we do not interpret section 6403(b)(2) as a "hold harmless" provision that requires or allows us to ignore the broader objectives of the Spectrum Act.[633] Second, as discussed in the following section, we have discretion to extend protection beyond the scope of the statutory mandate where doing so is consistent with those objectives and serves the public interest. Congress struck a balance in the Spectrum Act by establishing the minimum extent to which the Commission must make all reasonable efforts to preserve broadcast facilities and leaving the Commission discretion to protect additional facilities in appropriate cases.[634]

[629] *See* 47 C.F.R. § 73.1620(a)(1) (automatic program test authority). Other provisions of § 6403 also support our interpretation that § 6403(b)(2) does not mandate protection of facilities authorized in construction permits. Reading § 6403(b)(2) to require all reasonable efforts to preserve the coverage area and population to be served by authorized but unlicensed facilities would undermine the purpose of § 6403(h). This provision makes the right of a "licensee," but not a permittee, to protest a proposed order of modification under § 316 of the Communication Act inapplicable in the case of a modification under § 6403. If § 6403(b)(2) were read to mandate all reasonable efforts to preserve the coverage area and population to be served by authorized but unlicensed facilities, then a permittee would have greater rights than a licensee in the repacking process, and the apparent purpose of § 6403(h) to expedite the auction and repacking process would be frustrated. Our reading also is consistent with other subsections of § 6403(b) that focus solely on the preservation of the rights of licensees and do not mention the preservation of any rights reflected in construction permits. *See* Spectrum Act § 6403(b)(3) (prohibiting the Commission from involuntarily reassigning a "licensee" from UHF to VHF or from high VHF to low VHF); *id*. § 6403(b)(4) (requiring the Commission to reimburse costs incurred by "licensees").

[630] *See* Affiliates Associations Comments at 20–21; Bahakel Comments at 2–3; Channel 32 Comments at 4; Disney Comments at 16; Post-Newsweek Comments at 6; WGAL Comments at 7; *see also* Raycom Comments at 8.

[631] *See* Affiliates Associations Comments at 20–21; Belo Comments at 14; CCB Comments at 2–3; Channel 32 Comments at 5; CTI Comments at 2–3; Disney Comments at 2, 13–14, 15–16; Parker Comments at 3–4.

[632] *See* 4 NY Broadcasters Comments at 4; Channel 32 Comments at 5 n.15; Disney Comments at 2, 13–14, 16–18; Parker Comments at 3–6.

[633] *See* § III.B.2.a ("All Reasonable Efforts").

[634] Although we reject claims that § 6403(b)(2) mandates protection of facilities authorized in construction permits as of February 22, 2012, we exercise our discretionary authority to protect these facilities if licensed by the Pre-Auction Licensing Deadline, for the reasons discussed below.

b. Discretionary Preservation

190. *Background*. The Commission tentatively concluded in the *NPRM* that it has the discretion to protect additional facilities in the repacking process where appropriate.[635] The Commission proposed to exercise this discretion to protect the small number of new full power television stations that were authorized by construction permits, but were not yet constructed or licensed, as of February 22, 2012, and certain digital Class A facilities that also were not licensed on that date.[636] The Commission also sought comment on whether to protect any other authorized full power or Class A television facilities, including outstanding full power construction permits issued to effectuate a channel substitution following a rulemaking proceeding.[637]

191. *Discussion*. Although we interpret the Spectrum Act to mandate that we protect only facilities that were in operation as of February 22, 2012, we adopt the tentative conclusion in the *NPRM* that the Spectrum Act does not preclude us from exercising discretion to protect additional facilities beyond this statutory floor. Many commenters support this view.[638] Section 6403(i)(1) specifies that nothing in section 6403(b), including the preservation mandate in section 6403(b)(2), "shall be construed to expand or contract the authority of the Commission except as otherwise expressly provided."[639] Furthermore, section 6403(b) does not expressly restrict the Commission's authority to protect facilities that are not subject to the statutory mandate where doing so would serve the public interest. That authority is clearly encompassed within the Commission's broad spectrum management authority under the Communications Act.[640]

192. Our exercise of discretion requires a careful balancing of numerous factors in order to carry out the goals of the Spectrum Act and other statutory and Commission goals. On one hand, failing to protect certain facilities beyond the statutory floor may deprive viewers of television service they currently receive. A decision not to protect certain facilities also may strand the investments broadcasters have made in these facilities, including equipment and construction costs, as well as the payment of legal and engineering costs associated with applying for and licensing a facility,[641] in the justifiable belief that their facilities would be protected in the repacking process. In addition, a decision to deny discretionary repacking protection could have an adverse impact on the Class A service's digital transition.

193. On the other hand, any additional preservation beyond the statutory floor may encumber additional broadcast television spectrum, thereby increasing the constraints on the repacking process due to interference and other technical requirements. This additional encumbrance could hinder our ability to repack television spectrum and undermine our goal of using market forces to repurpose spectrum for

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[635] *NPRM*, 27 FCC Rcd at 12397, para. 113.

[636] *Id*. at 12397–98, paras. 114–115.

[637] *Id*. at 12398, para. 116.

[638] Comcast Comments at 16; Gray TV Comments at 3; Broadcast Networks Comments at 8.

[639] Spectrum Act § 6403(i)(1).

[640] *See* n.288.

[641] The consideration of these factors in connection with the repacking process is consistent with Commission precedent. *See, e.g., Reexamination of the Comparative Standard for Noncommercial Educational Applicants*, MM Docket No. 95-31, Second Report and Order, 18 FCC Rcd 6691, 6707, para. 41 (2003) (pending applicants "spent the time and money necessary to complete all of the engineering and legal components of a long-form application"); *Reallocation and Service Rules for the 698-746 MHz Spectrum* (*Television Channels 52-59*), GN Docket No. 01-74, Report and Order, 17 FCC Rcd 1022, 1042-43, para. 45 (2002) (*Lower 700 MHz R&O*) ("With regard to applications for construction permits, we recognize parties have made investments in these applications . . . .").

flexible use.[642] In addition, the exercise of discretionary protection may increase the costs of the reverse auction. Protecting facilities that were not in operation as of February 22, 2012 also may undermine our ability to prepare for the auction and repacking process and our need for a stable database of the facilities that will be protected prior to the auction. If we opt to protect facilities that significantly expand a station's coverage area, the cost of compensating the station for relinquishing its spectrum usage rights may be higher than if we were to protect only facilities licensed on February 22, 2012.[643]

194. As set forth more fully below, based on careful consideration of these factors, we conclude that the public interest is best served by extending protection to certain categories of facilities that were not licensed or the subject of a pending license to cover application as of February 22, 2012. More specifically, we will protect: (1) the small number of new full power television stations that were authorized, but not constructed or licensed, as of February 22, 2012; (2) full power facilities authorized in outstanding construction permits issued to effectuate a channel substitution for a licensed station; (3) modified facilities of full power and Class A stations that were authorized by construction permits granted on or before April 5, 2013, the date the Media Bureau issued a freeze on the processing of certain applications; and (4) Class A facilities authorized by construction permits to implement Class A stations' mandated transition to digital operations. Except in very limited circumstances discussed below,[644] we will limit discretionary protection to these categories.

195. We also generally will limit our discretionary protection to facilities in the preceding categories that are licensed[645] by the Pre-Auction Licensing Deadline to be announced by the Media Bureau.[646] Our approach avoids the possibility that we will protect facilities authorized in construction permits that may never be constructed, as well as the need to protect two sets of facilities for many stations—those that have been licensed as well as those that are authorized by construction permits. Protecting two sets of facilities would hinder our ability to repack television spectrum and unduly complicate the repacking process, thus undermining the purpose of the Spectrum Act. Our approach is consistent with past Commission actions to freeze facilities modifications during major spectrum transitions, fairly accommodates broadcasters' legitimate expectations, and adequately balances their ongoing need to make technical modifications to their facilities and the Commission's need for a stable database in order to prepare for and carry out the incentive auction.

(i) New Full Power Stations

196. As proposed in the *NPRM*, we will exercise our discretion to protect the new full power television stations that were authorized by construction permits, but not yet licensed, as of February 22, 2012.[647] We have considered all of the circumstances involved, including the equities in favor of these

[642] Because we cannot predict the outcome of the reverse auction or the number of stations that ultimately will be subject to the repacking process, we cannot predict with specificity the impact that affording certain protections will have on our repacking flexibility. We must rely on our general expertise and predictive judgments in this regard.

[643] *See* § IV.B.1.a (Reverse Auction Eligibility).

[644] *See* §§ III.B.3.b.v (Additional Cases) and III.B.3.d.ii (Out-of-Core Class A-Eligible LPTV Stations).

[645] The references to "licensed" facilities in this Section of the Order encompass both licensed facilities and those subject to a pending license to cover application.

[646] We delegate authority to the Media Bureau to issue a Public Notice specifying the Pre-Auction Licensing Deadline. We conclude that establishment of such a deadline in advance of the auction is necessary in order to ensure that the Commission will have a largely static view of the facilities that will be protected in the repacking process. We anticipate that the Public Notice will give stations at least 90 days prior notice of this deadline.

[647] WACP, Atlantic City, New Jersey, WMWC, Galesburg, Illinois, and KUKL-TV, Kalispell, Montana are now licensed. The construction permit for the one remaining station in this category, WMDE, channel 5, Seaford, Delaware, was originally scheduled to expire in May 2014, but has been tolled pursuant to § 73.3598(b) of our rules. 47 C.F.R. § 73.3598(b). This station will not be protected unless licensed by its expiration date or the Pre-Auction Licensing Deadline, whichever occurs earlier.

permittees and the potential impact on repacking flexibility, and conclude that protection is warranted. Several of these stations are now licensed and providing service to viewers and their communities of license. Each of these licensed stations filed a license application either before or shortly after release of the *NPRM*,[648] which occurred approximately seven months after the Spectrum Act was enacted. The timing of the license applications thus suggests that these permittees made significant investments toward constructing the stations prior to the statute's enactment date, in reliance on Commission-authorized construction permits. Moreover, we conclude that protecting these facilities will have minimal impact on our flexibility in the repacking process, because they are small in number and they are licensed or authorized on VHF channels and/or in remote locations where we anticipate that our repacking needs will be limited.[649]

(ii) Channel Substitution Construction Permits

197. *Background*. The Commission sought comment in the *NPRM* on whether to protect facilities authorized in a construction permit issued to a licensed station to effectuate a substitution of a new channel for its licensed channel (a "channel substitution").[650] The Commission noted that such stations already had completed a rulemaking process considering the proposed channel change, the Commission had modified the DTV Table of Allotments ("Table of Allotments") to reflect the change, and the substitute channels were entitled to interference protection under our rules.[651]

198. *Discussion*. We will exercise our discretion to protect facilities authorized in construction permits for channel substitutions that are licensed by the Pre-Auction Licensing Deadline. After considering the equities in favor of protecting the facilities authorized in channel substitution construction permits, as well as the potential impact on repacking flexibility, we conclude that protection is warranted. At the time the Spectrum Act was enacted, there were fewer than 20 of these construction permits outstanding. All of the rulemaking proceedings and corresponding changes to the Table of Allotments associated with these channel substitutions were completed prior to enactment of the Spectrum Act. In reliance on their Commission authorizations, a number of these stations have licensed their substitute channels, and are now providing service to viewers on their new channels. Approximately half of these licensed stations constructed their substitute facilities prior to release of the *NPRM*. Thus, it

[648] Although § 6403(b)(2) of the Spectrum Act provided notice to broadcasters that facilities not in operation as of February 22, 2012 may not be protected, the Commission confirmed and provided a more detailed explanation of that possibility in the *NPRM*. *See NPRM*, 27 FCC Rcd at 12390, para. 98 and 12397, paras. 113–114.

[649] Extending discretionary protection to VHF stations will have some impact on our repacking flexibility because it may limit our ability to accept UHF-to-VHF and high-VHF-to-low-VHF bids in the reverse auction, which will free up UHF spectrum. Overall, however, discretionary protection of VHF stations will have less impact on our repacking flexibility than protection of UHF stations because the Spectrum Act prohibits us from involuntarily reassigning stations from UHF channels to VHF channels in the repacking process and one of the central goals of that process will be to make as much UHF spectrum as possible available for new uses. *NPRM,* 27 FCC Rcd at 12361, para. 10. Further, fewer than 25 percent of full power and Class A stations are licensed on VHF channels, and many of these stations are located in sparsely populated states and areas.

[650] *NPRM*, 27 FCC Rcd at 12399, para. 116; *see also* 47 C.F.R § 73.622(i). Under the Commission's rules, a station must engage in a two-step process, including a rulemaking proceeding and a subsequent application process, to change the channel allotted to it in the Table of Allotments. As noted in the *NPRM*, as of February 22, 2012, these stations held authorizations for two channels—a license for the channel on which they were operating at that time and a permit to construct the substitute channel. *NPRM,* 27 FCC Rcd at 12398 n. 177. Thus, as of February 22, 2012, these stations were "licensees" with respect to the channel on which they were operating and "permittees" with respect to their newly authorized, but not yet licensed, substitute channel.

[651] *NPRM*, 27 FCC Rcd at 12399, para. 116.

is apparent that significant investments were made toward constructing these substitute facilities prior to enactment of the Spectrum Act.[652]

199. The fact that these channel substitution allotments were protected in the Table of Allotments prior to enactment of the Spectrum Act further weighs in favor of protecting the corresponding authorized facilities. Moreover, the Media Bureau authorized the channel substitutions because the proposals would improve service to existing viewers and/or expand service to new viewers. Failing to protect them would deprive viewers of this improved television service.

200. Protecting these stations' substitute facilities rather than their facilities licensed on February 22, 2012 will not significantly impact our repacking flexibility. While protecting such substitute facilities may have some impact on our repacking flexibility in the case of a contour increase, the number of stations that will receive protection is small and the majority of protected channel substitutions involve channel changes within the UHF band, changes from a UHF to a VHF channel, and/or stations located in less populated areas where our repacking needs should be limited. We find that any impact on repacking flexibility caused by protecting these facilities is far outweighed by the equities in favor of protection noted above.

201. Seven of the channel substitutions we are electing to protect result in a station moving from a VHF to a UHF channel, which will encumber additional UHF spectrum by adding a new station to the band. If any of these stations participates in the reverse auction, it will have the opportunity to relinquish its newly allotted UHF channel through a UHF-to-VHF bid, which could increase the cost of clearing UHF spectrum. On balance, however, we conclude that these concerns are outweighed by the investments we expect these seven stations have made in constructing their substitute facilities, the fact that three of them have already licensed their substitute facilities and are providing service to viewers on their new UHF channels, and the improved or expanded viewer services the Media Bureau determined would result from these substitutions.

202. We will protect channel substitution construction permits only if they are licensed by the Pre-Auction Licensing Deadline. Some commenters maintain that unconditionally guaranteeing protection of the facilities authorized in these construction permits would not have a significant impact on the Commission's repacking flexibility and that the stations at issue relied on their expectation that they would have the normal, three-year construction period in which to build their new facilities.[653] As discussed above, we do not interpret the Spectrum Act as requiring the protection of facilities authorized in construction permits, and we decline to exercise our discretion to protect such facilities that are not licensed by the Pre-Auction Licensing Deadline. While we acknowledge that these channel substitutions were granted because the Media Bureau found them to be in the public interest, those findings did not take into account Congress's mandate in the Spectrum Act to repurpose UHF spectrum for flexible use. We find that preserving a facility for the channel licensed and operating on February 22, 2012 (as required by the Spectrum Act) as well as an authorized facility for a different channel that remains unbuilt would limit our repacking flexibility without offering sufficient countervailing public interest benefits.

[652] The stations with channel substitution construction permits that did not complete construction of their substitute facilities prior to release of the *NPRM* did not receive their construction permits until various dates between mid-2011 and early 2012. These stations likely would not have been in a position to make substantial investments in construction of their facilities prior to the enactment of the Spectrum Act in February 2012. However, we expect that they have made significant investments since that time in reliance on their Commission authorizations. Accordingly, failure to protect these substitute facilities would result in a significant amount of stranded investment.

[653] *See* Channel 32 Comments at 8; Disney Comments at 29; Gray TV Comments at 4–5; LeSea Comments at 1–3; Lincoln Comments at 2–3; NAB Comments at 31.

Furthermore, the stations in this category should have sufficient time and notice to complete construction by the deadline if they wish to ensure protection on their substitute channels.[654]

203. *Construction Permits to Relocate from Channel 51.* We also address our treatment of stations seeking to relocate from channel 51 pursuant to a voluntary relocation agreement with Lower 700 MHz A Block licensees. After the Commission instituted a freeze on the acceptance of channel substitution rulemaking petitions in May 2011,[655] it announced that it would lift the freeze to accept petitions for rulemaking filed by these stations.[656] Since enactment of the Spectrum Act, we have issued three orders reallocating stations from channel 51.[657] Consistent with our approach above, we will protect the substitute channel facilities of former channel 51 licensees if they are licensed by the Pre-Auction Licensing Deadline.[658] We conclude that protecting these stations' substitute facilities rather than the channel 51 facility licensed on February 22, 2012 will not significantly impact our repacking flexibility. While protecting such facilities may have some impact on repacking flexibility in the case of a contour increase, the number of stations involved is small, they are moving from channel 51 to another UHF channel, and some are within relatively unpopulated areas where our repacking needs should be limited. We conclude that the minimal impact that protection of these relocated channel 51 facilities would have on our repacking flexibility is outweighed by the public interest benefit of clearing broadcast operations from channel 51 as expeditiously as possible in order to promote deployment of wireless broadband service in the 700 MHz A Block.

[654] Of the five channel substitution permits in this group that are not yet constructed, two must be constructed by dates in 2014, which we expect will precede the Pre-Auction Licensing Deadline. The remaining construction permits expire in 2015. These stations, whose channel allotments were modified prior to enactment of the Spectrum Act, will have sufficient time (i.e., approaching the traditional three-year construction period) to make necessary arrangements to have their substitute channel facilities licensed by the Pre-Auction Licensing Deadline if they prefer protection on their substitute channel. We encourage channel substitution permittees who no longer wish to construct their substitute channels to notify the Media Bureau and request that the channel on which they currently operate be reallotted to the Table of Allotments, 47 C.F.R. § 73.622(i).

[655] *Freeze on the Filing of Petitions for Digital Channel Substitutions, Effective Immediately*, Public Notice, 26 FCC Rcd 7721 (2011) (*Channel Substitution Freeze PN*).

[656] *General Freeze on the Filing and Processing of Applications for Channel 51 Effective Immediately and Sixty (60) Day Amendment Window for Pending Channel 51 Low Power Television, TV Translator and Class A Applications*, Public Notice, 26 FCC Rcd 11409 (2011) (*Channel 51 Freeze PN*).

[657] *Amendment of Section 73.622(i), Post-Transition Table of DTV Allotments (Oklahoma City, Oklahoma)*, DA No. 14-130 (Vid. Div. rel. Feb. 4, 2014); *Amendment of Section 73.622(i), Post-Transition Table of DTV Allotments (Cedar Rapids, Iowa)*, 28 FCC Rcd 13009 (Vid. Div. 2013); *Amendment of Section 73.622(i), Post-Transition Table of DTV Allotments (Greenville, North Carolina)*, 27 FCC Rcd 8865 (Vid. Div. 2012). The Greenville and Cedar Rapids facilities have been constructed (File Nos. BLCDT-20121029ACA and BLCDT-20140416AA.

[658] Because rulemaking petitions seeking to relocate stations from channel 51 are still permitted to be filed, they are not subject to the Media Bureau's April 5, 2013 freeze on the filing of certain facilities modifications, which is discussed in the following Section. Accordingly, we will not impose the requirement discussed in the next Section that these facilities modifications need to be authorized in a construction permit by April 5, 2013 in order to qualify for protection. We conclude that our ability to plan for the auction and repacking process, and our interest in having a stable station database leading up to the auction, will not be undermined by the processing and grant of such petitions because we do not expect a significant number of such petitions to be filed and, in any event, our interest is outweighed by the significant public interest benefits in clearing channel 51 as expeditiously as possible. Moreover, for the reasons discussed above, we do not expect that protecting a substitute facility rather than the channel 51 facility licensed on February 22, 2012 will significantly impact our repacking flexibility. Further, in determining whether to grant any rulemaking petitions seeking to relocate from channel 51 that are filed after the release of this Order, the Media Bureau will assess the extent to which grant of the petition will affect repacking flexibility.

(iii) Facility Modifications

204. *Background*. The Commission proposed in the *NPRM* not to exercise its discretion to protect construction permits for facilities modifications that were authorized but not licensed on February 22, 2012, or applications for such construction permits that were pending on that date.[659] That proposal was opposed by a number of broadcasters.[660]

205. On April 5, 2013, the Media Bureau issued a Public Notice (the "*Freeze PN"*) imposing limitations on the filing and processing of certain applications by full power and Class A television stations in light of the forthcoming auction and the need to plan for the repacking process.[661] The Media Bureau announced that, effective April 5, 2013, it would not accept for filing modification applications for changes to existing television service areas that would increase a full power station's noise-limited contour or a Class A station's protected contour in one or more directions beyond the area resulting from the station's authorized facilities as of that date. Similarly, Class A displacement applications that would increase the station's protected contour would not be accepted.[662] The Media Bureau explained that these limitations were necessary to (1) create a stable database of full power and Class A facilities that would allow for development and analysis of potential repacking methodologies; and (2) avoid frustrating the goals of the incentive auction.[663]

206. The Media Bureau also announced that it would continue to process pending or future applications that comply with the limitations described in the *Freeze PN*.[664] Pending applicants at variance with these limitations were given 60 days to amend their applications to comply with the limitations or request a waiver. The Bureau stated that pending applications that were not amended

[659] *NPRM*, 27 FCC Rcd at 12397, para. 114.

[660] For example, some broadcast commenters assert that the Commission should exercise discretion to protect facilities licensed or authorized after enactment of the Spectrum Act in order to avoid unnecessary disruption and permit fulfillment of the reasonable service expectations of stations and their audiences. *See* Gray TV Comments at 3. Commenters also argue that outstanding construction permits should be protected because, by granting a construction permit application, the Commission made the statutorily required determination that the proposed facility would serve the public interest, and failure to protect the facility necessarily would contravene the public interest. Broadcast Networks Comments at 8. Other broadcasters claim that a failure to protect facilities licensed after February 22, 2012 would result unfairly in the loss of investments that broadcasters made in reliance on construction permits with a three-year construction period. *See, e.g.*, Channel 32 Comments at 5–7. In this regard, commenters point out that the Commission continued to accept and process modification applications after the enactment of the Spectrum Act, and broadcasters expended technical, financial, and other resources to implement modifications in reliance on the Commission's authorizations. Disney Comments at 21–23; Parker Comments at 8; Univision Comments at 12; Belo Comments at 17. Only T-Mobile supports a February 22, 2012 cut-off date for discretionary protection, observing that, while some broadcasters argue that this date is arbitrary or unfair, "the Commission would likely face similar complaints regardless of the date selected." T-Mobile Reply at 97. According to T-Mobile, "[t]he alternative of a less definitive or more flexible cut-off date is far worse" because it would "risk[] delaying or disrupting the auction by making a moving target out of the spectrum that is its subject." *Id.*

[661] *Media Bureau Announces Limitations on the Filing and Processing of Full Power and Class A Television Station Modification Applications, Effective Immediately, and Reminds Stations of Spectrum Act Preservation Mandate*, Public Notice, 28 FCC Rcd 4364 (2013).

[662] The Media Bureau stated in the *Freeze PN* that it would consider, on a case-by-case basis, requests for waiver of the filing limitations in the *Freeze PN* "when a modification application is necessary or otherwise in the public interest for technical or other reasons to maintain quality service to the public." *Id*. at 4365. It also stated that Class A minor change applications to implement the digital transition could be filed and would be processed subject to the limitations set forth in the Commission's rules. *Id*.

[663] *Id.* at 4364–65.

[664] *Id.* at 4365.

would be processed subject to the rules and policies adopted in this Order.[665] Finally, the Bureau reminded stations that the Commission proposed to interpret section 6403(b)(2) as requiring only the preservation of facilities licensed as of February 22, 2012, and that it would decide in this Order the extent to which facilities that were not licensed as of that date would be protected in the repacking process.[666]

207. *Discussion*. We conclude that it will serve the public interest to extend discretionary protection to the facilities of full power and Class A stations authorized in construction permits that were granted on or before April 5, 2013, provided that the facilities are licensed by the Pre-Auction Licensing Deadline. We find that protection is justified by the equities in favor of these licensees, who expended technical, financial, and other resources to implement modifications in reliance on the Commission's grant of authorizations. We also conclude that these equities outweigh any adverse impact that protection may have on our repacking flexibility.

208. As commenters point out, the Commission continued to accept and grant modification applications after enactment of the Spectrum Act.[667] Once the Commission granted these applications, the authorized facilities were entitled to interference protection under our rules. Approximately 40 full power licensees with authorized modification construction permits on February 22, 2012 requested licenses to cover these facilities either before or shortly after release of the *NPRM*, suggesting that they made investments in constructing these facilities prior to enactment of the Spectrum Act in reliance on Commission authorizations.[668] Similarly, more than 30 full power licensees with construction permit applications that were granted after February 22, 2012 requested licenses to cover these facilities either before or shortly after release of the *NPRM*. Failure to protect these facilities, which are now licensed, would result in stranded investment and loss of service to viewers. While stations that constructed authorized facilities after issuance of the *NPRM* were on notice that these facilities might not be protected during the repacking process, we do not believe that this factor outweighs the harm that would result to broadcasters and viewers if such facilities are not protected.

209. We also conclude that the equities in favor of protecting these facilities modifications outweigh any potential adverse impact on our repacking flexibility. In July 2013, the Incentive Auction Task Force released updated *TVStudy* computer software for determining the coverage area and population served of each broadcast station and a Public Notice with the results of a staff analysis of whether a station could be reassigned to certain channels in the repacking process, using the licensed technical facilities of stations as of February 22, 2012.[669] After release of the *Repacking Data PN* and updated software, with respect to each licensee with a facilities modification construction permit authorized on or before April 5, 2013, but not licensed as of February 22, 2012, we compared the facility contour licensed on February 22, 2012 with the modified contour specified in the construction permit. Based on this comparison, we concluded that protection of the facilities specified in the construction permits, rather than the facilities licensed as of February 22, 2012, would not significantly impact our flexibility in the repacking process. We conclude that any such impact is outweighed by the equities in favor of these broadcasters, which expended technical, financial, and other resources to implement modifications in reliance on the Commission's grant of the authorizations.

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[665] *Id.*

[666] *Id*. at 4366.

[667] *See* Affiliates Associations Comments at 23; Channel 32 Comments at 6; Parker Comments at 8.

[668] *See* CCB Comments at 1–2 ($400,000 investment in modified facilities); CTI Comments at 2 ($200,000 investment in modified facilities); KAZN Comments at 5-6 ($2 million invested in DTS facilities); KRBK Comments at 2-3 ($1.7 million invested in modified facilities).

[669] *Repacking Data PN*, 28 FCC Rcd 10370.

210. Although some broadcasters challenge the specific timing of the *Freeze PN*, many acknowledge that a freeze would be necessary at some point in advance of the incentive auction[670] and that a freeze is consistent with past Commission actions during other major broadcast spectrum transitions.[671] We disagree that the timing of the *Freeze PN* was not adequately justified.[672] We conclude that the release of the *Freeze PN* well over a year after passage of the Spectrum Act appropriately balanced broadcasters' ongoing need for flexibility in making modifications to their facilities with the Commission's need for a stable database in advance of the incentive auction.[673] For these reasons, we reject the argument that the *Freeze PN*, and any limits on the broadcast facilities that will be protected, should not have taken effect until just before the incentive auction.[674]

211. *Processing of Pending Applications*. Applications that were pending on April 5, 2013 that complied with the filing limitations set forth in the *Freeze PN*, or were amended to comply, as well as later-filed applications that comply with the filing limitations, will continue to be routinely processed by Commission staff. To the extent that such applications are granted, the facilities will be protected in the repacking process, provided they are licensed by the Pre-Auction Licensing Deadline. Because these modified facilities will not increase a full power station's noise limited contour or a Class A television station's protected contour in any direction beyond the area resulting from a station's authorized facilities

[670] For example, NAB claims that "a future freeze date [by which broadcaster service areas will be measured] is both fair to broadcasters . . . and in the public interest." NAB Reply at 55; *see also* KAZN Reply at 2 (agrees with NAB that Commission should establish a "freeze" date). WGAL suggests that the Commission "protect such post-February 22, 2012, facilities up to a deadline in advance of the spectrum repacking." WGAL Comments at 8–9.

[671] Disney acknowledges that "[h]istorically, the FCC imposes a freeze when it determines that it is in the public interest to impose a freeze upon the acceptance, processing, or action upon applications seeking to operate using spectrum that is the subject of a rulemaking to change license service rules or spectrum allocations." Disney Comments at 22 n.63; *see also* Cox Media Comments at 7 (citing to "the Commission's well-established practice of issuing freezes when it seeks to cut-off requests for facilities changes or cease processing pending requests" in urging that the Commission protect facilities sought or granted as of some future freeze date); Affiliates Associations Comments at 23 ("The Commission has not yet imposed a freeze on modifications like it did before conducting the post-transition DTV repacking . . . ."). Examples of such prior Commission actions include the following: *Channel 51 Freeze PN*, 26 FCC Rcd 11409 (freezing applications for new Channel 51 facilities to permit Commission consideration of interference issues to licensees of adjacent reallocated spectrum); *Freeze on the Filing of Applications for New Digital Low Power Television and Translator Stations*, Public Notice, 25 FCC Rcd 15120 (2010) (freezing new and major change applications for low power stations in rural areas to permit the Commission to evaluate proposals to reallocate 120 megahertz of spectrum to mobile broadband use); *Freeze on the Filing of Certain TV and DTV Requests for Allotment or Service Area Changes*, Public Notice, 19 FCC Rcd 14810 (2004) (freezing applications for changes to service areas and channels to assist the Commission in designing a channel election and repacking process to assign each eligible broadcaster an in-core post-transition DTV channel); *Freeze on the Filing of TV and DTV "Maximization" Applications in Channels 60-69*, Public Notice, 18 FCC Rcd 627 (2003) (announcing freeze to facilitate clearing of spectrum for auction of the Upper 700 MHz Band); *Freeze on the Filing of TV and DTV "Maximization" Applications in Channels 52-59*, Public Notice, 17 FCC Rcd 11290 (2002) (announcing freeze of broadcast applications leading up to the auction of the Lower 700 MHz Band).

[672] *See* Letter from Rick Kaplan, NAB, to William T. Lake, Chief, Media Bureau, FCC, GN Docket No. 12-268 (filed May 6, 2013).

[673] We also reject T-Mobile's argument that February 22, 2012 is the preferable freeze date because this date would remove the risk of "delaying or disrupting the auction by making a moving target out of the spectrum that is its subject." T-Mobile Reply at 97. By releasing the *Freeze PN* well before the commencement of the auction, and adopting a Pre-Auction Licensing Deadline by which facilities must be licensed in order to be protected, we have provided forward auction applicants adequate time to prepare for the auction and to consider bidding strategies, while at the same time providing flexibility to broadcasters to make modifications.

[674] NAB Reply at 55; KAZN Reply at 2.

as of April 5, 2013, extending protection to these facilities has no impact on our need for a stable database nor will it constrain our repacking flexibility.[675]

212. While the *Freeze PN* remains in effect, we direct the Media Bureau to begin processing facilities modifications and displacement applications that were on file but were not granted by April 5, 2013 and were not amended to comply with the filing limitations set forth in the *Freeze PN*. We emphasize, however, that any such facilities, even if authorized and subsequently licensed by the Pre-Auction Licensing Deadline, will not be protected in the repacking process.[676] In light of the justifications underlying the *Freeze PN* and the fact that these applications were not amended to comply with it, we find that protection is not warranted. In addition, because these applications request facilities that would increase the stations' contour in one or more directions beyond the area resulting from the stations' authorized facilities as of the date of the *Freeze PN*, they have the potential to constrain our repacking flexibility. Moreover, because these applications have not yet been granted, these applicants have not acted in reliance on Commission grants, made any substantial investment in constructing their requested modified facilities, or begun operating such facilities to provide service to viewers. The fact that these applicants may have expended resources in preparing and filing their applications does not outweigh the detrimental impact on our repacking flexibility, or our interest in maintaining a stable database in advance of the auction, that would result from preservation of these facilities.[677]

213. However, we direct the Media Bureau to process these applications, rather than instructing that they be dismissed, to afford as much flexibility to these applicants as possible. For example, a pending applicant may determine that the likelihood of its facility being impacted by the repacking process is relatively small. Alternatively, a pending applicant may conclude that the risk of losing some coverage of its modified facility is outweighed by the benefit of operating such facility prior to the post-auction transition.

[675] We note that the Media Bureau has granted two waivers of the *Freeze PN*. With respect to WBRA-TV, channel *3, Roanoke, Virginia, the licensee received a construction permit to operate at maximized power, which expired in June 2011. Although the licensee timely finished construction and began operating the maximized facility in 2009, it failed to file a license application. Because the maximized facility was constructed and operating prior to February 22, 2012, we will protect the subsequently licensed facility (BLEDT-20131218CHV). With respect to KERA-TV, channel *14, Dallas, Texas, the tower on which the licensed facility is located is being dismantled and, thus, is no longer available for reasons outside the licensee's control. The licensee proposed to move its facility to a tower located 3.9 km from its licensed site with no change in height (BPED-20130528ALD), and the Media Bureau has granted a construction permit authorizing this change. While the construction permit authorizes a minimal contour extension in several directions, the total geographic area within the proposed noise-limited service contour does not exceed that of the licensed NLSC. Although not authorized on or before April 5, 2013, we will protect this facility if licensed by the Pre-Auction Licensing Deadline. We find that the equities in favor of preservation, including the fact that the change is outside the licensee's control, outweigh the impact on our repacking flexibility.

[676] This ineligibility for repacking protection does not apply to minor change applications filed by analog Class A licensees to convert to digital service that were pending as of or are filed after the *Freeze PN*. Such applications are exempt from the *Freeze PN* and are discussed in the next subsection.

[677] The Media Bureau will continue to consider requests for waiver of the *Freeze PN*. Our interest in a stable database will not be undermined by the processing and grant of such requests because the Media Bureau will grant such requests only upon a strong public interest showing, thereby limiting the number of waivers granted. In determining whether to grant any requests for waiver of the *Freeze PN* that are filed after the release of this Order, the Media Bureau will assess the extent to which grant of the waiver will affect the Commission's repacking flexibility. We expect that any potential impact on repacking flexibility will be outweighed by the public interest benefits that justify a waiver of the *Freeze PN*. Moreover, given the expected limited number of waivers granted, we do not expect that protecting the facilities authorized pursuant to a waiver will significantly impact our repacking flexibility.

(iv) Class A Television Stations Transitioning to Digital Service

214. We next address the protection of Class A licensees that were not operating digital facilities on February 22, 2012 and that received (or will receive) licenses for their initial Class A digital facilities after February 22, 2012. Some of these licensees will receive protection of their initial digital facilities under the discretionary protection we will afford to facility modifications authorized prior to issuance of the *Freeze PN*, as set forth in the previous discussion. However, not all Class A licensees were granted a digital construction permit prior to the *Freeze PN*. We accordingly discuss the protection of Class A stations' initial digital facilities separately here.[678]

215. *Background*. As explained in the *NPRM*, Congress authorized the incentive auction in the midst of the Class A television digital transition; the deadline for Class A stations to operate on a digital-only basis is not until September 1, 2015.[679] Because Class A licensees made their digital conversion plans in reliance on rules adopted in July 2011, the Commission proposed in the *NPRM* to protect in the repacking process certain digital Class A facilities that were not licensed as of February 22, 2012.[680] The Commission proposed to require such licensees to inform it of their digital transition plans and to elect protection of either their licensed analog facility or their authorized digital facility. The Commission also proposed to protect the licensed analog facilities of licensees that did not notify it of their election by a deadline it would determine in the future.

216. *Discussion*. We will exercise our discretion to protect Class A stations' initial digital facilities that were not initially licensed until after February 22, 2012, including those that were not authorized until after the *Freeze PN*, provided they are licensed by the Pre-Auction Licensing Deadline.[681] Our records show that approximately 110 analog Class A stations have transitioned to digital operations since enactment of the Spectrum Act in reliance on transition rules adopted by the Commission in 2011. Failure to protect these facilities could have a significant negative impact on the service's digital transition and result in wasted investment. We also conclude that protecting Class A stations' digital facilities rather than their analog facilities licensed on February 22, 2012 will not significantly impact our repacking flexibility. While protecting such Class A digital facilities may have some impact on our repacking flexibility in the case of a contour increase,[682] we note that digital Class A stations have

[678] As discussed above, § 6403(b)(2) mandates that we protect Class A facilities that were licensed or for which a license application was pending as of February 22, 2012. Moreover, we are exercising our discretion to protect modifications of Class A facilities, if licensed by the Pre-Auction Licensing Deadline, that were authorized in construction permits on or before April 5, 2013, the date of the *Freeze PN*, as well as after that date if proposed in applications that met the filing limitations set forth in the *Freeze PN*. Class A minor change applications filed by analog Class A licensees to convert to digital service that were pending as of or filed after April 5, 2013 were exempt from the *Freeze PN*, and the Media Bureau clarified that it would continue to process such applications if they comply with our current rules. *Freeze PN*, 28 FCC Rcd at 4365. In this Section, we discuss the extent to which initial digital facilities not licensed as of February 22, 2012, including facilities authorized after the date of the *Freeze PN*, will be protected in the repacking process.

[679] *NPRM*, 27 FCC Rcd at 12397, para. 115; *see also Amendment of Parts 73 and 74 of the Commission's Rules to Establish Rules for Digital Low Power Television, Television Translator, and Television Booster Stations and to Amend Rules for Digital Class A Television Stations*, MB Docket No. 03-185, Second Report and Order, 26 FCC Rcd 10732, 10753–54, para. 45 (2011) (*LPTV DTV Second R&O*).

[680] *NPRM*, 27 FCC Rcd at 12397, para. 115.

[681] Many commenters support extending protection to digital Class A facilities initially licensed after February 22, 2012. *See, e.g.*, Casa Comments at 3–4 (KQDK-CA's digital facility, which was licensed in November 2012, should be protected to avoid stranding investment); Vision Comments at 7–8 (supporting allowing stations to elect protection of digital facilities at some future date, rather than protecting only those digital facilities licensed as of February 22, 2012).

[682] As discussed above, we find no significant repacking impact resulting from protection of construction permits authorized on or before April 5, 2013, but not licensed as of February 22, 2012, which includes some construction

(continued….)

significantly smaller coverage areas than full power stations. While full power stations may radiate up to 1000 kilowatts power, Class A stations may radiate at a maximum operating power of 15 kilowatts.[683] In addition, the Spectrum Act already requires us to protect an analog Class A station's facilities as licensed on February 22, 2012, and we find that protecting a station's digital conversion facility, rather than its analog facility, will not have a significant additional impact on our repacking flexibility.

217. We do not adopt the proposal to allow Class A stations to elect protection of a digital construction permit that remains unbuilt as of the commencement of the auction process.[684] Rather, in order to qualify for protection, Class A digital facilities must be licensed by the Pre-Auction Licensing Deadline.[685] Class A stations that have not completed the transition to digital service as of that deadline will receive protection only of their licensed analog facilities, to the extent protected in this Order. We find that requiring Class A digital facilities to be licensed by the Pre-Auction Licensing Deadline in order to receive protection is warranted to avoid protecting facilities that may never be constructed.[686] We further find that Class A licensees have a reasonable amount of advance notice to complete construction of their digital facility and obtain a license by the deadline, in light of the fact that such licensees have been on notice since July 2011 of the need to file construction permits to covert to digital service, the specific notice provided by the Media Bureau informing them of the importance of beginning the digital conversion process,[687] and the length of time between release of this Order and the expected timing of the Pre-Auction Licensing Deadline.

218. We clarify that we are not modifying the deadline for Class A stations to convert to digital service in this Order. Licensees are free to wait until the September 2015 deadline to complete

(Continued from previous page)
permits for initial digital Class A facilities. *See* para. 209. Task Force staff has conducted similar analyses on a continuing basis with respect to Class A initial digital facilities that were authorized after April 5, 2013. Based on those analyses, we conclude that protecting these digital facilities, including any increase in coverage area these stations will have by virtue of their digital construction permits vis-à-vis their analog facilities, will not significantly impact our flexibility in the repacking process.

[683] *See* 47 C.F.R § 74.735(b) (limiting UHF Class A stations to operating power of 15 kilowatts and VHF Class A stations to three kilowatts); *see also* 47 C.F.R. § 74.787(b)(2)(requiring Class A stations to have contour overlap between analog and initial digital facilities). We also note that as of February 22, 2012, there were fewer than 350 analog Class A stations, and since that date more than 60 of these licensees were cancelled or reverted to LPTV status and thus no longer are entitled to protection under the Spectrum Act.

[684] Class A minor change applications to implement the digital transition are not subject to the filing limitations in the Media Bureau's April 5, 2013 freeze. Our interest in a stable database will not be undermined by the processing and grant of such applications because we do not expect a significant number of them and, in any event, our interest is outweighed by the significant public interest benefits resulting from the Class A digital transition. Moreover, for the reasons discussed here, we do not expect that protecting the Class A digital, rather than the analog, facility will significantly impact our repacking flexibility.

[685] Licensees choosing to flash-cut to digital service on their analog channel are required to submit an FCC Form 302-CA application to cover construction of the digital facility. Licensees with a digital companion channel also must submit an FCC Form 302-CA application to transfer Class A status to their constructed digital facility. *LPTV DTV Second R&O*, 26 FCC Rcd at 10756–57, paras. 52-3.

[686] As a practical matter, we note that relatively few Class A stations are at risk of having their digital facilities unprotected under our approach. More than half of Class A licensees already have licenses for their digital facility, and a third hold or have a pending application for a digital construction permit. However, we note that approximately 35 analog Class A licensees still have not filed for a digital construction permit, despite individual notice from the Media Bureau in the first quarter of 2013 of the need to do so. The digital facilities of these stations will not be protected if they are not licensed by the Pre-Auction Licensing Deadline.

[687] *See, e.g.*, Mar. 3, 2013 letter from Deputy Chief, Video Division to KVBI-LP (http://licensing.fcc.gov/cgi-bin/prod/cdbs/forms/prod/getimportletter_exh.cgi?import_letter_id=39467).

their digital transition, but will receive repacking protection only for their analog facilities consistent with the provisions of this Order.[688]

(v) Additional Cases

219. *World Trade Center Stations*. We will afford discretionary protection to stations affected by the destruction of the World Trade Center and will not require certain authorized facilities for these stations to be licensed by the Pre-Auction Licensing Deadline. Full power television stations WNBC, WABC-TV, WPIX, and WNET were licensed and operating on the World Trade Center, and WPXN-TV held a construction permit to move to that site, when it was destroyed in the terrorist attacks of September 11, 2001. Each of these five stations, as well as WCBS-TV, currently are operating at the Empire State Building and have pending applications for construction permits seeking interference protection for facilities in Lower Manhattan near the previous site of the World Trade Center. Given the unique circumstances facing these stations, which were forced to move to a temporary location after the destruction of the World Trade Center,[689] the length of time necessary to construct a building comparable to the World Trade Center to which they could relocate, and the small number of stations involved, we conclude that there are significant equities in favor of providing these stations with a choice as to which facilities will be protected in the repacking process. Accordingly, we will permit each of these stations to elect protection of either: (1) their licensed Empire State Building facilities or (2) facilities at One World Trade Center ("1WTC"), the primary building of the new World Trade Center complex, that are authorized in a construction permit.[690] Providing these stations with such flexibility will not significantly impact our repacking flexibility or our interest in a stable database,[691] and any such concerns are far outweighed by the substantial equities in favor of flexibility noted above.

220. To be eligible for protection under the second option, stations must obtain a construction permit for the 1WTC facilities by the Pre-Auction Licensing Deadline. Such facilities, however, are not required to be licensed by the Pre-Auction Licensing Deadline in order to be protected. Because stations seeking to operate permanent facilities on 1WTC have had to await the construction of the building before they could file for construction permits reflecting their proposed new facilities, we find that it would be unreasonable to require such stations to construct in time to meet this deadline.[692]

221. *Stations Reallocated Pursuant to Section 331 of the Communications Act*. We will exercise our discretion to protect the facilities for new full power television stations on channel 2 at Wilmington, Delaware and channel 3 at Middletown Township, New Jersey that were allotted in 2013 pursuant to a court order.[693] Although these allotments were made and applied for after passage of the

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[688] *See* §§ III.B.3.a (Mandatory Protection of Full Power and Class A Facilities); III.B.3.b (Discretionary Preservation) (discussing discretionary preservation of certain modifications authorized on or before the *Freeze PN*, provided they are licensed by the Pre-Auction Licensing Deadline).

[689] The licensee of WPXN-TV was unable to construct authorized facilities at the World Trade Center because of the terrorist attack of September 11, 2001.

[690] The deadline for these stations to elect the facility to be protected in the repacking process is the Pre-Auction Licensing Deadline.

[691] Because 1WTC is close to the former World Trade Center site and the facilities that were destroyed were operating with maximum height and power, moving the stations to 1WTC will not result in a significant change in the stations' coverage contours.

[692] In addition, we will waive the *Freeze PN* to accept any applications from stations impacted by the destruction of the World Trade Center proposing a facility at 1WTC because we do not believe that it was possible to prepare a FCC Form 301 application for that site by April 5, 2013 given the stage of construction of the site at that time.

[693] These channels were allotted to the Post-Transition DTV Table of Allotments, *see* 47 C.F.R. § 73.622(i), after a U.S. Court of Appeals for the District of Columbia Circuit decision. *PMCM LLC, TV v. FCC*, 701 F.3d 380 (D.C. Cir. 2012); *Reallocation of Channel 3 from Ely, Nevada to Middletown Township, New Jersey*, Report and Order, 28 (continued….)

Spectrum Act, it is necessary to protect these facilities to avoid frustrating the court's mandate that we authorize these facilities and the mandate under section 331 of the Communications Act that the Commission allocate a commercial VHF channel to each State if possible.[694] In addition, we note that, because the court's mandate is limited to two stations that will operate on VHF channels, protecting these facilities will have minimal impact on our repacking flexibility.

222. Although the Wilmington station is now licensed, the Middletown Township facility is not.[695] We will not require this station to be licensed by the Pre-Auction Licensing Deadline in order to be protected in the repacking process. The station's channel was not allotted until March 2013, it was not possible for the station to file a construction permit application for the facility until after this date, and the application was not grantable until April 14, 2014. Thus, it would be unreasonable to require this station to be constructed in time to meet the Pre-Auction Licensing Deadline.

223. *KTNC-TV, Channel 14, Concord, California*. TTBG, the former licensee of KTNC-TV, channel 14, Concord, California, constructed and had an application for a license to cover on file for its authorized channel 14 facility prior to February 22, 2012, but was operating at reduced power on that date (and continues to do so) due to its inability to satisfy a condition pertaining to non-interference to land mobile stations.[696] TTBG argues that it should be allowed to choose protection of either its licensed pre-DTV transition facility on channel 63, or the facility specified in its construction permit for channel 14.[697] We will exercise our discretion to protect the facilities in TTBG's pending channel 14 license application, even if they are not fully operational and the station has not received a license by the Pre-Auction Licensing Deadline, in order to prevent stranded investment in the event the station is able to commence full operations.[698] Given the unique circumstances that have prevented TTBG from operating at full power, the fact that it had completed construction and filed a license to cover application as of the enactment of the Spectrum Act, and the minimal impact that protecting this one facility will have on our repacking flexibility, we conclude that the equities in favor of protection outweigh any potential harm.

224. *KHTV-CD, Los Angeles, California*. We will not protect stations that are eligible for a Class A license but that did not file an application for such license until after February 22, 2012, even if the application is granted before the auction.[699] For the reasons discussed in detail below, however, we make one exception for KHTV-CD, Los Angeles, California.[700]

(Continued from previous page)
FCC Rcd 2825 (2013); *Reallocation of Channel 2 from Jackson, Wyoming to Wilmington, Delaware*, Report and Order, 28 FCC Rcd 2828 (2013). The Wilmington facility is now licensed (File No. BLCDT-201131129AIH).

[694] Section 6403(i)(1) specifically states that nothing in § 6403(b) "shall be construed to expand or contract the authority of the Commission except as otherwise expressly provided." Spectrum Act § 6403(i)(1).

[695] FCC File No. BPCDT-20130528AJP.

[696] TTBG Comments at 1–4.

[697] *Id.* at 4.

[698] FCC File No. BLCDT-20091210ABC. Because § 6403(b)(2) requires only preservation of actual operations on February 22, 2012, and TTBG was not operating on that date at its fully authorized power, we conclude that these facilities are not entitled to mandatory protection. In the event the channel 14 authorization is subsequently modified, the modified facility will be protected if licensed by the Pre-Auction Licensing Deadline. We will not protect TTBG's channel 63 facility. Television stations were required by statute to cease digital operations on channels 52-69 (out of core channels) and operate on only the "core" television channels 2-51 by June 12, 2009. *See* DTV Delay Act, Pub. L. 111-4, 123 Stat. 112 (2009). Because television stations have been statutorily prohibited from operating on channel 63 since 2009, we decline to protect that facility.

[699] *See* § III.B.3.d.ii (Out-of-Core Class-A-Eligible LPTV Stations) (deciding not to extend discretionary protection to such stations).

[700] *See id*.

c. Non-Final License Revocation or Downgrade Proceedings.

225. We clarify that any licensee of facilities that are eligible for protection in the repacking process as set forth in this Order that is the subject of a non-final license validity proceeding[701] or downgrade order will be protected until the proceeding or order becomes final and non-reviewable. Specifically, this treatment will apply to the facilities of licensees who have been downgraded from Class A to LPTV status, and to the facilities of full power and Class A licensees with expired, cancelled, or revoked licenses. This approach is consistent with the protections from interference afforded under our general processing standards, and we see no reason to depart from those standards with respect to the repacking process. Moreover, we agree with commenters who argue that denying protection to such facilities effectively would invalidate the licensees' rights to pursue their pending appeals.[702]

d. Facilities That Will Not Receive Discretionary Protection

226. We will not exercise our discretion to extend protection in the repacking process beyond the facilities discussed above. Doing so may encumber additional broadcast spectrum, increase repacking constraints, and undercut our ability to repurpose spectrum. We conclude that these concerns outweigh other considerations with regard to facilities that are not entitled to mandatory protection or addressed above. Below, we specifically address our decision not to afford protection to pending rulemaking petitions to move from a VHF to a UHF channel, out-of-core Class A-Eligible LPTV stations, LPTV and TV translator stations, and special temporary and experimental authorizations.

(i) Pending Channel Substitution Rulemaking Petitions

227. *Background*. Section 6403(g)(1)(B) of the Spectrum Act provides that the Commission "may not" reassign a television licensee from a VHF to a UHF channel from the enactment date of the Spectrum Act until the completion of the incentive auction "unless (i) such reassignment will not decrease the total amount of [UHF] spectrum made available for reallocation . . . or (ii) a request from such licensee for the reassignment was pending at the Commission on May 31, 2011."[703] In the *NPRM*, the Commission proposed not to act on VHF-to-UHF channel change requests pending on May 31, 2011 "in order to ensure that we do not unnecessarily compromise our flexibility in the repacking process."[704] The Commission also noted that granting these requests prior to the incentive auction could create an opportunity for the petitioners to relinquish their rights to newly allotted UHF channels through UHF-to-VHF bids in the reverse auction.[705]

228. *Discussion.* We decline to exercise our discretion to protect the facilities requested in pending VHF-to-UHF channel substitution rulemaking requests.[706] Although the number of petitions involved is small, protecting them would encumber additional UHF spectrum by adding new stations to the UHF band, thereby increasing the number of constraints on the repacking process and limiting our flexibility. We conclude that protecting the facilities requested in these petitions would disserve our goals

[701] *See* § IV.B.1.a.iv (Relinquishment of Expired or Revoked Licenses and Downgraded Class A Licenses) (defining "license validity proceeding" as a proceeding regarding the expiration or cancellation of a license).

[702] *See* UVM Reply at 20.

[703] Spectrum Act § 6403(g)(1)(B).

[704] *NPRM*, 27 FCC Rcd at 12398, para. 117; *see* Spectrum Act § 6403(g)(1)(B). When the *NPRM* was adopted, there were 10 such requests pending. *Channel Substition Freeze*, 26 FCC Rcd 7721. The petition for Augusta, Georgia was subsequently dismissed at petitioner's request.

[705] *NPRM*, 27 FCC Rcd at 12397, para. 117 n.181.

[706] This includes the facilities addressed in *Amendment of Section 73.622(i), Post-Transition Table of DTV Allotments, Television Broadcast Stations (Cleveland, Ohio)*, Notice of Proposed Rulemaking, 26 FCC Rcd 14280 (Vid. Div. 2011).

by increasing the potential cost of repurposing UHF spectrum for new, flexible uses.[707] Moreover, these petitioners have not acted in reliance on Commission grants, have not made any investment in constructing their requested facilities, and have not begun operating the proposed facilities to provide service to viewers. Although the petitioners have expended some resources in preparing and filing their rulemaking petitions, we find that this factor does not outweigh the detrimental impact on repacking flexibility that would result from preservation of the UHF facilities proposed in these petitions.

229. We disagree with commenters who assert that section 6403(g)(1)(B) compels the Commission to process and grant channel substitution rulemaking requests that were pending on May 31, 2011.[708] The statute grants the Commission the discretion to reassign a licensee from VHF to UHF if either of the two statutory conditions in this provision is satisfied, but it does not mandate such reassignment.[709] Further, the mandatory reading advocated by commenters would compel the Commission to grant all pre-May 31, 2011 VHF-to-UHF channel substitution requests without regard to whether the requests meet our technical requirements or otherwise serve the public interest.[710] There is no indication in the statute that Congress intended such a result.[711]

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[707] If a petition to move from a VHF to a UHF channel is granted in advance of the incentive auction and protected in the repacking process, the station could demand a share of incentive auction proceeds in exchange for relinquishing its newly granted rights through a UHF-to-VHF bid in the reverse auction. In response to the Commission's expression of concern about this possibility in the *NPRM*, 27 FCC Rcd at 12398 n.181, Bonten stated that it would accept a condition on its construction permit prohibiting it from submitting such a bid. Bonten Comments at 7. We note, however, that § 6403(a)(2) provides that "a relinquishment of usage rights . . . *shall include*" three types of relinquishment, one of which is a UHF-to-VHF bid. Spectrum Act § 6403(a)(2) (emphasis added).

[708] For example, according to Media General, "Congress mandated that the FCC process pending VHF-to-UHF allotment petitions . . . that were pending [as of May 31, 2011]." Media General Comments at 5. *See also* Bonten Comments at 6; Raycom Comments at 2–4 (failure to process the pending petitions contravenes Congressional intent that they be processed in the ordinary course).

[709] As stated above, § 6403(g)(1)(B) provides that during the relevant time period, the Commission "may not" reassign a broadcast television licensee from a VHF channel to a UHF channel "unless" either of two conditions is satisfied. Thus, the two conditions trigger exceptions to the general prohibition against reassigning a licensee from VHF to UHF. The Commission and a number of courts have interpreted the "may not . . . unless" and "shall not . . . unless" construction in other contexts as permissive. For example, the 1993 Budget Act provides that the Commission "shall not" issue any license by lottery "unless" one or more applications were accepted for filing before July 26, 1993. The Commission interpreted this language as permissive, providing it with the discretion to use lotteries—but not mandating lotteries—if the condition following "unless" was satisfied. *See, e.g., Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, PP Docket No. 93-253, Memorandum Opinion and Order, 9 FCC Rcd 7387, 7391, para. 13 (1994); *see also Folden v. U.S.*, 56 Fed. Cl. 43, 46 (2003), *aff'd,* 379 F.3d 1344, 1350 (Fed. Cir. 2004); *Ranger Cellular v. FCC*, 333 F.3d 255, 257 (D.C. Cir. 2003). Similarly, the Seventh Circuit interpreted a federal education law providing that attorney's fees "may not" be awarded for an attorney's participation in a certain type of meeting "unless" the meeting is convened by order of a court or agency as permissive, granting the discretion to award attorney's fees if the condition following "unless" was satisfied. *Linda T. v. Rice Lake Area Sch. Dist.*, 417 F.3d 704, 709 (7th Cir. 2005); *see also Petrarca v. Rhode Island*, 583 F.Supp. 297, 300 (D.R.I. 1984) (statute stating that prisoner "shall not" be paroled "unless" certain conditions are met provided parole board with "discretion to keep a convict in prison for any amount of time, up to his maximum sentence, after he has met these criteria").

[710] Some commenters claim that § 6403(g)(1)(B) compels the Commission to *act on* or *process* (but not necessarily grant) the pending pre-May 31, 2011 VHF-to-UHF channel substitution requests. *See* Media General Comments *passim*; Bonten Comments at 6–9; Bonten Reply at 2–6; Raycom Comments at 3–6; Raycom Reply at 4–6. This argument has no merit. The statute expressly refers to "reassign[ment]," not processing.

[711] If Congress had intended such a result, it could have explicitly provided that the Commission "shall" reassign a licensee from VHF to UHF "if" a "request from such licensee for the reassignment was pending at the Commission on May 31, 2011." Congress knows how to use a "shall . . . if" construction, and did so in other provisions of the

(continued….)

230. Some commenters argue that failure to process these pending rulemaking petitions would inequitably treat these petitioners differently from similarly-situated petitioners whose petitions resulted in the issuance of an NPRM after May 31, 2011 and were subsequently granted.[712] We disagree. The two petitions that resulted in the issuance of an NPRM after May 31, 2011 were accompanied by expedited consideration requests,[713] whereas none of the pending petitions requested such consideration. Moreover, both of these petitions were granted prior to enactment of the Spectrum Act. Thus, their processing was not dependent on the Commission's consideration in this proceeding of the goals of the auction and repacking process or the meaning of section 6403(g)(1)(B).

231. Having determined that section 6403(g)(1)(B) does not compel grant of the pending VHF-to-UHF petitions, we direct the Media Bureau to dismiss any of these petitions if issuance of an NPRM would not be appropriate. This would be the case, for example, if the proposed facility would result in an impermissible loss of existing service or the petition fails to make a showing as to why a channel change would serve the public interest. We further direct the Media Bureau to hold in abeyance any remaining petitions or related rulemakings proceedings and to process them once the Media Bureau lifts the filing freezes now in place, unless the petition is withdrawn.[714]

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Spectrum Act. *See* Spectrum Act § 6403(d)(4). Bonten and Media General rely on letters from Members of Congress purporting to interpret § 6403(g)(1)(B) to "allow those broadcasters who had invested the time and resources necessary to file reallocation petitions to have their petitions considered in accordance with existing Commission standards and processes." Letter from Sen. Kay Hagan (D-NC), Sen. Lindsey Graham (R-SC), Sen. Saxby Chambliss (R-GA) to Julius Genachowski, Chairman, FCC (May 1, 2012), at 1; Letter from Rep. G.K. Butterfield (D-NC), Rep. Kathy Castor (D-FL), Rep. Morgan Griffith (R-VA), Rep. Gregg Harper (R-MS), Rep. Cliff Stearns (R-FL) to Julius Genachowski, Chairman, FCC (July 26, 2012) at 1. *See* Bonten Comments at 6; Media General Comments at 6; *see also* Letter from Sen. Mark R. Warner (R-VA) to Julius Genachowski, Chairman, FCC (May 16, 2012). We do not read these letters as interpreting § 6403(g)(1)(B)(ii) to require the Commission to grant the pending requests. We also note that it is well-settled that such post-enactment explanations of intent are of little or no probative value in interpreting legislative history. *See Regional Rail Reorganization Act Cases*, 419 U.S. 102, 132 (1974) ("[P]ost-passage remarks of legislators, however explicit, cannot serve to change the legislative intent of Congress expressed before the Act's passage.") (citations omitted); *Bread Political Action Committee v. FEC*, 455 U.S. 577, 582 n.3 (1982) ("We cannot give probative weight to these [post-enactment] affidavits [of a Senator and his assistant], however, because '[s]uch statements 'represent only the personal views of th[is] legislato[r], since the statements were [made] after passage of the Act.'") (citations omitted).

[712] Media General Comments at 9–10; NAB Comments at 31–32.

[713] In one case, the station's tower had collapsed and since it was required to construct a new facility, it requested a channel change in order to address on-going viewer reception problems. *Amendment of Section 73.622(i), Post-Transition Table of DTV Allotments, Television Broadcast Stations. (Eau Claire, Wisconsin)*, MB Docket No. 11-100, Report and Order, 26 FCC Rcd 10326 (2011). In the other case, the licensee had already modified its facility twice to increase power in an attempt to alleviate reported VHF reception problems and its proposed channel substitution would result in a population gain of approximately 515,000 persons. *Amendment of Section 73.622(i), Post-Transition Table of Allotments, Television Broadcast Stations. (Panama City, Florida)*, MB Docket No. 11-140, Report and Order, 26 FCC Rcd 14415 (2011).

[714] *See* para. 556. We direct the Media Bureau to hold such petitions in abeyance, rather than process them, because allowing VHF stations to move their existing service into the UHF band on an unprotected basis pending the outcome of the repacking process presents a significant potential for viewer disruption if the station's operations in the UHF band are displaced. We find there to be less potential for viewer disruption in the case of pending modifications that do not comply with the *Freeze PN*, which the Media Bureau will process but, if granted, will not be protected in the repacking process. *See para*. 212. In the case of a facilities modification, only the increase in contour will not be protected, not the station's entire existing service.

(ii) Out-of-Core Class A-Eligible LPTV Stations

232. *Background*. The Community Broadcasters Protection Act of 1999 ("CBPA") accorded certain qualifying LPTV stations with "primary" Class A status.[715] Although the statute prohibited the Commission from granting Class A status to LPTV stations operating on out-of-core channels (channels 52-69),[716] it provided such stations with an opportunity to achieve Class A status on an in-core channel (channels 2-51).[717] There remain approximately 100 formerly out-of-core Class A-eligible LPTV stations that obtained an in-core channel but did not file for their Class A license until after February 22, 2012 or have not yet filed for a Class A license.

233. *Discussion*. With one exception, we will not protect stations that are eligible for a Class A license but that did not file an application for such license until after February 22, 2012, even if the application is granted before the auction.[718] These stations are not entitled to mandatory preservation because their Class A facilities were not licensed or the subject of a pending Class A license application as of February 22, 2012.[719] The fact that such a station may obtain a Class A license after that date does not alter this conclusion because section 6403(b)(2) mandates preservation of only the full power and Class A facilities that were actually in operation as of February 22, 2012.[720] We also reject the claim that the CBPA requires preservation of such stations.[721] Despite the availability of two alternative approaches whereby these stations could obtain Class A status, the stations in this category failed to take either step and thus remained secondary LPTV stations on February 22, 2012.[722]

234. Moreover, we decline to extend discretionary protection to LPTV stations that had not filed an application for a Class A license as of February 22, 2012. Protecting such stations would encumber additional spectrum by requiring protection of approximately 100 stations, thereby increasing the number of constraints on the repacking process and limiting our flexibility.[723] While we recognize

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[715] Community Broadcasters Protection Act of 1999, Pub. L. No. 106-113, 113 Stat. Appendix 1 at pp. 1501A-594 – 1501A-598 (1999), *codified at* 47 U.S.C. § 336(f).

[716] 47 U.S.C. § 336(f)(6)(A); *see Establishment of a Class A Television Service*, MM Docket No. 00-10, Report and Order, 15 FCC Rcd 6355, 6396–97, para. 103 (2000) ("it would be inconsistent with the statute to provide interference protection on a channel outside the core") (*Class A R&O*).

[717] Such stations were required to obtain a construction permit for an in-core channel before receiving Class A status. 47 U.S.C. § 336(f)(6)(A) (providing that, when an out-of-core Class A-eligible LPTV licensee was assigned an in-core channel, the Commission was required to issue a Class A license simultaneously). To effectuate this requirement, the Commission directed out-of-core Class A-eligible LPTV stations seeking Class A status to file a Class A license application simultaneously with the construction permit application to move to an in-core channel. *Class A R&O*, 15 FCC Rcd at 6396–97, para. 103. The Commission commenced protection of such stations with the award of the in-core construction permit, rather than waiting until the in-core facility was constructed. Some out-of-core Class A-eligible LPTV stations did not follow the procedures outlined by the Commission. Instead, these stations filed their Class A license applications after the in-core facility was constructed, which the Media Bureau granted if otherwise consistent with the Commission's rules.

[718] Moreover, spectrum usage rights covered by such unprotected facilities will not be recognized for relinquishment during the reverse auction. *See* § IV.B.1.a.ii (Spectrum Usage Rights Eligible for Relinquishment).

[719] *See* § III.B.3.a (Mandatory Protection of Full Power and Class A Facilities) (explaining that § 6403(b)(2) mandates that we protect Class A facilities that were licensed or for which a license application was pending as of February 22, 2012).

[720] *See id*.

[721] *See* Venture Reply at 9–10.

[722] *See* § III.B.3.d.iii (LPTV and TV Translator Stations) (explaining that protection of LPTV and TV translator stations in the repacking process is not mandated by § 6403(b)(2)).

[723] Almost all of the stations in this category operate on UHF channels and many are located in spectrum-congested areas.

that these stations have made investments in their facilities, we conclude that this does not outweigh the significant detrimental impact on repacking flexibility that would result from protecting them, especially in light of the failure of such stations to take the steps to obtain a Class A license and remove their secondary status in a timely manner. These stations failed to file for Class A licenses until after February 22, 2012, or have still failed to file to date, despite the fact that the CBPA and the Commission's rules implementing it were adopted more than a decade ago.[724] These stations remained secondary and any investment was made with "explicit, full and clear prior notice that operation in the LPTV [and TV translator service] entails the risk of displacement."[725] Although we will not protect stations that filed for and obtained a Class A license after February 22, 2012, in the repacking process, we will provide them with an advanced opportunity to locate a new channel. Specifically, if such station obtains a Class A license but is displaced in the repacking process, it may file a displacement application during one of the filing opportunities for alternate channels.[726]

235. We will, however, exercise our discretion to protect one station in this category -- KHTV-CD, Los Angeles, California, licensed to Venture. Venture made repeated efforts over the course of a decade to convert to Class A status.[727] During this period,[728] Venture continued to have a Class A

[724] Indeed, in 2000, the Commission cautioned that "it would be in the best interest of qualified LPTV stations operating outside the core to try to locate an in-core channel *now*, as the core spectrum is becoming increasingly crowded and it is likely to become increasingly difficult to locate an in-core channel in the future." *Class A R&O*, 15 FCC Rcd at 6396–97, para. 103 (emphasis added). Moreover, all out-of-core LPTV stations were required to file displacement applications for an in-core channel by September 1, 2011. *LPTV DTV Second R&O*, 26 FCC Rcd at 10733, para. 2. Thus, all stations in this category had the opportunity to file for Class A status when filing for their in-core channel by September 1, 2011, well in advance of February 22, 2012.

[725] *In the Matter of Petition by Community Broadcasters Association to Amend Part 74 of the Commission's Rules,* Memorandum Opinion and Order, 59 Rad. Reg. 2d (P&F) 1216, 1217, para. 4 (1986) (*Community Broadcasters Association MO&O*). Our decision above to exercise discretion to protect new full power stations licensed after February 22, 2012 does not warrant protection of the Class A-eligible stations in this category, even if they obtain a Class A license before the auction. *See* Venture Reply at 10; *see also* § III.B.3.b.i (New Full Power Stations). As an initial matter, such full power stations are small in number and are licensed or authorized on VHF channels and/or in remote locations, and thus present far less impact on repacking flexibility than the approximately 100 stations in this category, almost all of which operate on UHF channels and many of which are located in spectrum-congested areas. Moreover, the new full power stations have proceeded to obtain licenses for their stations in due course, whereas the stations in this category have failed to take the steps necessary to remove their secondary status, despite the fact that the CBPA and the Commission's rules implementing it were adopted more than a decade ago.

[726] *See* § V.C.1.b (Alternate Channels and Expanded Facilities Opportunities) (delegating authority to the Media Bureau to determine whether such stations should be permitted to file for a new channel along with priority stations or during the second filing opportunity). Except as indicated here, our existing displacement rules will apply to such applications. *See* 47 C.F.R. §§ 73.3572(a)(4) and 74.787(a)(4).

[727] Venture was granted an in-core construction permit for KHTV-LP, constructed the facility, and filed a Class A license application for the in-core channel in July 2001. In that application, it made the required certification that it "does, and will continue to" meet all Class A operating requirements and applicable full power requirements. *See* FCC File No. BLTTA-20010712AHT, FCC Form 302-CA, Section II, Questions 3, 4, 8, 9, 10. That application was dismissed pursuant to § 336(f)(7) of the Communications Act, however, because the licensed facility was predicted to cause interference. Venture Reply at 4. Venture subsequently filed three more applications for in-core channels, each of which was dismissed because of interference or international objection. *Id*. at 4–6. KHTV-LP was displaced by the commencement of digital operations by a full power station on channel 48 in May 2003 and was granted an STA to operate on channel 67 through 2011.

[728] In addition to its initial Class A license application filed in July 2001 that was later dismissed, Venture filed a Class A license application for the construction permit application it filed in 2002, certifying again that it was meeting all Class A operating requirements and applicable full power requirements. While the construction permit application was dismissed due to interference, the Class A license application remained pending until July 11, 2012. Venture Reply at 5 n.12, 6–7 (stating that KHTV "abide[d] by the FCC's Class A continuing eligibility requirements for the last 12 years").

license application on file in which it certified that it was meeting, and would continue to meet, all Class A operating requirements and applicable full power requirements.[729] After finally locating and constructing a suitable in-core channel, Venture filed its Class A license application just two days after February 22, 2012.[730] Given the unique circumstances that prevented Venture from filing its Class A license application for channel 27 until just two days after February 22, 2012, its certified operation of KHTV-LP consistent with Class A operating requirements since 2001, and its repeated efforts to convert to Class A status, we conclude that the equities in favor of protection of this station outweigh the minimal impact that protecting this one facility will have on our repacking flexibility.

(iii) LPTV and TV Translator Stations

236. *Background*. Section 6403(b)(5) of the Spectrum Act provides that nothing in section 6403 "shall be construed to alter the spectrum usage rights of low-power television stations." The Commission proposed in the *NPRM* not to extend repacking protection to LPTV or TV translator stations, noting that these low power stations always have had secondary status under the Commission's rules.[731] In addition, the Commission sought comment on its view that the interference protection ordinarily accorded to LPTV and TV translator facilities against modifications of Class A facilities under section 336(f)(7)(B) of the Communications Act does not apply with respect to channel assignments made in the repacking process.[732]

237. *Discussion*. Although we recognize the valuable services that many LPTV and TV translator stations provide, we decline to extend repacking protection to these stations. We recognize that our decision will result in some viewers losing the services of these stations, may strand the investments displaced LPTV and TV translator licensees have made in their existing facilities, and may cause displaced licensees that choose to move to a new channel to incur the cost of doing so. On balance, however, we conclude that these concerns are outweighed by the detrimental impact that protecting LPTV and TV translator stations would have on the repacking process and on the success of the incentive auction. As discussed below, we adopt measures to mitigate the potential impact of the auction and repacking process on LPTV and TV translator stations, including adopting special procedures for displaced stations to select a new channel among the limited number of channels that will remain following the repacking process.[733] We will also initiate a rulemaking proceeding after the release of this

[729] Thus, Venture certified that KHTV-LP aired a minimum of 18 hours of programming each day and three hours of locally produced programming each week, and complied with the Commission's main studio requirements, rules governing informational and educational children's programming, the public inspection file rule, including preparing and placing in the file on a quarterly basis an issues/programs list and the station's quarterly-filed Children's Television Programming Report, the political programming rules, station identification requirements, and the Emergency Alert System (EAS) rules. *See Class A R&O*, 15 FCC Rcd at 6366, paras. 24–25.

[730] The application for a construction permit for this in-core channel (channel 27) was filed in August 2009. That application was granted on February 15, 2012. Because Venture had not filed a Class A license application with its August 2009 construction permit application, the staff granted Venture an LPTV authorization on February 15, 2012, requiring that Venture obtain an LPTV license for channel 27 before applying for Class A status. Venture filed a license to cover construction of the LPTV facility on February 17, 2012, which the staff granted on February 22, 2012. Accordingly, Venture was unable to file its Class A license application for channel 27 until after that date. Venture Reply at 6. That application (FCC File No. BLDTA-20120224ABQ) was granted on July 11, 2012.

[731] *NPRM*, 27 FCC Rcd at 12399, para. 118.

[732] *Id*. Specifically, § 336(f)(7)(B) of the Communications Act prevents the Commission from approving a proposed modification of a Class A license "unless the . . . licensee shows" non-interference to LPTV or translator facilities authorized or proposed before "the application for . . . modification of such a license . . . was filed." 47 U.S.C. § 336(f)(7)(B). The Commission proposed to interpret § 336(f)(7)(B) as "reflect[ing] an intention to grant protection against changes in Class A facilities proposed by licensees, not to limit the previously unanticipated broadcast television spectrum auction required by Congress in the Spectrum Act." *NPRM*, 27 FCC Rcd at 12399, para. 118.

[733] *See* § V.D.1 (Transition Procedures: LPTV and TV Translator Stations).

Order to consider further actions to provide regulatory relief to displaced LPTV and TV translator stations.[734]

238. Protection of LPTV and TV translator stations in the repacking process is not mandated by section 6403(b)(2). The protection provision applies only to "each broadcast television licensee," which is defined as the "licensee of—(A) a full-power television station; or (B) a low-power television station that has been accorded primary status as a Class A television licensee" under section 73.6001(a) of the Commission's rules.[735] There is no basis in the text of section 6403(b)(2) or the pertinent statutory definitions to conclude that low power stations that have not been accorded Class A status are entitled to the protections afforded by section 6403(b)(2).[736]

239. We disagree with parties who argue that section 6403(b)(5) mandates protection of LPTV and TV translator stations in the repacking process.[737] Section 6403(b)(5) provides that nothing in section 6403 shall be construed to "alter the spectrum usage rights of low power television stations." This provision simply clarifies the meaning and scope of section 6403; it does not limit the Commission's spectrum management authority.[738] In any case, our decision not to protect LPTV or TV translator stations when we repack full power television stations does not "alter" their spectrum usage rights.[739] LPTV and TV translator stations are secondary to full power television stations, which may be authorized and operated "without regard to existing or proposed low power TV or TV translator stations."[740] As T-Mobile points out, "the Commission made clear more than three decades ago that secondary, low power television stations 'may not cause interference to, and must accept interference from, full-service television stations, certain land mobile radio operations and other primary services.'"[741]

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[734] *See id*.

[735] Spectrum Act §§ 6001(6), 6403(b)(2).

[736] TV translators were not made eligible for Class A status under the CBPA. *See Class A R&O*, 15 FCC Rcd at 6369–70, para. 35.

[737] ICN Comments at 1; Mako Comments at 5; NRB Comments at 4–5; SEI Comments at 3; Signal Above Comments at 2–3.

[738] *See* n.288.

[739] Several commenters refer to recent statements by Congressman Joe Barton as support for their argument that Congress intended that all licensed television stations, including LPTV stations, be protected in the repacking process. *See* Capitol Reply at 3; MSGPR Comments at 5 ("Congressman Barton reminded the Chairman that the intent of Congress was to protect broadcasters, and it was therefore not their intention to force LPTV broadcasters off the air or remove them from the market."); A. Weiss Comments at 6 ("Congressman [Joe] Barton never intended for the FCC to have the right to wipe out existing licensed LPTV broadcasters who were serving the public."). However, as discussed above, post-enactment explanations of the intent of individual legislators cannot substitute for legislative history, or override the clear meaning of the statutory language. *See* n.711.

[740] *See* 47 C.F.R. § 74.702(b).

[741] T-Mobile Reply at 99 (citing *Amendment of Parts 73 and 74 of the Commission's Rules to Establish Rules for Digital Low Power Television, Television Translator, and Television Booster Stations and to Amend the Rules for Digital Class A Television Stations,* , MM Docket No. 03-185, Report and Order, 19 FCC Rcd 19331, 19333, para. 2 (2004) (*Digital LPTV Order*)). Accordingly, we disagree with commenters who assert that LPTV and TV translator stations are secondary only to full power television stations, and are entitled to repacking protection vis-à-vis new primary users of the repurposed broadcast spectrum. Letter from Mike Gravino, Director, LPTV Spectrum Coalition, to Marlene H. Dortch, Secretary, FCC, Gen. Docket No. 12-268 at 3–4 (filed Aug. 27, 2013)(LPTV Spectrum Aug. 27, 2013 *Ex Parte* Letter); Mako Comments at 4–6; MSGPR Comments at 2; SEI Comments at 4–5. We note that in an analogous situation, when the Commission reallocated spectrum comprising television broadcast channels 52-69 to wireless usage, it likewise treated LPTV stations as secondary to the services provided by future wireless licensees in the reallocated spectrum. *See Lower 700 MHz R&O*, 17 FCC Rcd at 1034–5, para. 27 (LPTV and TV translator stations not permitted to cause harmful interference to primary services, including new licensees in Channels 52-59, and cannot claim protection from harmful interference from primary services, including new

(continued….)

240. We reject IBN's assertion that LPTV and TV translator stations' spectrum usage rights are protected from taking by the Fifth Amendment to the U.S. Constitution.[742] The Communications Act is clear that there can be no ownership interest in spectrum licensed to broadcast television stations,[743] and that this principle is equally true for licenses awarded at auction.[744] Any rights of LPTV and TV translator station licensees to use spectrum are defined by their licenses, which expressly subject them to accepting interference from primary services.[745]

241. Although we have discretion to grant protection to additional facilities where appropriate, we do not believe that extending protection to LPTV and TV translator stations in the repacking process would be consistent with the goals of the Spectrum Act. There are more than 5,500 licensed LPTV and TV translator stations, and almost 4,500 of these stations are licensed on UHF channels. Protecting them would increase the number of constraints on the repacking process significantly, and severely limit our recovery of spectrum to carry out the forward auction, thereby frustrating the purposes of the Spectrum Act. While we recognize that LPTV and TV translator station operators have made investments in their facilities, they have done so with "explicit, full and clear prior notice that operation in the LPTV [and TV translator service] entails the risk of displacement."[746]

242. We likewise decline to exercise our discretionary authority to protect replacement digital low power TV translator stations authorized pursuant to section 74.787(a)(5) of the Commission's rules ("digital replacement translators" or "DRTs").[747] There are approximately 150 licensed or authorized DRT facilities, all of which are on UHF channels separate from the primary stations whose signals they

(Continued from previous page)
licensees in Channels 52-59); *Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, MM Docket No. 87-268, Sixth Report and Order, 12 FCC Rcd 14588, 14652–53, para. 142 (1997) (noting that, as a secondary service, LPTV stations must cease operation when a new service provider on reallocated channels 60-69 is operational and would receive interference from the LPTV station).

[742] *See* U.S. Const., amend. V. IBN argues that "[i]n the modern era when applicants for television spectrum must often participate in auctions run by the Commission, old theories that licensees have no property rights are obsolete and invalid." IBN Comments at 3.

[743] *See* 47 U.S.C. §§ 301, 304, 309(h); *FCC v. Sanders Bros. Radio Station*, 309 U.S. 470, 475 (1940) ("The policy of the Act is clear that no person is to have anything in the nature of a property right as a result of the granting of a license."); *see also Ashbacker Radio Corp. v. FCC*, 326 U.S. 327, 331–32 (1945); *CBS, Inc. v. FCC*, 453 U.S. 367, 395 (1981); *Prometheus Radio Project v. FCC*, 373 F.3d 372, 428 (3rd Cir. 2004). We also note there is no merit to the argument that a post-auction rulemaking change that may affect the value of an auctioned license should be considered a taking under the Fifth Amendment. *See Mobile Relay Assocs. v. FCC*, 457 F.3d 1, 11–12 (D.C. Cir. 2006); *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, WT Docket No. 07-293, Report and Order and Second Report and Order, 25 FCC Rcd 11710, 11775-76, para. 150 & n.388 (2010) (*2010 WCS Order*).

[744] *See* 47 U.S.C. § 309(j)(6); *Celtronix Telemetry, Inc. v. FCC*, 272 F.3d 585-589 (D.C. Cir. 2001).

[745] *See Digital LPTV Order*, 19 FCC Rcd at 19333, para. 2 ("stations in the low power television service are authorized with 'secondary' frequency use status. These stations may not cause interference to, and must accept interference from, full-service television stations, certain land mobile radio operations and other primary services") (citing 47 C.F.R. §§ 74.703, 74.709, 90.303).

[746] *Community Broadcasters Association MO&O,* 59 Rad. Reg. 2d (P&F) at 1217, para. 4.

[747] *See* PTV Comments at 8; Bahakel Comments at 3; Bonten Comments at 10; Bonten Reply at 7–8; CBS Reply at 2–4; Cox Media Comments at 5; Cox Media Reply at 2–4; NAB Comments at 33; PTV Reply at 4; Raycom Reply at 8; Tribune Comments at 18–21; WGAL Comments at 13–14. We do not interpret the statute to mandate protection of the coverage area and population served by secondary translators "who re-broadcast the main station's signal." *See* NAB Comments at 4 (filed May 8, 2014). Despite NAB's claim, our interpretation is not "contrary to the plain text of the Spectrum Act." *Id*. Moreover, interpreting the statute to mandate protection of secondary translators, including DRTs, would have a detrimental impact on the repacking process and on the success of the incentive auction. *See* para. 237.

carry. If the Commission protected these facilities, it would have to protect a separate channel facility for each DRT operated by a full power station, significantly affecting repacking flexibility in markets where they are licensed. As discussed below, however, in order to mitigate the potential impact of the repacking process on DRTs, we will afford DRT displacement applications priority over other LPTV and TV translator displacement applications in cases of mutual exclusivity.[748] Moreover, in connection with the rulemaking proceeding we intend to initiate relating to the potential displacement of LPTV and TV translator stations, we will consider whether to create a new replacement translator service for stations that experience losses in their pre-auction service areas.

243. We do not agree with commenters who claim that the licensing process for the DRT service justifies according DRTs different repacking protections than other TV translators.[749] In creating the DRT service, the Commission concluded that, because assigning these translators a separate call sign based on the translator's channel would cause technical problems and impose additional costs, it would instead assign DRTs the same four letter call sign as their associated full power station.[750] In addition, the Commission associated DRTs with full power stations' main licenses so that the translators could not be separately transferred or assigned, or converted to a LPTV station, thus "ensur[ing] that the replacement translator service is limited to only those situations where a station seeks to restore service to a loss area and the license is used for that purpose."[751] In doing so, the Commission did not confer an operating status on DRTs that differs from other TV translator stations. On the contrary, it put the licensees of these facilities on notice that DRTs, like other TV translator stations, would be secondary in nature and therefore subject to displacement.[752]

244. Finally, we adopt our proposal in the *NPRM* not to extend interference protection to LPTV or TV translator stations vis-à-vis Class A television stations in the repacking process.[753] Section 336(f)(7)(B) of the Communications Act prevents the Commission from approving a modification of a Class A license "unless the . . . licensee shows" that its proposal would not cause interference to LPTVor translator facilities authorized or proposed before "the application for . . . modification of such a license . . . was filed."[754] We do not interpret this language, which grants LPTV and TV translator stations protection against changes to facilities proposed by Class A licensees, to restrict the Commission in implementing the previously unanticipated broadcast television spectrum incentive auction and repacking process authorized by Congress in the Spectrum Act.[755]

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[748] *See* § V.D.1 (Transition Procedures: LPTV and TV Translator Stations). We also note that, if a station is reassigned to a new channel in the repacking process, its need for a DRT may no longer exist or may be significantly different based on the signal propagation characteristics of its new channel assignment.

[749] CBS argues that the Commission should protect DRTs because, unlike typical TV translator stations, DRTs are not given a separate call sign, and may not be separately assigned or transferred. *See* CBS Reply at 4. PTV and NAB also assert that, because DRTs were authorized to fill in full power station service areas, they are an integral part of full power stations' facilities that must be protected. PTV Reply at 8; NAB Comments at 33.

[750] *See Amendment of Parts 73 and 74 of the Commission's Rules to Establish Rules for Replacement Digital Low Power Television Translator Stations*, MB Docket No. 08-253, Report and Order, 24 FCC Rcd 5931, 5943–44, paras. 28–29 (2009) (*DRT R&O*).

[751] *DRT R&O*, 24 FCC Rcd at 5941, para. 23.

[752] The Commission determined that the DRT service would be licensed "with 'secondary' frequency use status," *id.* at 5942, para. 25, and that the rules associated with television translator stations generally would apply to the new service.

[753] *NPRM*, 27 FCC Rcd at 12399, para. 118. We did not receive any comments on our *NPRM* proposal regarding this issue.

[754] 47 U.S.C. § 336(f)(7)(B).

[755] LPTV Coalition asserts that the Commission should conduct a study of the Spectrum Act's impact on the LPTV and TV translator industry pursuant to the Unfunded Mandates Reform Act (UMRA). LPTV Spectrum Aug. 27, (continued….)

(iv) Special Temporary and Experimental Authorizations

245. Several commenters argue that section 6403(b)(2) requires the Commission to protect not only licensed facilities as of February 22, 2012, but also any other facilities that were being used to serve viewers on that date, including facilities operating pursuant to experimental authorizations or Special Temporary Authority ("STA").[756] We disagree. As numerous commenters have argued in this proceeding, Congress is presumed to legislate against the background of existing laws and regulations.[757] STAs and experimental authorizations are, as their names indicate, interim, provisional, and non-permanent in nature.[758] These authorizations also are secondary to all other authorized and licensed users, including secondary services such as the LPTV service.[759] We are not persuaded that Congress intended to require the Commission to preserve experimental, temporary, or secondary facilities in the repacking process. We also decline to exercise our discretionary authority to protect such facilities. While station operators may have made investments in these authorizations, they have done so with full prior notice that operations pursuant to these authorizations are secondary and subject to termination at any time. In addition, there are presently outstanding a small number of these authorizations allowing full power broadcasters to operate with power levels in excess of those permitted under our rules, and protecting such authorizations would have a negative impact on our repacking flexibility.

4. International Coordination

246. Section 6403(b)(l) of the Spectrum Act states that, for purposes of making spectrum available for the forward auction of broadcast television spectrum, the Commission "may, subject to international coordination along the border with Mexico and Canada," reassign television channels and reallocate available portions of spectrum.[760] In the *NPRM*, the Commission acknowledged the need to coordinate, stating, "[w]e note that modification of the 700 MHz band arrangements [negotiated with Canada and Mexico during the DTV transition] or the creation of new separate arrangements pertaining to the 600 MHz spectrum will be necessary to implement 600 MHz operations in areas along the common border and to protect these 600 MHz operations from cross-border interference."[761]

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2013 *Ex Parte* Letter at 3. UMRA, however, does not apply to independent regulatory agencies such as the Commission. *See* 2 U.S.C. § 1502(1) (incorporating terms as defined under 2 U.S.C. § 658); 2 U.S.C. § 658(1) (providing that the term "agency" has the same meaning as defined in § 551(1) of title 5 of the U.S. Code, "but does not include independent regulatory agencies"). Because we decline to protect LPTV stations in the repacking process, we also reject the proposal of the LPTV Coalition that LPTV stations should be able to qualify for primary status when they are repacked. *See* LPTV Spectrum *Ex Parte* Letter at 4–5.

[756] Affiliates Associations Comments at 21; WGAL Comments at 2.

[757] *See Brand X*, 545 U.S. at 993 (noting presumption that Congress is aware of "'settled judicial and administrative interpretation[s]'" when it enacts a statute) (quoting *Commissioner v. Keystone Consol. Indus., Inc.,* 508 U.S. 152, 159 (1993)); *Hernstadt v. FCC*, 677 F.2d 893, 903 n.22 (D.C. Cir. 1980) ("Congress is presumed to be cognizant of, and legislate against the background of, existing interpretations of law.").

[758] Experimental authorizations permit a station to conduct technical experiments directed toward improvement of operations and service, *see* 47 C.F.R. Part 5, subpart D, and STAs permit a station to temporarily operate at a specified variance from the station's authorization or the rules applicable to the particular class of station. 47 C.F.R. § 73.1635; *see* 47 C.F.R. § 73.1635(a)(4) (providing that an STA may be granted for an initial period not to exceed 180 days and that a "limited number of extensions" may be granted, not to exceed 180 days per extension). That rule also specifically provides that "[a]n STA may be modified or cancelled by the FCC without prior notice or right to hearing." 47 C.F.R. § 73.1635(b).

[759] *In the Matter of Promoting Expanding Opportunities for Radio Experimentation and Market Trials Under Part 5 of the Commission's Rules and Streamlining Other Related Rules*, ET Docket Nos. 10-236, 06-155, Report and Order, 28 FCC Rcd 758, 760, para. 3 (2013).

[760] Spectrum Act § 6403(b)(1).

[761] *NPRM,* 27 FCC Rcd at 12426-27, para. 197.

247. Pursuant to international treaty,[762] the United States coordinates all radio spectrum operations in the border areas with Canada and Mexico. Coordination secures interference protection and promotes successful operations for all users of spectrum along the borders. Through efforts of the U.S. Department of State ("State Department") with technical input from the FCC, several bilateral arrangements have been negotiated with Canada and Mexico governing the border areas to afford each country the opportunity to maximize efficient use of spectrum. As explained in the *NPRM*, "[t]hese arrangements provide for the establishment of new services, protection of new and existing services from cross-border interference, and the integration of new services within each country's domestic spectrum agenda."[763] For example, the United States was able to complete its DTV transition and reallocate spectrum from broadcast television to wireless service pursuant to and in accordance with agreed-upon cross-border arrangements requiring coordination of reassigned television stations operating within certain distances of the borders.[764] Canada has largely completed its DTV transition, again in accordance with agreed-upon cross-border arrangements. Mexico's DTV transition is still ongoing, as is coordination of television station reassignments and reallocations in accordance with agreed-upon cross-border arrangements.

248. We stress that this cross-border coordination process is continual. In addition to holding numerous face-to-face working level bilateral meetings and teleconferences on various spectrum issues throughout the year, the U.S.-Canada Radio Technical Liaison Committee ("RTLC") and the U.S.-Mexico High Level Consultative Committee on Telecommunications ("HLCC") hold high level meetings to discuss spectrum coordination issues and set agendas for discussion of future issues. The active participants in the RTLC meetings are the State Department, FCC, and Industry Canada, and in the HLCC meetings, the State Department, FCC, Instituto Federal de Telecomunicaciones ("IFT")[765] and Secrétaria de Comunicaciones y Transportes ("SCT").[766]

249. The FCC has used this ongoing process to keep Canada and Mexico fully informed on broadcast television spectrum incentive auction coordination issues. Beginning in 2010, Commission staff discussed with Mexico and Canada the National Broadband Plan and its recommendation to conduct an incentive auction to make more spectrum available for wireless broadband service.[767] In 2011, Commission staff informed Canada and Mexico of the Commission's progress in planning for the incentive auction, including discussion of repacking models for the 600 MHz Band and the status of pending legislation authorizing the FCC to conduct an incentive auction. The FCC staff further briefed Canadian and Mexican counterparts at the first meetings following passage of the Spectrum Act, including providing detailed descriptions of the Commission's proposed process for conducting the incentive auction. In numerous meetings and teleconferences since adoption of the *NPRM,* FCC staff provided detailed briefings on the *NPRM* and discussed the 600 MHz Band Plan for the incentive auction,

[762] *See generally* International Telecommunication Union Radio Regulations (rev. World Radio Conference 2012).

[763] *NPRM*, 27 FCC Rcd at 12371-72, para. 34.

[764] *Id.* at 12426-27, para. 197. *See also* 2000 U.S.-Canada DTV Letter of Understanding, 2008 U.S.-Canada DTV Exchange of Letters, 2005 U.S.-Canada 700 MHz Public Safety Land Mobile Arrangement and 2011 U.S.-Canada 700 MHz Commercial Land Mobile Arrangement (Arrangement 0); 1998 U.S.-Mexico DTV Memorandum of Understanding, and 2006 U.S.-Mexico 698-806 MHz Protocol for Terrestrial Non-Broadcasting Radiocommunication Services.

[765] Prior to September 2013, when IFT began operation, IFT's predecessor, the Comisión Federal de Telecomunicaciones (COFETEL), participated in HLCC meetings.

[766] In September 2013, a new entity, the Federal Communications Institute or IFT (Instituto Federal de Telecomunicaciones), assumed COFETEL's responsibilities, as well as new authorities granted by a major Constitutional and statutory communications reform initiative. As a result, IFT now participates in the HLCC process.

[767] Federal Communications Commission, Connecting America: The National Broadband Plan at 88-91 (2010).

interference issues, and coordination issues for resolution. Significantly, Industry Canada recognized 600 MHz spectrum coordination issues in a 2013 spectrum outlook report, stating: "[i]t is expected that the Canadian usage of the UHF TV band will eventually be harmonized with usage in the United States. Industry Canada will evaluate the timing and the process that could be used in Canada for the repurposing of the 600 MHz band, based on the outcome of the incentive auction process in the United States."[768]

250. As planning for the incentive auction progressed, the FCC increased incentive auction-related coordination. In 2013, it formed technical task groups with both Industry Canada and IFT to conduct regular meetings to further coordination. The FCC has used these meetings to demonstrate the mutual benefit to all our countries of harmonized usage of the 600 MHz Band, and to keep our neighbors informed of our specific plans for usage of the band as a result of the incentive auction. All parties at the meetings agree on the technical benefits of freeing more spectrum for wireless broadband and harmonizing use of the 600 MHz Band.

251. The FCC combined these technical meetings with high level engagements by Commission leaders to foster greater cooperation. Chairman Genachowski, Commissioner Clyburn (both as Commissioner and as Acting Chairwoman) and Chairman Wheeler have met with senior officials from both Canada and Mexico on various occasions regarding coordination of the 600 MHz Band, including representatives from Industry Canada, the Department of Canadian Heritage, the Canadian Radio-television and Telecommunications Commission, and from Mexico, SCT, the new Mexican regulator IFT, and its predecessor COFETEL. These engagements continue bilaterally and at meetings of international organizations where senior level officials of the United States, Canada and Mexico are present.

252. These efforts demonstrate that the FCC is moving quickly to coordinate 600 MHz spectrum usage with Canada and Mexico, as urged by several commenters.[769] They also show that the FCC is fully complying with its obligation to ensure that spectrum reassignments and reallocations taken by the Commission are coordinated with Canada and Mexico.

253. NAB asserts in its comments on the *NPRM* that the Spectrum Act "requires coordination as a *precondition* to repacking."[770] In a 24-page document filed on the eve of the Sunshine period[771] (thus preventing in-depth analysis and depriving interested parties of an opportunity for comment), NAB and other broadcasters claim that, "the FCC must conclude new agreements with Canada and Mexico before conducting the incentive auction" and that, to repack stations as part of the incentive auction, we must negotiate a "new, pre-approved table of allotments with Canada and Mexico."[772] We disagree with NAB that we must complete such coordination before the auction or the repacking process, either as a legal or a practical matter. As a legal matter, the statutory language does not impose a temporal requirement regarding coordination; rather, consistent with the ordinary meaning of the phrase "subject to,"[773] we

[768] Industry Canada, Spectrum Mgmt. and Telecomms., Commercial Mobile Spectrum Outlook 33, (2013) available at https://www.ic.gc.ca/eic/site/smt-gst nsf/vwapj/Outlook-2013-en.pdf/$FILE/Outlook-2013-en.pdf.

[769] *See, e.g.*, Belo Comments at 12-13; Nokia Comments at 21; CEA Comments at 34.

[770] NAB Comments at 15.

[771] *See* 47 C.F.R. § 1.1203(a), (c).

[772] *See* Letter from Rick Kaplan, Executive Vice President, NAB, *et al.* to Marlene H. Dorch, Secretary, Federal Communication Commission in Docket No. 12-268 at 8-9 (May 8, 2014) (May 8, 2014 NAB International Filing) . *See also* Affiliates Association Reply at 26-27; Block Stations Reply at 5; Harris Broadcast Reply at 3, 4, 6-7.

[773] The Spectrum Act states: "For purposes of making available spectrum to carry out the forward auction . . .the Commission . . . may, subject to international coordination along the border with Mexico and Canada – . . . (i) make such reassignments of television channels as the Commission considers appropriate; and (ii) reallocate such portions of such spectrum as the Commission determines are available for reallocation." Spectrum Act § 6403(b)(1).

interpret the statute to mean that any reassignments or reallocations the Commission makes are governed or affected by coordination.[774] Thus, the statute affords the FCC discretion in determining how to implement the coordination process, including the timing of that process.[775] NAB argues to the contrary in its latest filing because agreements were reached in advance of the DTV transition,[776] and Congress presumably was aware of that precedent when it adopted the Spectrum Act.[777] NAB mischaracterizes the precedent of the DTV transition, and places more weight on it than it will bear. International coordination is an ongoing process; in the case of the DTV transition, coordination of some TV stations continued past the DTV transition deadline. Even if Congress could be assumed to share the NAB's subjective view of the DTV transition, however, the statutory language hardly can be stretched to require the Commission to conduct the incentive auction coordination on a schedule similar to the DTV coordination, given that international coordination by its nature involves negotiation with sovereign nations whose actions the FCC cannot control.[778] For all of these reasons, we agree with CTIA and Verizon that preapproval by Canada and Mexico of all reassignments and reallocations is not required by the Spectrum Act.[779]

254. Further, we disagree with NAB that as a practical matter the Commission must complete coordination, including assignment of specific channel allotments, in order to carry out the repacking process. What is required to undertake the repacking process is a mutual understanding with Canada and Mexico as to how the repacking in the United States will be conducted to protect border stations in all countries from interference, and how any possible repacking *could* be conducted in Canada and Mexico should either of those countries ever determine that they might want to undertake such a process. Based on the incentive auction coordination discussions to date, the mutual benefit to Canada, Mexico, and the United States to find more spectrum to meet the burgeoning demand for wireless broadband, and our shared history of cooperative spectrum coordination, we expect to reach arrangements with Canada and Mexico that will enable us to carry out the repacking process in a manner that is fully consistent with the requirements of the statute and our goals for the auction.[780]

255. While NAB claims that the Spectrum Act requires the Commission to conduct the incentive auction coordination the same way it conducted the DTV coordination, it also asserts that the amount of time required for the DTV coordination will make it impossible for the FCC to do so prior to the incentive auction and the repacking process.[781] Contrary to NAB's arguments, the incentive auction is not the DTV transition: unlike the former, the latter involved a time-consuming television station-by-television station coordination. While NAB is correct that the coordination process can take time, the

[774] *See* Black's Law Dictionary, 1425 (6th Ed. 1990) (defining "subject to" as meaning "[l]iable, subordinate, subservient, inferior, obedient to; governed or affected by; provided that; provided; answerable for.").

[775] Spectrum Act § 6403(b)(1).

[776] *See* May 8, 2014 NAB International Filing, Declaration of Bruce Franca at 2, para. 8 ("international coordination agreements were reached with Canada and Mexico *before* any significant implementation of DTV by U.S. stations occurred").

[777] *See id.* at 6 n.17 and accompanying text.

[778] Had it so intended, Congress might have required "all reasonable efforts" to produce such agreements in advance, as it did with regard to preservation of existing broadcast service. *See* Spectrum Act § 6403(b)(2). Yet it did not.

[779] CTIA Comments at 32; Verizon Comments at 32.

[780] As demonstrated above, the Commission is making every effort to reach to new arrangements with Canada and Mexico as soon as international sovereignty and the internal processes and spectrum policies of our neighbors allow. If for any reason we are unable to conclude such arrangements prior to repacking, we will repack U.S. broadcast stations consistent with existing agreements. Contrary to NAB's assertions (May 8, 2014 NAB International Filing at 7), we can do so consistent with the requirements of the Spectrum Act.

[781] NAB Comments at 13; May 8, 2014 NAB International Filing at 9; Declaration of Bruce Franca at 7-8, paras. 21-23.

FCC, as explained above, has already been engaged with Canada and Mexico on incentive auction coordination for years.[782]

256. As the foregoing discussion clearly demonstrates, NAB's suggestion that the Commission is waiting until after the incentive auction and the repacking process to begin coordination, or that it is "planning to reach agreements with Canada and Mexico only *after* the auction,"[783] is simply wrong. The Commission is making an all-out effort to reach arrangements. NAB's further suggestion that coordination must not be ongoing because broadcasters have not been briefed on it is also wrong.[784] The Commission regards the confidentiality of the ongoing government-to-government incentive auction coordination discussions as critical to their ultimate success.[785]

257. The Commission noted in the *NPRM* that "modified domestic rules might be necessary in order to comply with any future agreements with Canada and Mexico regarding use of the 600 MHz Band."[786] In addition to cross-border spectrum sharing arrangements, the Commission sought comment in the *NPRM* on possible changes to FCC rules. While the FCC received comments regarding the arrangements, discussed above, it received none regarding possible rule changes. We have determined that minor changes to section 27.57(b) are required to include the spectrum band to be auctioned and to make the rule applicable to wireless services. Therefore, we adopt these changes and include the revised rule in Appendix A.

C. Unlicensed Operations

258. Below, we address the operation of unlicensed devices in the reorganized UHF band. We will allow TVWS devices to operate on any unused television channels following the incentive auction. We also intend to designate, after additional notice and opportunity for public input, one unused channel in the remaining television band in each area for shared use by wireless microphones and TVWS devices. In addition to access to these unused channels in the television bands, we designate the 600 MHz Band guard bands for unlicensed use nationwide and will allow unlicensed use of channel 37 in locations that are not being used for the RAS or WMTS. Such use will be subject to the completion of a rulemaking proceeding that we will initiate after the release of this Order to consider changes to our existing Part 15 rules to further facilitate the use of TVWS devices in the remaining television spectrum and flexible unlicensed use in the 600 MHz Band guard bands and on channel 37 (600 MHz and TVWS Part 15 Proceeding). In order to provide certainty to all potential bidders, and to participants in the unlicensed device ecosystem, we intend to conclude that rulemaking prior to the incentive auction.

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[782] NAB also fails to acknowledge that the FCC still has considerable time to continue to coordinate with Canada and Mexico, with the auction targeted for mid-2015 and, thereafter, a phased transition of spectrum from broadcast to wireless operations, which will occur in the U.S. over a period lasting up to 39 months after the broadcast station repacking becomes effective.

[783] May 8, 2014 NAB International Filing at 9.

[784] May 8 NAB, 2014 International Filing, Declaration of Bruce Franca at 6, para. 17

[785] We note, however, that the many meetings and discussions outlined above have addressed, among a number of key factors, non-operational allotments. *See* Letter from Rick Kaplan, NAB to Gary Epstein, Mindel De La Torre, Ruth Milkman, and William Lake, FCC, GN Docket No. 12-268 at 2 (filed March 7, 2013) (urging the FCC to "identify the number of non-operational allotments [with no operating broadcast station] that are currently being protected by Canada, Mexico and the U.S . . . [and p]ropose to Canada and Mexico using these non-operational allotments to find new channels . . . to accommodate repacked U.S. stations in the border areas").

[786] *NPRM*, 27 FCC Rcd at 12426-27, para. 197. Section 27.57(b) of the Commission's rules states that operation in the 698-763MHz, 775-793, and 805-806 MHz bands is subject to international agreements with Mexico and Canada, and that, consistent with such agreements, licenses must not cause interference to, and must accept harmful interference from, television broadcast operations in Mexico and Canada. 47 C.F.R. § 27.57(b).

1. Background

259. The Commission's Part 15 rules provide for operation of low power radio transmitters on an unlicensed basis in many different spectrum bands.[787] These unlicensed radio transmitting devices (unlicensed devices) are an important part of this nation's communications capabilities, serving to augment the operations of licensed services and to meet the needs of a wide range of wireless applications. Unlicensed devices operate on a non-interference basis within bands allocated for authorized services or designated for Industrial, Scientific and Medical ("ISM") devices. The Part 15 rules specify the minimal technical requirements necessary to prevent harmful interference to authorized services. This approach has provided manufacturers and developers with the flexibility to devise a wide variety of innovative standards and devices, like WiFi and Bluetooth, which are thriving in bands that were formerly considered to be lacking significant commercial value.

260. Today in the television bands, the Part 15 rules allow the operation of two general categories of unlicensed devices, fixed and personal/portable ("TV White Space devices" or "TVWS devices").[788] Fixed devices may operate at power levels up to four watts equivalent isotropically radiated power ("EIRP") and incorporate a geo-location capability and a means to access a database that provides a list of available television channels at their location.[789] They also must contact a database to obtain a channel list before operating and re-check the database at least once daily.[790] Personal/portable devices may operate at power levels up to 100 milliwatts EIRP and must contact a database to obtain a list of available channels or operate under the control of another white space device that obtains a list of available channels from a database.[791] Fixed TVWS devices may operate on channels 2-51 (except channels 3, 4 and 37), while personal/portable devices may operate on channels 21-51 (except channel 37).[792]

261. In the *NPRM*, the Commission sought comment on how best to preserve and expand unlicensed use of the television bands and repurposed UHF spectrum, including making some spectrum available for unlicensed operations on a nationwide basis.[793] The Commission proposed to continue to allow the operation of TVWS devices in the remaining broadcast television spectrum on unused television channels, under the same rules they use for access currently.[794] The Commission also sought comment on

[787] 47 C.F.R. part 15. Under Part 15, unlicensed devices are allowed to operate on frequencies allocated to other services on the basis that unlicensed devices do not cause harmful interference and have no rights to protection from interference. *Id.* § 15.5(b). The rules allow unlicensed operation across most frequency ranges, but specify radiated field strength and/or conducted power limits, as appropriate, at low levels in order to minimize the potential for harmful interference.

[788] *See Unlicensed Operation in the TV Broadcast Bands,* ET Docket No. 04-186, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd 16807 (2008) (*Unlicensed Operation Second R&O* or *2008 White Spaces Order*). *See also* 47 C.F.R. §§ 15.703(c) and 15.703(i).

[789] *See* 47 C.F.R. §§ 15.711(b)(1) and 15.711(b)(3)(i). As an alternative to incorporating a geo-location capability, fixed devices may have their geographic coordinates determined and programmed by a professional installer.

[790] *See id.* § 15.711(b)(3)(i).

[791] *See id.* §§ 15.711(b)(3)(ii) and 15.711(b)(3)(iv)(A).

[792] *See id.* §§ 15.703(i), 15.703(k) and 15.703(m). As of this date, the Commission has approved nine fixed TVWS devices but no personal/portable devices.

[793] *NPRM,* 27 FCC Rcd at 12437, para. 227.

[794] *Id.* at 12439, para. 233. The Spectrum Act provides that nothing in § 6403(b) "shall be construed to . . . prevent the implementation" of the Commission's *2008 White Spaces Order* "in the spectrum that remains allocated for broadcast television use after the reorganization required by" § 6403(b). Spectrum Act § 6403(i)(2). *See Unlicensed Operation Second R&O*, 23 FCC Rcd 16807.

whether it should permit unlicensed operations on the two unused channels in the television bands near channel 37 (if available) that currently are designated exclusively for wireless microphones.[795]

262. In addition, the Commission proposed to make 600 MHz Band guard band spectrum available for unlicensed device use on a non-interference basis.[796] The Commission sought comment on whether the existing power and emission limits for TVWS devices in the television bands are appropriate for unlicensed operations in the 600 MHz Band guard band spectrum to protect licensed operations in adjacent bands, whether the same database process should be used to make such spectrum available for use by unlicensed devices operating in the guard bands, and whether changes would be required to accommodate different amounts of guard band spectrum.[797] The Commission also sought comment on making some portion of the duplex gap available for unlicensed operations.[798]

263. The Commission further proposed to make channel 37 available for unlicensed use, while protecting WMTS and the RAS that operate on this channel.[799] It sought comment on appropriate interference protection criteria for WMTS and the RAS. The Commission noted that its rules require that locations of WMTS operations be registered with the American Society for Healthcare Engineering ("ASHE"), and that there are relatively few radio astronomy operations, all of which operate at specified locations. It therefore believed that protection of these services would be feasible by identifying appropriate protection areas in the TV bands databases.[800]

2. Discussion

264. We are taking a number of actions to make available a significant amount of spectrum for unlicensed use in the post-auction television bands, the 600 MHz Band guard bands, and on channel 37, some of it on a nationwide basis.[801] In total, we will make between 20 and 34 megahertz of spectrum newly available for unlicensed use, including for use by unlicensed broadband devices. This new spectrum for unlicensed use will be in addition to the TV white space channels that will exist after the incentive auction. These actions will help to create certainty for the unlicensed industry, thereby promoting greater innovation in new devices and services, including increased access for broadband services across the country.[802]

265. First, we anticipate that there will be at least one channel not assigned to a television station in all areas of the United States at the end of the repacking process,[803] and we intend, after notice and an opportunity for public input, to designate one such channel in each area for shared use by TVWS devices and wireless microphones. We will also permit TVWS devices to operate on all other available

[795] *NPRM,* 27 FCC Rcd at 12440-12441, para. 238.

[796] *Id.* at 12440, paras. 234-236.

[797] *Id.* at 12440, paras. 235-36.

[798] *Id.* at 12421, para. 178.

[799] *Id.* at 12440, para. 237.

[800] *Id.*

[801] In the discussion below, we use the general term "unlicensed operation" with respect to operations in the guard bands and on channel 37, and the specific term "TVWS device" with respect to operations in the television broadcast bands.

[802] *See Id.* at 12238, para. 232, 12440, para.234. We note that this spectrum for unlicensed use is in addition to spectrum that is available nationwide in a number of other bands, including the 915 MHz, 2.4 GHz, 5 GHz and 5.8 GHz bands. *See* 47 C.F.R. § 15.247 (rules for the 915, 2.4 GHz and 5.8 GHz bands) and subpart E of Part 15 (rules for the 5 GHz band).

[803] For engineering reasons, there may be a few areas with no spectrum available in the television bands for unlicensed devices and wireless microphones to share.

channels in those portions of the UHF band that remain allocated and assigned only to broadcast services.[804] We expect that there will still be a substantial amount of spectrum available for use by these devices in the post-auction television bands, particularly in areas outside of the central urban areas of the largest DMAs.

266. Second, we will permit unlicensed devices to operate in the 600 MHz Band guard bands, as specifically contemplated by section 6407(c) of the Spectrum Act, which will make spectrum available for unlicensed devices nationwide. Under the band plan we adopt in this Order, between 14 and 28 megahertz of spectrum in the 600 MHz Band guard bands will be available for unlicensed use nationwide, depending on the amount of spectrum recovered in the auction, including in major markets where today and post-auction few if any vacant television channels may be available.

267. Third, we will permit unlicensed operations on channel 37 at locations where it is not in use by incumbents, subject to the development of the appropriate technical parameters to protect incumbents from harmful interference.

268. Finally, we will initiate a rulemaking proceeding to establish Part 15 technical rules that implement our decisions here, and to revisit our TVWS rules.[805] We will allow TVWS devices to continue to operate in those portions of the UHF band that will be repurposed for the 600 MHz Band until a 600 MHz Band licensee commences operations.[806]

a. Television Bands

269. We anticipate that there will be at least one channel in the UHF band in all areas that is not assigned to a television station in the repacking process. As is the case today, these white space channels will be necessary to avoid interference between primary broadcast stations in the final channel assignment process. Although we also anticipate that there will be fewer unused television channels in the repacked television bands,[807] we believe that at least one of them should be available for shared use by wireless microphones and unlicensed devices. We therefore intend, after additional notice and an opportunity for comment, to designate one television channel in each area for such shared use.[808] We also agree with those commenters who argue that television channels that remain unused by broadcast television stations after the incentive auction should not be designated exclusively for wireless

[804] As discussed in § III.E (Allocations), we are allocating the 600 MHz Band for co- primary broadcasting, fixed, and mobile services. After the incentive auction, full power and Class A stations will be relocated out of portions of the 600 MHz Band that will be used for new fixed and mobile services; however, some low power and TV translator stations may continue operating for some period of time in spectrum that will be assigned to new wireless broadband services or designated for unlicensed guard band use. *See* § V.D.3 (Transition Procedures for TVWS and Unlicensed Device Operations). Ultimately, unlicensed TVWS devices will not be permitted to operate in geographic locations where spectrum is assigned to new wireless broadband services.

[805] Our rules generally condition operation of unlicensed devices on the requirement that they not cause harmful interference to authorized services. *See* 47 C.F.R. § 15.5(b). The Spectrum Act likewise conditions unlicensed use of guard band spectrum on not causing harmful interference to licensed services. Spectrum Act § 6407(e).

[806] *See* § V.D.3 (Transition Procedures for TVWS and Unlicensed Device Operations).

[807] Currently, TVWS devices are prohibited from operating on the first unused channel above channel 37 and the first unused channel below channel 37. *See* 47 C.F.R. § 15.707(a). Depending on the amount of spectrum recovered in the incentive auction, there may be no television channels remaining above channel 37 in some or all parts of the country. Thus, in some areas, particularly urban areas in certain DMAs, the two unused television channels previously designated (where available) exclusively for wireless microphone use may no longer be available.

[808] *See* Letter from Austin Schlick, Director, Communications Law, Google Inc., to Gary Epstein, Chair of the Incentive Auction Task Force, Federal Communications Commission, GN Docket No. 12-268 (filed Apr. 21, 2014) (asking that the FCC preserve up to two vacant channels in each television market that are now being used by wireless microphones and open such channels to use by unlicensed TVWS devices following the incentive auction).

microphones, and instead should also be made available for potential use by unlicensed TVWS devices.[809] Accordingly, in addition to the channel designated for shared use by wireless microphones and unlicensed devices as described above, we will make any other television channels unused by broadcast television stations after the incentive auction available for TVWS device use (to the extent consistent with the applicable technical rules) as well as wireless microphone use except at those specified times and locations where wireless microphone users have registered their operations for interference protection in the TV bands databases.[810] In taking this approach, we seek to strike a balance between the interests of all users of the television bands, including secondary broadcast stations as well as TVWS devices and wireless microphones, for access to the UHF TV spectrum.

b. Guard Bands

270. The 600 MHz Band Plan includes guard bands to prevent harmful interference between licensed services outside the guard bands. Under the Spectrum Act, these bands may be no larger than technically reasonable to prevent harmful interference to licensed services.[811] Consistent with the Spectrum Act, the 600 MHz Band Plan we adopt provides for a guard band between television spectrum and 600 MHz downlinks, a guard band between 600 MHz uplinks and downlinks (a duplex gap), and guard bands between 600 MHz downlinks and channel 37, to protect licensed services from harmful interference.[812] We will not know until the conclusion of the incentive auction which specific 600 MHz Band Plan scenario we will employ, including the specific sizes of the guard bands. Depending on the amount of spectrum recovered in the auction, guard band spectrum will total at least 14 megahertz, and as much as 28 megahertz.[813] As an example, if we clear 84 megahertz of spectrum, there will be a three megahertz guard band between channel 37 and the 600 MHz Band downlink band, and an 11 megahertz duplex gap between 600 MHz Band uplink and downlink bands (a total of 14 megahertz).[814] If we clear 126 megahertz of spectrum, there will be two three megahertz guard bands adjacent to channel 37, an 11 megahertz duplex gap, and a nine megahertz guard band between the 600 MHz Band downlink band and television licensees (a total of 26 megahertz).

271. Permitting unlicensed operations in the 600 MHz Band guard bands will make additional spectrum available for unlicensed devices nationwide. The record provides significant support for this action.[815] Unlicensed devices complement licensed services and serve a wide range of consumer needs.

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[809] *See, e.g.*, Broadcom, CSR, and Marvell Comments at 1; IEEE 802 Comments at 3-4; Google and Microsoft Comments at 51; Motorola Comments at 14-15, 51; Neul Comments at 6-7; PISC Comments at 41; WSA Comments at 34; WISPA Comments at 17-19; Google Reply at 11-13; IEEE Reply at 2-4; PISC Reply at 16-19; Wi-Fi Alliance Reply at 2. *See also* para. 309.

[810] *See* § III.D.3 (LPAS and Unlicensed Wireless Microphones). As discussed in § V.D.4 (Transition Procedures for LPAS and Unlicensed Wireless Microphones), however, we will continue to prohibit TVWS devices from operating on the two channels currently designated for wireless microphones until the Commission's rules to improve the TV bands databases to provide for more immediate protection of registered wireless microphone operations becomes effective. Licensed wireless microphone users may register their operating information in the TV bands databases at any time. *See* 47 C.F.R. § 15.713(h)(8). Entities operating large numbers of wireless microphones on an unlicensed basis must comply with channel use requirements and must obtain Commission approval before they can register in the TV bands databases. *See* 47 C.F.R. § 15.713(h)(9).

[811] Spectrum Act § 6407(b). This issue is discussed in detail in § III.A.2.e (Guard Bands).

[812] *See* § III.A.2.e (Guard Bands).

[813] The smallest amount of guard band spectrum (14 megahertz) results if 84 megahertz of spectrum is repurposed, while the largest amount of guard band spectrum (28 megahertz) results if 108 megahertz or 138 megahertz of spectrum is repurposed.

[814] Under this scenario, channel 37 functions as a guard band between 600 MHz downlink and television spectrum.

[815] *See, e.g.*, Google/Microsoft Comments at 32; Motorola Mobility Comments at 14; WGAW Comments at 8. *See also* Spectrum Act § 6407(c). Section 6407(c) was a compromise intended by the conferees to "create a nationwide (continued….)

They contribute tens of billions of dollars to our economy annually, not only through the sales of unlicensed products themselves, but also through collateral commercial activities that they facilitate. Making spectrum available for unlicensed devices will result in economic and consumer benefits, including greater broadband innovation and increased access for broadband services.[816] Additionally, unlicensed spectrum poses low barriers to entry, allowing any party to operate unlicensed devices or provide wireless broadband services.[817] Finally, spectrum in the 600 MHz frequency range has excellent propagation characteristics that allow signals to reach farther and penetrate walls and other structures, thus making it well suited for a variety of unlicensed applications.[818] Commenters have suggested that an 11 megahertz guard band, which we are adopting for the duplex gap (and the lower guard band under at least one clearing scenario), would be usable for broadband unlicensed devices.[819]

272. Qualcomm claims that allowing unlicensed operation in the guard bands or duplex gap at the levels permitted under the TVWS rules (*e.g.*, power limits, antenna height) would cause harmful interference to licensed mobile LTE operations.[820] Qualcomm's analyses purport to demonstrate that unlicensed and wireless operations would have to be separated by as much as 8.5 megahertz to avoid harmful interference.[821] Broadcom, on the other hand, argues that the assumptions in Qualcomm's analyses are unrealistic and that low power unlicensed devices can operate without causing harmful interference to wireless LTE operations.[822] We note that there are significant differences in the assumptions underlying the Qualcomm and Broadcom analyses relative to factors such as the assumed characteristics of the filters in the wireless broadband devices, propagation loss, and body loss. In addition, the current rules for white space devices provide for different power levels under different conditions and certain of Qualcomm's analyses assumed that devices might operate in this spectrum at the highest permissible power level of 4 Watts effective isotropic power level. We disagree with TIA that all operation in the 600 MHz Band guard bands should be licensed to reduce the potential for harmful interference.[823] We note that licensed wireless service providers do not oppose unlicensed use of the guard band spectrum provided that unlicensed devices do not interfere with and accept interference from licensed wireless broadband operations.[824]

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band of spectrum that can be used for innovative unlicensed applications." 158 Cong. Rec. H915 (daily ed. Feb. 17, 2012) (remarks of Rep. Waxman).

[816] Motorola Mobility Comments at 15-16.

[817] Google/Microsoft Comments at 3.

[818] *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04-186 and 02-380, Second Memorandum Opinion and Order, 25 FCC Rcd at 18662, para. 1 (2010).

[819] Broadcom Apr. 23, 2014 *Ex Parte* Letter at 2 (Wi-Fi devices can transmit at 40 milliwatts with a four megahertz gap from LTE downlinks without causing harmful interference to licensed operations); WISPA/CompTIA/CCIA/Free Press/Google/Public Knowledge/Microsoft/Broadcom Apr. 22, 2014 *Ex Parte* Letter at 1; PISC/NAF/Public Knowledge/Free Press Apr. 21, 2014 *Ex Parte* Letter at 2.

[820] *See* Qualcomm *Ex Parte* at 1 (filed May 8, 2014) (interference analyses for both fixed and personal portable TVWS devices rely on various assumptions, such as the appropriate propagation model, signal path losses, receiver filter characteristics and other technical characteristics). *See also* Qualcomm *Ex Parte* (filed April 3, 2014); Qualcomm *Ex Parte* (filed Feb. 19, 2014).

[821] *Id*. at 19.

[822] *See* Broadcom *Ex Parte* at 4 (filed April 23, 2014).

[823] TIA Comments at 10-13.

[824] AT&T Reply at 35-36 (not opposing unlicensed use of the guard band spectrum provided that it does not interfere with licensed wireless broadband operations and accepts interference from such operations); CTIA Reply at 25-26 (same); Verizon Reply at 8-9 (same).

273. While our Part 15 rules for unlicensed use provide an appropriate and reliable framework for permitting low power uses on an unlicensed basis,[825] a further record is necessary to establish the technical standards to govern such use. The appropriate assumptions for the technical analyses will be considered in the forthcoming 600 MHz and TVWS Part 15 proceeding.[826] Consistent with the Spectrum Act,[827] unlicensed use of the guard bands will be subject to the Commission's ultimate determination that such use will not cause harmful interference to licensed services. At this juncture, we are confident that unlicensed devices can operate in the duplex gap under existing TVWS rules without causing such interference. We note, for example, that unlicensed devices are permitted to operate throughout the entire 10 megahertz duplex gap at 1920 – 1930 MHz for the personal communications service.[828] We tentatively conclude that devices operating at a level of 40 mW and having a bandwidth of six megahertz will be viable in this spectrum. We intend to adopt technical rules governing unlicensed use of the 600 MHz Band guard bands in the 600 MHz and TVWS Part 15 Proceeding prior to the incentive auction to address concerns about the potential impact on auction bids.[829]

c. Channel 37

274. We also will permit unlicensed operations in channel 37, subject to the development of the appropriate technical parameters for such operations as part of our 600 MHz and TVWS Part 15 Proceeding in order to protect the WMTS and RAS from harmful interference. Unlicensed operations on channel 37 will be authorized in locations that are sufficiently removed from WMTS users and RAS sites to protect those incumbent users from harmful interference.

275. We recognize the importance of WMTS to patient care,[830] and will remain mindful of this critical function when developing these technical parameters. We also recognize the concerns of WMTS equipment manufacturers and users about the potential for unlicensed operations on channel 37 to cause harmful interference to the WMTS. Parties disagree on the appropriate interference analysis methodology (e.g., I/N ratio and signal attenuation factors) as well as the ability of the TV bands databases to provide adequate protection to the WMTS.[831] We will consider these issues as part of our 600 MHz and TVWS Part 15 Proceeding, with the objective of developing reliable technical requirements that will permit unlicensed operations, while protecting the WMTS and RAS from harmful interference.[832]

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[825] We interpret section 6407(c) of the Spectrum Act as consistent with that view. Section 6407(c) grants the Commission the discretion to permit "the use" of the 600 MHz Band guard bands "for unlicensed use."

[826] Spectrum Act § 6407(e).

[827] *See id*.

[828] For example, the Broadband Personal Communications Services (PCS) uplink and downlink bands are separated by a ten megahertz duplex gap that is used by Unlicensed PCS devices, primarily cordless telephones. *See* 47 C.F.R. Part 15, subpart D (Unlicensed Personal Communications Service Devices).

[829] *See* Sony Comments at 6; Qualcomm Comments at 23; TIA Comments at 11.

[830] *See* para. 281.

[831] GEHC Comments at 32-34, Reply at 4; Philips Healthcare Comments at 4; WMTS Coalition Reply at 12-13. Broadcom disputes certain aspects of GEHC's interference analysis and argues that GEHC understates the sharing opportunities between the WMTS and unlicensed devices. Letter from Jennifer K. Bush, Associate General Counsel, Broadcom Corp., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2-3 (filed Jan. 17, 2014) (Broadcom Jan. 17, 2014 *Ex Parte* Letter).

[832] We intend to address in the future proceeding whether the concerns that WMTS location information in the ASHE database may be imprecise or missing can be addressed by establishing conservative separation distances from unlicensed devices and by reminding hospitals and other medical facilities of their obligation under the rules to register and maintain current information in the database and notify the database administrator when any information changes. *See* 47 C.F.R. § 95.1111(a) and (b). We also note that WMTS use at a medical campus such as a hospital complex could be protected in the TV bands databases using a capability similar to the databases'

(continued….)

276. Subject to the adoption of appropriate technical rules, authorizing the use of channel 37 for unlicensed operations will make additional spectrum available for unlicensed devices on a nationwide basis, thereby advancing our goal of promoting innovation in new unlicensed devices. This will make an additional six megahertz of spectrum available for unlicensed devices in areas of the country that are not in close proximity to hospitals or other medical facilities that use WMTS equipment, or to RAS sites. It is appropriate to revisit the Commission's previous decision to prohibit unlicensed operation on channel 37.[833] The repurposing of spectrum for wireless services will reduce the number of channels available for TVWS use, and channel 37 could provide additional spectrum for such use in those areas where it is not used for the WMTS and RAS. Channel 37 spectrum could be combined with guard bands on one or both sides of channel 37, if the amount of recovered spectrum requires the use of such guard bands, to provide a larger band for unlicensed use.[834] Also, since the time the Commission made its decision to prohibit unlicensed use of channel 37, we have designated multiple TV bands database administrators, have had extensive experience working with their databases, and have a high degree of confidence that they can reliably protect fixed operations. The fixed locations where the WMTS is used are already registered in the ASHE database, and these data could be added to the TV bands databases. WMTS operations could then be protected by establishing minimum distance separations as is done to protect other fixed operations, such as TV stations, wireless microphones and receive sites. The TV bands databases should be capable of handling the large number of registered WMTS sites easily, and these data can be updated on a frequent basis to ensure that new and changed WMTS registrations are quickly reflected in the TV bands databases.

277. As noted above, the Commission has extensive experience permitting unlicensed device operation, while protecting authorized incumbent services from harmful interference. In particular, we anticipate that we can provide reliable protection of the WMTS through the use of a database system like the TV bands databases.[835] If spectrum adjacent to channel 37 continues to be allocated for and used by broadcast television services, this approach would also benefit TVWS equipment manufacturers and users by allowing us to consider modification of the out-of-band emission limits on channels 36 through 38 that were designed to protect the WMTS.[836] TVWS equipment manufacturers have had to avoid operation

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current feature that restricts channel availability at the minimum distance from the boundary of an area (as defined by four geographic points) in which low power auxiliary devices (wireless microphones) are used.

[833] *See Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04-186 and 02-380, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd at 16186, para. 155 (2008).

[834] Depending on the amount of spectrum recovered, a single guard band may be required above channel 37, or guard bands may be required above and below channel 37.

[835] For example, the database would contain the locations of WMTS installations that require protection, and unlicensed device operators could access the database to determine whether channel 37 is available for their use at a given location. The database would protect the WMTS by prohibiting operation of unlicensed devices on channel 37 within a specific distance that would be determined in a further rulemaking proceeding. Because WMTS installations are registered in a private database supported by ASHE, the designated WMTS coordinator, *see* 47 C.F.R. § 95.1111(a), we will need to explore the issues regarding importing information from the current ASHE database for use with the TV bands databases and whether any additional information needs to be collected.

[836] *See* 47 C.F.R. § 15.709(c)(4). These limits were established based on the assumption that TVWS devices could be used in close proximity with WMTS equipment operating on adjacent channels. They are significantly tighter than the adjacent channel emission limits that apply on other channels and are difficult for manufacturers to meet. Compliance with these limits can preclude white space operation on channels 35 and 39 due to the sharp filtering required to meet the limit on channel 37. However, if the locations of WMTS operations are placed in a database, we can protect these operations by ensuring that adjacent channel TVWS devices are at least a specified minimum distance from their locations. This would eliminate the need for special, tighter emission limits to protect the WMTS since the required minimum separation distance between white space devices and adjacent channel WMTS equipment would offset higher out-of-band emission limits.

on channels 35 and 39 to comply with the limits. However, if we modify these emission limits as part of the 600 MHz and TVWS Part 15 Proceeding, TVWS devices may be able to operate on these channels.

278. With regard to the RAS, there are a limited number of sites to protect, and their locations could be included in a database in the same manner as the sites of other protected services, such as the Offshore Radiotelephone Service, the Private Land Mobile Radio Service and Commercial Mobile Radio Service ("PLMRS/CMRS"), and certain other receive-only sites.[837] We intend to explore in the 600 MHz and TVWS Part 15 Proceeding whether it would be appropriate to adopt rules to prohibit operation of unlicensed devices within a certain distance from the sites and require unlicensed device operators to access the database to determine whether channel 37 is available for their use at a given location. In addition, we intend to seek comment on whether to adopt any other technical requirements necessary to protect the RAS, such as power and antenna height limits.

D. Other Services

1. Channel 37 Services

279. We decline to relocate WMTS stations or RAS observatories from channel 37. We conclude that we cannot relocate these services in accordance with the provisions of the Spectrum Act. Our 600 MHz Band Plan includes three megahertz guard bands between channel 37 and any adjacent wireless broadband services. We will establish coordination zones around existing RAS facilities so that any such wireless broadband services can be deployed to cover the broadest area possible with minimal impact to RAS observatories.[838]

a. Background

280. Channel 37 (608-614 MHz) is allocated for both RAS and Land Mobile Service (the latter being limited to WMTS).[839] RAS is a receive-only service that uses highly sensitive receivers to examine and study radio waves of cosmic origin. There are twelve RAS telescopes that have been using channel 37 or plan to use channel 37 in the near future.[840] Of these, ten comprise the National Radio Astronomy Observatory's ("NRAO's") Very Long Baseline Array ("VLBA"), which are distributed in several locations in the United States and its territories, and collect simultaneous observations that are combined to emulate a single telescope 5000 miles in diameter.[841] The remaining two telescopes are characterized as single dish instruments.[842] The Commission protects RAS from in-band harmful interference by imposing field strength limits on WMTS and requiring coordination of WMTS use within

[837] *See* 47 C.F.R. § 15.712(d), (e) and (h).

[838] As discussed in § III.C.2.c (Channel 37), we are not making channel 37 available for any new licensed uses, but we will expand unlicensed use by allowing unlicensed devices to operate in channel 37 subject to our determination in a future proceeding that we can impose technical parameters to prevent harmful interference to WMTS and RAS services.

[839] 47 C.F.R. § 2.106.

[840] Letter from Karl B. Nebbia, Associate Administrator to Julius Knapp, Chief, Office of Engineering and Technology, GN Docket No. 12-268, App. A at 2 (filed May 6, 2014) (accompanying National Science Foundation Comments) (hereinafter "NSF Comments").

[841] These stations operate together as a large interferometer. Detailed information on the VLBA is available at: http://www.vlba.nrao.edu/astro/obstatus/current/node5 html. The VLBA telescopes are located in Mauna Kea, Hawaii, Owens Valley, California, Brewster, Washington, Kitt Peak, Arizona, Pie Town, New Mexico, Fort Davis, Texas, Los Alamos, New Mexico, North Liberty, Iowa, Hancock, New Hampshire, St. Croix, Virgin Islands.

[842] Two large radio telescopes operate at Green Bank WV and Arecibo, PR. In addition, we note that the *NPRM* considered thirteen observatories operating in channel 37 by including the Allen Telescope Array in Hat Creek, CA. However, this facility cannot operate below 900 MHz and will therefore not be considered further for protection in this band. NRAO Comments at 2.

certain distances of RAS observatories.[843] In addition, TVWS devices are prohibited from operating on channel 37 and on any other channel within 2.4 kilometers of protected radio observatories.[844]

281. WMTS is used for remote monitoring of patients' vital signs and other important health parameters (e.g., pulse and respiration rates) inside medical facilities. In addition, WMTS includes devices that transport the data via a radio link to a remote location, such as a nurses' station, which is equipped with a specialized radio receiver. WMTS operates licensed stations on three bands, including 608-614 MHz (channel 37) in the UHF band. Health care institutions are required to register their locations and coordinate the use of all three bands through the ASHE, the designated frequency coordinator,[845] prior to commencing operation.[846] This process minimizes the potential of WMTS users from causing interference to, and receiving interference from other WMTS devices.

282. In the *NPRM*, the Commission invited comment on whether to relocate RAS, and if relocated, whether the replacement spectrum should be a subset of the 500-700 MHz range for RAS' continuum observations or in a different band.[847] The *NPRM* also requested comments on the cost of relocating RAS from channel 37 to another channel in the 500-700 MHz range, and whether it would be more desirable to relocate RAS to either channel 32 or the low (channels 2-6) or high (channels 7-13) VHF band.[848] In response to the Commission's request that commenters identify all current and planned RAS observation sites within the United States,[849] the National Science Foundation ("NSF") provided a list of thirteen sites where "radio astronomy observations are conducted, have been conducted or are planned to be conducted."[850] Nickolaus Leggett states that in addition to these listed sites, there are amateur radio astronomy operations within the United States in educational environments such as high schools, junior colleges, colleges, and universities.[851] However, Leggett does not provide any data regarding actual number of facilities, their locations, or specific capabilities.

283. The Commission also sought comment on whether or not to relocate WMTS users from channel 37 to a nearby television channel or to other spectrum, whether such relocation, if necessary, could be accomplished by retuning existing equipment or if new equipment would be required, and what the estimated relocation costs would be.[852] The *NPRM* also requested comments on the timeframe and process for the possible relocation of WMTS, including the appropriate standard for relocation.[853]

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[843] *NPRM*, 27 FCC Rcd at 12428, para. 203 (citing 47 C.F.R. §§ 95.1115(a)(1), 95.1119, 95.1107). 47 C.F.R.§ 95.1119 (WMTS devices are prohibited from operating within 80 kilometers distance from the three single-dish sites and 32 kilometers from the ten VLBA sites. The rule also provides coordination requirements).

[844] *NPRM*, 27 FCC Rcd at 12428, para. 203.

[845] *See Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service*, ET Docket 99-255, Order, 16 FCC Rcd 4543 (2001) (*WMTS R&O*).

[846] *See WMTS R&O* and *Order*, 16 FCC Rcd 4543 (2001).

[847] *NPRM*, 27 FCC Rcd at 12429, para. 206.

[848] *Id.* at para. 207.

[849] *Id.* at 12428-29, para. 204.

[850] NSF Comments at 2. Both CORF and NRAO commented that observations are made on channel 37 spectrum at the ten VLBA sites and Green Bank, but neither stated that such observations are made at Arecibo. *See* CORF Comments at 5-6; *see also* NRAO Comments at 1. NRAO further notes that other sites, such as Arecibo, have observed on channel 37 in the past and are capable of doing so in the future; and that the Allen Telescope is not capable of performing below 900 MHz. NRAO Comments at 2.

[851] Leggett Comments at 3.

[852] *NPRM*, 27 FCC Rcd at 12431, paras. 211–12.

[853] *Id.* at para. 213.

b. Discussion

(i) Statutory Limit on Relocation Costs

284. We conclude that the Spectrum Act limits our authority to relocate incumbent RAS and WMTS users from channel 37 because the total costs of relocating all such users would exceed $300 million. The Spectrum Act directs the FCC to "evaluate the broadcast television spectrum" and to "make such reassignments of television channels as the Commission considers appropriate."[854] The Spectrum Act also provides the Commission with authority to "implement and enforce" this provision of that Act "as if . . . a part of the Communications Act."[855] However, section 6403(b)(4) of the Spectrum Act, which is entitled "[p]ayment of relocation costs," restricts that discretion in certain respects. Section 6403(b)(4)(A)(iii) requires the Commission to reimburse, from the TV Broadcaster Relocation Fund,[856] the costs reasonably incurred by "a channel 37 incumbent user, in order to relocate to other suitable spectrum," provided that "all such users can be relocated," and that "the total relocation costs of such users do not exceed $300,000,000."[857] We interpret "such users" to refer to all channel 37 users; that is, all RAS and WMTS incumbents.[858] We thus conclude that section 6403(b)(4) prohibits the Commission from relocating any channel 37 incumbent user, unless the Commission can move all of the channel 37 incumbents (i.e., all of the RAS and WMTS incumbents) to suitable spectrum for $300 million or less.

285. Examination of the record reflects that the cost of relocating all of the RAS and WMTS incumbents from channel 37 would far exceed $300 million. NSF estimates that relocation costs for RAS would likely not exceed $1 million per site to design, build, and implement new receivers and feed horns[859] or no more than $13 million total.[860] However, commenters, including potential wireless service providers and WMTS equipment manufacturers, agree that the relocation of all WMTS operations on channel 37 would be well in excess of $300 million.[861]

286. WMTS infrastructure is expensive, complex and integrated into the physical building of a medical facility.[862] Since 2000, when channel 37 was allocated for land mobile use and limited to the WMTS, the healthcare industry has invested heavily in developing and deploying WMTS systems in that band.[863] Most WMTS devices manufactured since that time have been designed to operate only on channel 37 to take advantage of specific filter designs that mitigate against potential adjacent channel

[854] Spectrum Act § 6403(b)(1)(A). We note that, although "reserved exclusively" for RAS and WMTS, channel 37 is one of the "television channels" identified in the Commission's rules. 47 C.F.R. § 73.603(a), (c). We also note that the Spectrum Act provides the Commission with authority to "implement and enforce" its provisions, including § 6403(b)(1)(A), as if they were part of the Communications Act. Spectrum Act § 6003(a).

[855] Spectrum Act § 6003(a).

[856] *See id.* § 6403(d).

[857] *Id.* § 6403(b)(4)(A)(iii).

[858] *Id.*

[859] A feed horn is a satellite dish component that distributes the signal from the dish to the receiver.

[860] NSF Comments at 8-9. NSF states that estimated relocation costs would likely not exceed this amount regardless of whether sites were required to move in-band within the UHF TV spectrum or to a completely new band such as the VHF-TV spectrum.

[861] *See* AT&T Comments at 39, GEHC Reply at 4, WMTS Coalition Comments at 16, Letter from Lawrence J. Movshin, Counsel, WMTS Coalition, to Marlene H. Dotch, Secretary, FCC, GN Docket No. 12-268 (filed Jan. 15, 2014) (WMTS Coalition Jan. 15, 2014 *Ex Parte*)..

[862] GEHC Comments at 7.

[863] *Id.* at 6.

interference from UHF digital TV stations.[864] As of January 13, 2014, there were more than 121,000 registered WMTS devices in use at more than 2,300 locations.[865]

287. Furthermore, most WMTS devices that operate on channel 37 are designed to operate only within that spectrum and cannot simply be retuned. Thus, relocation to different spectrum would require redesign and replacement of the equipment.[866] The record reflects that the replacement costs of WMTS devices, on average, are between $6,000 and $10,000 each.[867] The WMTS Coalition states that a conservative estimate of relocation costs, without factoring in additional costs such as for engineering and installation, would be almost $2 billion.[868] The consensus among commenters is that WMTS operations would be too costly to relocate: no commenter has provided any estimate that places costs within the $300,000,000 statutory limit.[869] Considering the number of registered devices and the average cost estimates provided for equipment replacement alone, the cost of WMTS relocation could easily approach one billion dollars or more.[870] We therefore conclude that WMTS cannot be relocated within the constraints specified in the statute. Because the statute requires that both RAS and WMTS be relocated from channel 37, and because the estimated costs of relocating WMTS far exceeds the statutory limit, we conclude that none of the channel 37 incumbents will be relocated and both WMTS and RAS will continue to operate on channel 37 following the incentive auction.

(ii) Interference Protections for Incumbent Services

288. The introduction of wireless broadband operations on adjacent channels could be problematic for RAS and WMTS on channel 37 unless appropriate mitigation measures are taken.[871] Both GEHC and Philips Healthcare, two of the largest manufacturers of WMTS devices, argue that more stringent OOBE limits on new commercial wireless systems are necessary to ensure safe operation of

[864] WMTS Coalition Comments at 14.

[865] WMTS Coalition Jan. 15, 2014 *Ex Parte*.

[866] *See* GEHC Reply at 8-9. Replacement includes devices, antenna, cabling, and access points. *See also* Philips Comments at 2.

[867] *See* GEHC Reply at 8-9. The cost of a specific deployment would be based on the size and layout of the health care institution, the amount of infrastructure needed (*e.g.*, antennas, cabling, etc.), as well as monitoring stations. Our understanding is that the estimated cost is an average per device for the entire system; *see also* Letter from Dale Woodin, Executive Director, ASHE to Ira Keltz, Office of Engineering and Technology (May 20, 2013). (ASHE estimates that WMTS devices cost in the range of $5,000 - $10,000 on a system-wide basis resulting in an estimated investment in this band in the range of $0.7-$1.4 billion); *see also* WMTS Coalition Jan. 15, 2014 *Ex Parte*, Att. at 6 (claiming that there are a significant number of devices that have not been registered and estimating costs for a replacement system to average almost $9,500 per transmitter, the WMTS Coalition claims that the total replacement cost could exceed $2 billion for an estimated 212,000 installed transmitters).

[868] GEHC Comments at 8. GEHC estimates the WMTS investment in channel 37 operations at between $0.7 and $1.2 billion, exclusive of installation, testing, and training costs and increases in operating and maintenance expenses that would be associated with the replacement of current equipment. GEHC states that this estimate does not include administrative, engineering, or installation costs which would cause the total cost of relocation to increase above this amount.

[869] WMTS Coalition Comments at 13. *Accord* AT&T Comments at 39 (stating that it is "AT&T's current understanding is that it would likely be cost prohibitive to relocate wireless medical telemetry devices from Channel 37").

[870] Taking into account that there are a number of devices not registered, as well as additional labor and transactional costs associated with relocation, it is more likely that costs would exceed one billion dollars.

[871] *See, e.g.*, CTIA Reply at 31-32; *see also* NAS-CORF Comments at 6 (WMTS and RAS "both need strong protection from interference "); *see also* NRAO Comments at 6 ("conditions will change drastically after the UHF rebanding plan is implemented as adjacent spectrum is repurposed and/or re-packed").

WMTS devices.[872] In addition, the WMTS Coalition argues that a guard band between wireless systems and channel 37 is needed to protect WMTS from adjacent channel interference.[873] As the NRAO notes "the worst possible outcome . . . would be to create or preserve an allocation to RAS that is rendered unusable by RAS because it is not adequately supported."[874]

289. To address these concerns, we adopt certain interference protection measures. Under the 600 MHz Band Plan we adopt,[875] operations adjacent to channel 37 will remain as television or be limited to wireless downlink, or both, depending on the incentive auction outcome. Limiting new wireless operations to downlink adjacent to channel 37 eliminates the possibility of mobile devices, which can operate anywhere, transmitting on nearby frequencies in close proximity to RAS and WMTS installations. This in turn reduces the potential of interference from mobile devices to the incumbent services.

290. The 600 MHz Band Plan also incorporates guard bands to prevent harmful interference between 600 MHz broadband wireless service and the licensed services on channel 37.[876] Our decision to incorporate guard bands into the 600 MHz Band Plan is discussed in detail above.[877] The three megahertz guard band in our Band Plan between WMTS on channel 37 and 600 MHz operations is supported by examination of the record. Wireless broadband base stations operate at higher power than mobile devices and pose a harmful interference risk if operated adjacent to channel 37 in locations near WMTS sites.[878] A three megahertz guard band on either side of channel 37 is technically reasonable to provide protection from OOBE and overload interference to WMTS from adjacent wireless broadband services.[879] This guard band will ensure that OOBE from nearby wireless base stations do not significantly raise the noise floor in channel 37, which otherwise could impact a receiver's ability to reliably detect and demodulate desired signals. In addition, this guard band will prevent harmful interference caused by overload in the adjacent channels. Such interference could force active components in WMTS receivers into compression resulting in desensitization. The analysis in the attached Technical Appendix corroborates our conclusion.[880]

291. If the auction clears less than 84 megahertz of spectrum, the spectral environment around channel 37 will remain the same, with channels 36 and 38 available for television operations. Consistent with current rules, which do not provide any specific protections for channel 37 incumbents beyond the DTV OOBE limits, we will not implement guard bands between channel 37 and adjacent television

[872] Philips Healthcare Comments at 5; GEHC Comments at 24.

[873] WMTS Coalition Jan. 15, 2014 *Ex Parte*.

[874] NRAO Comments at 6.

[875] *See* § III.A.2 (600 MHz Band Plan).

[876] If 84 megahertz is repurposed, adjacent wireless broadband services will be placed above channel 37, requiring only a single guard band between channel 37 and the wireless broadband services. If the auction clears more than 84 megahertz, two guard bands will be necessary, one above and one below channel 37.

[877] *See* § III.A.2.e (Guard Bands).

[878] *See generally* GEHC Comments at19. *See also* GEHC Reply at 30-31. Philips Healthcare also provided interference threshold numbers that are not as conservative as those provided by GEHC. *See* Philips Healthcare Comments at 5.

[879] In light of this conclusion, our decision to establish three megahertz guard bands satisfies the requirements of § 6407(b) of the Spectrum Act.

[880] *See* Technical Appendix § II.E.2 (Potential for Interference between 600 MHz Downlink and WMTS). This analysis is based on the receive filter characteristics and the protection criteria used in an interference analysis provided by GEHC. GEHC Comments at 46-51. We note that some commenters supported a band plan scenario which provided a four megahertz guard band between WMTS and wireless broadband services. *See* GEHC Reply at 25. However, the support was based on spectrum recovery scenarios that we do not adopt in this Order. Further, no technical information was provided in support of a four megahertz guard band.

operations in that case. The WMTS community argues that an increased number of television stations could be assigned to channels 36 and 38 in the repacking process,[881] and that WMTS operations located near a DTV transmitting antenna will experience a reduction in useable spectrum of more than 20 percent, effectively reducing system capacity for WMTS operations.[882] The need to relocate stations to channels 36 or 38 will depend on the results of the auction. If stations are relocated to these channels, the extent of any potential interference to WMTS will depend in large part on the locations of the stations. Under certain scenarios channels 36 or 38 would not be used at all for television service. Some stations currently operating on channels 36 or 38 may choose to participate in the auction or be reassigned to other channels in the repacking process, making channel 37 more usable for WMTS in some locations. While we are sensitive to the desire to minimize any detrimental impact on WMTS, under the current circumstances, WMTS will not receive enhanced protection if additional stations are added to channels 36 or 38 as a result of the repacking process.

292. RAS poses different interference concerns than WMTS. Our current rules do not specify protection levels for radio astronomy sites.[883] The RAS has been able to function successfully on channel 37 due to the relatively stable spectral environment associated with television operations on adjacent channels and the flexibility the Commission has had in locating television stations far away (both geographically and spectrally) from RAS locations. Because of the extreme sensitivity of the RAS receivers, wireless operations near channel 37 could cause harmful interference following the auction.[884] However, a collateral benefit of our decision to establish guard bands to prevent harmful interference to WMTS from adjacent wireless operations also provides protection to RAS. In other words, because the guard bands for WMTS provide frequency separation from wireless services, the physical separation necessary for wireless services to protect RAS from harmful interference decreases significantly.

293. Recognizing the value of providing as much flexibility as possible to new 600 MHz Band licensees, we are not adopting any specific constraints on wireless fixed and base station locations operating in the 600 MHz downlink band, but instead will require any new 600 MHz licensee to coordinate with NSF prior to commencing operations at permanent fixed locations near RAS observatories.[885] Requiring coordination will provide the necessary certainty to RAS observatories that their sites will be protected. Specifically, we will require such coordination for stations within 25 kilometers of a VLBA installation.[886] Staff analysis to support these separation distances is detailed in the

[881] GEHC Reply at 26.

[882] *See* WMTS Coalition Comments at 26-27; GEHC Comments at 7; GEHC Reply at 27; Philips Healthcare Comments at 4.

[883] *See* 47 C.F.R. § 2.106 FN US74 which states, "the radio astronomy service shall be protected from unwanted emissions only to the extent that such radiation exceeds the level which would be present if the offending station were operating in compliance with the technical standards or criteria applicable to the service in which it operates."

[884] *See, e.g.*, Motorola Mobility Comments at 12 ("these services will find the operating environment far more severe as they become sandwiched between advanced mobile networks and high-powered broadcast facilities"). The emissions mask for commercial wireless systems would allow OOBE into channel 37 of -13dBm per 100 kHz, regardless of power level; over 100 dBm higher than the level of protection recommended in ITU recommendation RA.769 ("Protecting Criteria used for radio astronomical measurements"). *See* 47 C.F.R. §27.53(g).

[885] We note that radio astronomy observations in channel 37 are conducted using two types of installations – single dish and Very Long Baseline Array (VLBA) – each of which have different protection requirements. VLBA observations are less susceptible to interference than single dish observations because interfering signals do not correlate across the multiple receivers that comprise the array. Also, we note that we are not limiting the notification to a subset of the UHF band due to the extreme sensitivity of RAS receivers. Similarly, our rules for TV white space devices prevent them from operating on any available TV channel within 2.4 kilometers of an RAS site (47 C.F.R. § 15.712(h)).

[886] Our decision here is consistent with other Commission actions regarding coordination for sites near RAS observatories. *See, e.g.*, Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt

(continued….)

attached Technical Appendix.[887] Because the RAS observatories are generally located in remote locations, we do not expect dense wireless deployment near those sites. Thus, this requirement does not present a significant burden to 600 MHz wireless licensees' network because the number of necessary coordinations is expected to be minimal. In addition, many observatories are also protected by terrain features (e.g., nearby mountains) that block wireless signals, making coordination, in most cases, a simpler process.

294. We note that the only two single dish radio astronomy installations that operate in channel 37 are the Green Bank, WV and Arecibo, PR observatories. Our rules already require specific procedures for wireless operations near those locations.[888] We also note that in many cases, geographic features that protect RAS sites will block wireless system signals. Consistent with section 1.924, we will require wireless licensees to provide the following information: identification of the geographical coordinates of the antenna location (NAD-83 datum), the antenna height, antenna directivity (if any), type of emission, and effective isotropic radiated power.[889] We strongly encourage the parties to cooperate so as not to unreasonably frustrate the operations of RAS or wireless operations.

2. Television Fixed Broadcast Auxiliary Stations

295. *Background.* Subpart F of the Commission's Part 74 rules allows certain fixed broadcast auxiliary service ("BAS") operations on television channels 14-51 on a secondary basis.[890] Because these stations are secondary, they must not interfere with and must accept interference from current and future full-power television stations, LPTV stations (including Class A stations) and TV translator stations.[891] There are a relatively low number of fixed BAS stations operating in channels 14 to 51.[892] In addition to operating in the UHF band, fixed BAS operates in several other frequency bands on a primary basis.[893]

296. In the *NPRM*, the Commission proposed to continue to allow fixed BAS on a secondary basis in the UHF band spectrum that remains available for television services nationwide following the incentive auction.[894] It also proposed that fixed BAS stations be required to cease operating and relocate at their own expense when a new 600 MHz wireless licensee intends to commence operations within interference range.[895] The Commission further proposed that broadcast television or new wireless

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Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service, IB Dkt. No. 07-101, *Report and Order*, 24 FCC Rcd. 10414, 10431 (2009) (the Commission adopted a 50 km coordination zone for vehicle mounted earth stations around VLBA sites).

[887] *See* Technical Appendix § II.E.3 (Potential for Interference between 600 MHz Downlink and RAS).

[888] *See* 47 C.F.R. § 1.924.

[889] *See* 47 C.F.R. § 1.924(d).

[890] *See generally* 47 C.F.R. §§ 74.600 *et seq.* (Subpart F – Television Broadcast Auxiliary Stations). Specifically, § 74.602(h) permits TV studio transmitter links (STLs), TV relay stations, and TV translator relay stations to operate fixed point-to-point service. Only licensees of a TV broadcast station, a Class A TV station, a TV broadcast network entity, a low power TV station, or a TV translator station may hold fixed BAS licenses on TV channels 14-51. *See* 47 C.F.R. §§ 74.600, 74.632(a).

[891] 47 C.F.R. § 74.602(h)(2). Fixed BAS in TV Channels 14-51 is also secondary to land mobile stations in areas where land mobile sharing is currently permitted. *Id.*

[892] The Commission's Universal Licensing System (ULS) reflects 192 fixed BAS licensed in TV Channels 14 through 51 with 151 of these stations licensed on television channels 21 through 51.

[893] Fixed BAS stations are also licensed in the non-TV UHF, 900 MHz, 2 GHz, 7 GHz, 13 GHz, and 18 GHz bands, though new stations are no longer licensed in certain subbands. *See* 47 C.F.R. §§ 74.602(g), 74.602(h)(3)(4).

[894] *NPRM*, 27 FCC Rcd at 12485, para. 217.

[895] *Id.* at 12485, paras. 218, 220.

licensees be required to provide 30 days' notice to all incumbent fixed BAS operations within interference range prior to commencing operations.[896]

297. *Discussion.* We will continue to license fixed BAS on a secondary basis in the UHF spectrum that remains allocated and assigned to full power television services nationwide. However, as discussed in Section V.D.2 below, fixed BAS stations must cease operating and/or relocate out of the 600 MHz Band repurposed for wireless services, at their own expense, no later than the end of the Post-Auction Transition Period; or, during the Post-Auction Transition Period, if a new 600 MHz wireless licensee intends to commence operating and there is a likelihood of harmful interference from the fixed BAS station.. The few commenters addressing fixed BAS relocation issues are supportive of this approach.[897] We discuss below the requirements relating to cessation of BAS operations in the reorganized UHF band.[898]

298. Fixed BAS licensees will not be entitled to compensation for relocating to other frequencies.[899] Fixed BAS is a secondary service,[900] and the Spectrum Act does not provide for reimbursement of any relocation costs through the TV Broadcaster Relocation Fund.[901]

3. Low Power Auxiliary Stations and Unlicensed Wireless Microphones

299. Low power auxiliary station ("LPAS") operations, which are currently authorized only for broadcast and certain related entities,[902] are intended for uses such as wireless microphones, cue and control communications, and synchronization of TV camera signals (referenced collectively as "wireless microphones").[903] The Commission's rules provide for licensed LPAS operations on unused television channels on a secondary, non-exclusive basis.[904] The Commission also currently permits certain

[896] *Id.* at 12485, para. 219. *See, e.g.*, 47 C.F.R. § 101.103(d) (30-day coordination "notice and wait" requirement). *See also Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, First Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 8825 (1996); *Revisions to Broadcast Auxiliary Service Rules in Part 74 and Conforming Technical Rules for Broadcast Auxiliary Service, Cable Television Relay Service and Fixed Services in Parts 74, 78 and 101 of the Commission's Rules*, ET Docket No. 01-75, Report and Order, 17 FCC Rcd 22979 (2002); *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees*, WT Docket No. 10-153, Report and Order, Further Notice of Proposed Rulemaking, and Memorandum Opinion and Order, 26 FCC Rcd at 11628 (2011).

[897] *See, e.g.*, Affiliates Associations Comments at 41-42; CTIA Comments at 43; Verizon Reply Comments at 50.

[898] *See* § V.D.2 (Television Fixed Broadcast Auxiliary Stations).

[899] We note that the Commission did not provide for the reimbursement of secondary fixed BAS from TV channels 52-59 or from TV channels 60-69. *Reallocation of Television Channels 60-69, the 746-806 MHz Band*, Report and Order, 12 FCC Rcd 22953 (1998).

[900] Section 74.602(h) provides that TV STLs, TV relay stations, and TV translator relay stations may be authorized "on a secondary basis and subject to the provisions of subpart G of [Part 74]." 47 C.F.R. § 74.602(h). Secondary licensees must accept interference from and must not cause interference to primary services. *See Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, First Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 8825, 8869, para. 89 (1996).

[901] *See* Spectrum Act § 6403(b)(4)(A).

[902] *NPRM*, 27 FCC Rcd at 12433, para. 221 & n.336; 47 C.F.R. § 74.832(a)(1)-(6) (specifying particular broadcast and production entities eligible to hold LPAS licenses).

[903] *See generally* 47 C.F.R. §§ 74.801 *et seq.* (Subpart H – Low Power Auxiliary Stations); *NPRM*, 27 FCC Rcd at 12433-12434, para. 221. This Section does not address operations of wireless assist video devices, which are authorized under Part 74, Subpart H rules on a licensed basis. 47 C.F.R. §§ 74.801; 74.870.

[904] *NPRM*, 27 FCC Rcd at 12433, para. 221. *See generally* 47 C.F.R. §§ 74.801 *et seq.* (Subpart H – Low Power Auxiliary Stations). The Commission's rules provide that LPAS operations are limited to locations removed from

(continued….)

unlicensed operations of wireless microphones (including related devices) in the television bands pursuant to a limited waiver and Part 15 rules.[905] In the *NPRM*, the Commission noted that the repacking process may result in a reduced amount of spectrum available for use by wireless microphones, and sought comment on how best to accommodate licensed and unlicensed wireless microphone operations, along with the other uses, in the television bands and 600 MHz Band guard band spectrum to ensure that this spectrum is used efficiently and effectively following the incentive auction.[906]

300. Wireless microphones provide many important functions that serve the public interest, and today operate throughout the television bands. They play an essential role in enabling broadcasters and other video programming networks to serve consumers, including helping to cover breaking news and broadcasting live sports events.[907] They significantly enhance event productions in a variety of settings (including theaters and music venues, film studios, conventions, corporate events, houses of worship, and internet webcasts), often are integral to creating high quality content that consumers demand and value, and contribute substantially to our economy.[908] Below, we discuss wireless microphone operations in the television bands, where we provide additional opportunities for access to available channels following the incentive auction, and in the 600 MHz Band guard bands, where we will permit microphone users to operate, subject to the forthcoming rules for low power operations in those bands. In addition, as discussed in Section V.C.4, below, during the Post-Auction Transition Period we will allow wireless microphone users to continue to operate in the repurposed spectrum pursuant to certain conditions.[909] Recognizing the many important benefits provided by wireless microphones, we also will be initiating a proceeding in the next few months to address the needs of wireless microphone users over the longer term, both through revisions to our rules concerning use of the television bands and through promotion of opportunities using spectrum outside of the television bands.

a. Television Bands

301. *Background*. The television channels available for wireless microphones currently include two unused channels (when available) in the UHF band near channel 37, where unlicensed TVWS

(Continued from previous page)
existing co-channel TV broadcasting stations by not less than certain distances specified in the rules (unless otherwise authorized), *id.* § 74.802(b), that LPAS licensees will not be granted exclusive frequency assignments, *id.* § 74.802(d), that selection of frequencies for operations shall be guided by the need to avoid interference with TV broadcast reception, and that station usage is "secondary to TV broadcasting and land mobile stations" operating in the spectrum allocated for TV broadcasting and "must not cause harmful interference." *Id*. § 74.803(b).

[905] *See NPRM*, 27 FCC Rcd at 12434-12435, para. 222. As referenced in this Order, "unlicensed wireless microphones" includes all LPAS devices that operate on an unlicensed basis in the television bands pursuant to this waiver and certain Part 15 rules.

[906] *NPRM*, 27 FCC Rcd at 12435-12436, paras. 224-225.

[907] *See, e.g.*, CBS et al Comments at 3-4; NAB Comments at 47-48 (importance for production of broadcast programming and electronic news gathering (ENG)); NFL Comments at 3 (providing reliable and secure communications that professional games require); SAG-AFTRA Comments at 1-2; Joint Reply of the Commissioner of Baseball, NBA, NFL, NHL, NCAA, NASCAR at 2-5 (critical for capturing audio from in-game events and enhancing viewers experience).

[908] *See, e.g.*, Broadway League Comments at 3-5 (enable world-class sound experiences for millions of Broadway theater goers, contributing significantly to economy); Sennheiser Comments at 3-5 (ubiquity of microphones in all aspects of entertainment business, in news reporting, in sports, and in commercial, civic, and religious life); Shure Comments at 4-8 (organizations large and small rely on wireless microphones to deliver clear, real-time audio to audiences, and significantly enhance the economic value of these enterprises).

[909] *See* § V.D.4 (LPAS and Unlicensed Wireless Microphones). In § V.D.4, we also address operations of wireless assist video devices during the Post-Auction Transition Period.

device operations currently are prohibited,[910] as well as any other channels available at locations that are separated from television stations by specified separation distances.[911] The number of these other channels varies depending on location, and often may include channels that also can be used by unlicensed TVWS devices.[912] Licensed LPAS operators may obtain protection from interference from TVWS devices on those channels by reserving them at specified locations and times of operation in the broadcast TV bands databases.[913] In addition, certain qualifying unlicensed operators also can obtain interference protection from unlicensed TVWS devices at specified times by registering with the Commission, enabling them to have their operations included within the broadcast TV bands databases.[914]

302. To promote more efficient and effective wireless microphone operations in the television bands following the incentive auction, the Commission sought comment in the *NPRM* on reducing the current required separation distances between wireless microphones and television stations for co-channel operations in the broadcast TV bands, as well as on permitting even closer wireless microphone operations than provided for generally in the rules through a coordination process or use of a database.[915] The Commission noted that, in a separate proceeding on wireless microphones, it sought comment on other rule revisions, including expanding eligibility for certain unlicensed entities so that they could operate on a licensed basis under the Part 74 LPAS rules in the television spectrum.[916]

303. *Discussion.* We take several steps in this proceeding, and in the related wireless microphones proceeding,[917] to ensure that the reduced amount of television spectrum that remains following the incentive auction can continue to accommodate wireless microphone operations, along with other uses of this spectrum, in an efficient and effective manner. First, we are revising our rules for co-channel operations to expand the areas where wireless microphones may be used in the television bands. Second, in the related wireless microphones proceeding, we are concurrently extending to certain

[910] *NPRM*, 27 FCC Rcd at 12434, para. 222; *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04-186 and 02-380, Second Memorandum Opinion and Order, 25 FCC Rcd at 18671-18677, paras. 25-36 (2010) (*TV White Spaces Second MO&O*); 47 C.F.R. §15.707(a); *see also id.* § 15.712(f)(2).

[911] *NPRM*, 27 FCC Rcd at 12434, para. 222. *See* 47 C.F.R. § 74.802(b).

[912] In many areas, there may be more of these other channels available for wireless microphone operations than are available for unlicensed white space devices. For instance, the Commission's rules provide that only fixed white space devices may operate below channel 21, and such devices are not permitted in any channel immediately adjacent to occupied TV channels. *See* 47 C.F.R. §§ 15.703(c), 15.707, 15.711, and 15.712.

[913] *NPRM*, 27 FCC Rcd at 12434, para. 222; *TV White Spaces Second MO&O*, 25 FCC Rcd at 18675-18676, para. 33; 47 C.F.R. § 15.712(f) and 713(h)(8).

[914] *See NPRM*, 27 FCC Rcd at 12434-12435, para. 222; *TV White Spaces Second MO&O*, 25 FCC Rcd at 18675-18676, paras. 32-33; 47 C.F.R. § 15.713(h)(9). Wireless microphone use also is authorized on licensed and unlicensed bases on frequencies outside of the core TV bands. *See NPRM*, 27 FCC Rcd at 12435, para. 222 n.348.

[915] *NPRM*, 27 FCC Rcd at 12436, para. 225. Different separation distances apply in the VHF band. *Id.*

[916] *NPRM*, 27 FCC Rcd at 12435-12436, para. 224 n.354.

[917] In the *NPRM*, the Commission noted that, in a separate proceeding on wireless microphones, it was considering whether to expand eligibility for certain entities to operate on a licensed basis under the Part 74 LPAS rules, and would be issuing a public notice seeking to refresh the record in that proceeding. *NPRM*, 27 FCC Rcd at 12435–36, para. 224 n.354 (citing *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band*, WT Docket No. 08-166, WT Docket No. 08-167, ET Docket No. 10-24, Report and Order and Further Notice of Proposed Rulemaking, 25 FCC Rcd 643, 682-687 paras. 81-90 (2010) (*Wireless Microphones Order and Further Notice*)). On October 5, 2012, a Public Notice was issued to do so. *See The Wireless Bureau and the Office of Engineering and Technology Seek to Update and Refresh Record in the Wireless Microphones Proceeding*, WT Docket Nos. 08-166, 08-167, ET Docket No. 10-24, Public Notice, 27 FCC Rcd 12067 (2012).

unlicensed wireless microphone users the rights of licensed LPAS users to access television spectrum.[918] Third, although there may no longer be two unused television channels available for wireless microphones following the incentive auction, we intend to designate one television channel that is not assigned to a television station in the repacking process for use by both wireless microphones and unlicensed TVWS devices. In addition, we will take further steps in the near term in the 600 MHz and TVWS Part 15 Proceeding to make improvements to the registration system in the TV bands databases. These steps will provide licensed LPAS operators a more timely and effective means to obtain needed protection from unlicensed TVWS device operations on any of the available television channels. On balance, we conclude that the changes we are making best serve to address the important needs of wireless microphone users as well as other users that seek access to the broadcast spectrum that remains available for use following repacking.

304. *Co-channel Operations*. To ensure that wireless microphones users have access to as many television channels as possible following the repacking process, we are revising our rules for co-channel operations in two ways. These revisions will provide wireless microphones with access to additional television channels in particular locations without raising interference concerns to television licensees. Such additional access may be particularly important in those locations where most television channels are occupied by broadcasters and wireless microphone users seek access to several channels.

305. First, we reduce the current co-channel separation distances applicable to wireless microphone operations in the television bands. The current rule,[919] which was adopted prior to the transition to digital television, was designed to protect analog television reception and, therefore, is outdated. Further, the distances the rule specifies in many cases may be greater than necessary to protect against interference because it does not account for variations in power or antenna height that reduce the size of some stations' service areas. Consistent with Shure's proposal to take into account the predicted television station contour and the radiated power of the wireless microphone,[920] we revise the rule to permit wireless microphones to operate at distances as close as four kilometers from a television station's predicted service contour (including digital or analog full power, Class A, and LPTV stations).[921] A number of commenters support reducing the applicable separation distances for co-channel operations.[922]

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[918] Concurrent with our release of this Order, we will be releasing an order in the wireless microphones proceeding that provides for limited expansion of Part 74 licensee eligibility for certain unlicensed wireless microphone users. *See Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band*, WT Docket No. 08-166, WT Docket No. 08-167, ET Docket No. 10-24, Report and Order and Further Notice of Proposed Rulemaking, FCC 14-50 (adopted May 15, 2014) (*Wireless Microphones Second Report and Order*).

[919] *See* 47 C.F.R. § 74.802(b) (specifying the applicable separation distances for VHF and UHF channels under current rules).

[920] Shure Comments at 25. *See also, e.g.*, PISC Reply at 22-23 (proposing that wireless microphone users be allowed to choose between relying on a geographic separation or on the actual signal strength received at a venue's location).

[921] The contour values that the Commission used for protecting TV reception from TV white space devices are specified in § 15.712(a)(1). In developing this rule, the Commission used the contour values in § 73.622(e) (for digital TV stations) and § 73.683(a) (for analog TV stations).

[922] *See, e.g.*, Boeing Comments at 4; Google and Microsoft Comments at 52-53; PISC Comments at 37-39; Sennheiser Comments at 10-11; WISPA Comments at 19-20; Sennheiser Reply at 18; Shure Reply at 20-21; WSA Reply at 11-12; WISPA Reply at 9-11. Commenters argue that doing so would authorize wireless microphone use on additional channels in more locations, channels which might otherwise go unused. *See, e.g.*, PISC Comments at 34-35 (noting that reducing the co-channel separation distance potentially could make several additional channels available for wireless microphone use in New York City, where availability of spectrum for wireless microphones is limited). As detailed below, we reject NAB's argument that any rule revision reducing the current co-channel separation distance would unduly increase the risk of interference with TV reception.

306. Our action aligns the separation distance rules for wireless microphones with those for unlicensed personal/portable TVWS devices,[923] which operate at similar power levels. Personal/portable TVWS devices are permitted to operate with a maximum power of 100 milliwatts and must operate at least four kilometers outside the protected service contour of co-channel television stations (digital or analog), a distance based on a power level of four watts (4,000 milliwatts).[924] Most wireless microphones typically operate at power levels of less than 50 milliwatts.[925] For analog wireless microphones, even if there were as many as 16 operating simultaneously in a six megahertz TV channel, more than the typical six to eight microphone range for most existing technologies,[926] the total transmitted power within a six megahertz channel will not exceed 800 milliwatts, five times less than the power on which the four kilometer separation distance required for personal/portable TVWS devices is based. Even were sixteen wireless microphones on a six megahertz channel to operate at up to 250 milliwatts, as permitted for licensed LPAS operators,[927] the total transmitted power still would not exceed four watts (4,000 milliwatts). Thus, we disagree with commenters that express general opposition to any reduction of the co-channel separation distance,[928] and conclude based on our technical analysis that a four kilometer separation distance between wireless microphones and a television station's protected service contour will protect television reception from interference.

307. Second, to enable licensed LPAS operators to access additional co-channel spectrum, we also will permit licensees to operate even closer to television stations than the revised separation distances, provided that any such operations are coordinated with the television licensees. Several commenters assert that wireless microphones can operate effectively on co-channels much closer to television stations than currently allowed, and several point out that many already do so today.[929] Many commenters assert that such closer co-channel operations can be ideal for wireless microphones because

[923] 47 C.F.R § 15.712(a)(2) (required separation distance for personal/portable white space devices where antenna height above average terrain is less than three meters).

[924] The Commission derived the four kilometer separation distance based on a power level of 4,000 milliwatts (four watts), concluding that it would protect television reception within a station's service contour from a fixed co-channel TVWS device operating with a power level of up to 4,000 milliwatts EIRP and an antenna height of three meters HAAT. *See Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, *Third Memorandum Opinion and Order*, 27 FCC Rcd 3692, 3699-3700 paras. 17-18 (2012). The required separation distances from a television station contour for Mode II personal/portable TVWS devices are the same as for four watt fixed devices with an antenna height above average terrain of three meters. *See* 47 C.F.R. § 15.712(a)(2). The Commission required that personal/portable TVWS devices also comply with this four kilometer co-channel separation distance.

[925] *See Wireless Microphones Order and Further Notice,* 25 FCC Rcd at 684-685, para. 86.

[926] As a general matter, six to eight analog wireless microphones can operate on a six megahertz channel. *See TV White Spaces Second MO&O*, 25 FCC Rcd at 18676, para. 33. In recent years, some manufacturers have developed equipment that permits as many as 16 microphones on a television channel under certain circumstances.

[927] *See* 47 C.F.R. § 74.861(e)(1)(ii).

[928] *See, e.g.*, NAB Reply, WT Docket Nos. 08-166, 08-167, OET Docket No. 10-24 at 20 (filed Mar. 12, 2013) (opposing, without technical analysis, any general rule revisions reducing co-channel separation distances for all wireless microphone users because of concern that this could create a risk of interference to Part 74 operations and to TV viewers).

[929] *See, e.g.*, Google and Microsoft Comments at 53-54; PISC Comments at 34-37; Shure Comments at 25; WSA Comments at 34-35; PISC Reply at 20; WSA Reply at 12; Letter from Michael Calabrese, Director, Wireless Future Project, New America Found., PISC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2-3 (filed Aug. 19, 2013) (PISC Aug. 19, 2013 *Ex Parte*); *cf.* Spectrum Bridge Comments at 9. *But see* NFL Comments at 5 (revising the separation distance may not be helpful in providing more spectrum for wireless microphones because NFL wireless microphones users already encounter interference from television stations under existing separation rules).

such operations would be free of unlicensed TVWS devices.[930] Commenters propose various solutions to allow for closer co-channel operations, including coordination with affected broadcasters.[931] Based on the record before us, we conclude that the best approach is to permit licensed LPAS users, including newly eligible licensees (see discussion below), to obtain access to additional television channels at a given location through the coordination process. Requiring coordination with broadcasters effectively addresses the concerns of those commenters, including NAB, that oppose or express concern about revising the rules to provide for closer co-channel operations, based on the potential for interference to television operations.[932] We note that many of the licensed LPAS operators, including both broadcasters and many users that would now be eligible for licenses, already coordinate with each other to share spectrum.[933] Several broadcasters state that they successfully coordinate the sharing of channels among broadcasters and other wireless microphone users, including Broadway theaters in New York City, on a routine basis.[934]

308. *Expanded License Eligibility for Certain Unlicensed Wireless Microphone Users*. In the *Wireless Microphones Second Report and Order* that we adopt concurrently with this Order, we expand licensed LPAS eligibility to include professional sound companies and venues that use wireless microphones in connection with major events/productions.[935] These revised licensing rules will extend to currently unlicensed wireless microphone users operating at specified locations the rights of licensed LPAS operators to operate in television spectrum, including the same rights to access the TV bands databases for interference protection from unlicensed TVWS devices.[936]

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[930] *See, e.g.*, PISC Comments at 34-35; WSA Comments at 35; WISPA Reply at 10-11. *But see* CP Comm. Reply at 3 (arguing that wireless microphone users prefer interference-free channels but not necessarily co-channels).

[931] *See, e.g.*, Boeing Comments at 4-5 (wireless microphone users should be required to coordinate their operations with broadcasters and to use a database that could account for the particular interference conditions at a location); WSA Comments at 34 and Reply at 12 (advocating coordination); Sennheiser Comments at 11 and Reply at 18 (wireless microphone operations should be permitted where the TV signal falls below a specified threshold); PISC Comments at 34-37 and Reply at 21-22 (wireless microphone operations should be permitted only where they may be shielded from TV signals due to building attenuation); Shure Comments at 25 (same); WSA Reply at 12 (same); PISC Comments at 21-22, 39-40 (database accounting for particular interference conditions); Shure Comments at 25 and Reply at 20-21 (same); WISPA Comments at 19-20 (same).

[932] *See, e.g.*, NAB Reply, WT Docket Nos. 08-166, 08-167, OET Docket No. 10-24 at 20 (filed Mar. 12, 2013) (opposing general rule revisions reducing co-channel separation distances for all wireless microphone users because of concern that this could create a risk of interference to Part 74 operations and to TV viewers, while stating that, under 47 C.F.R. §§ 74.803 and 74.24, broadcast professionals using the frequency coordination process already are permitted where necessary to operate wireless microphones at shorter co-channel distances at certain locations, such as inside studios or buildings, where such operations would not create interference to other protected operations).

[933] Under existing rules, LPAS licensees that seek to operate wireless microphones in the same area are required to endeavor to select frequencies in such manner as to avoid mutual interference with each other and are guided by the need to avoid interference to TV broadcast reception, and LPAS operations by Part 73 or broadcast auxiliary licensees are permitted on a short term basis without prior Commission authorization, provided that they coordinate with the broadcast station licensee. 47 C.F.R. §§ 74.803; 74.24. Unlicensed wireless microphone users that would be newly eligible for licensing, such as various Broadway theaters, also have indicated that they are familiar with the frequency coordination process. *See, e.g.*, Broadway League Comments at 12 (noting that there are few available channels than in the heart of the Broadway Theatre District, and "through skillful engineering and coordination, Broadway theatres have extracted use from every available slice of spectrum without causing interference").

[934] Letter from Catherine Wang, Counsel for Shure Incorporation, to Marlene H. Dortch, Secretary, FCC, Docket No. 12-268 (filed Feb. 10, 2014) (Shure et. al. Feb. 10, 2014 *Ex Parte* Letter) (filed jointly by several broadcasters, frequency coordinators, and wireless microphone manufacturers).

[935] *See generally Wireless Microphones Second Report and Order*.

[936] *Id*.

309. *Designating Channels for Wireless Microphones*. As noted above, we anticipate that there will be at least one television channel in all areas of the United States that is not assigned to a television station in the repacking process.[937] As is the case today, such "white space" channels will be necessary to avoid interference between primary broadcast stations in the final channel assignment process. Although we anticipate that there will be fewer such unused television channels in the repacked television bands,[938] we intend, after additional notice and an opportunity for comment, to designate one of these television channels in each area for shared use by wireless microphone and unlicensed devices.[939] We also agree with those commenters who argue that unused television channels that remain unused by broadcast television stations after the incentive auction should not continue to be designated exclusively for wireless microphone use and should be made available for potential use by unlicensed TVWS devices as well.[940] Accordingly, in addition to the channel designated for shared wireless microphone and unlicensed TVWS device use as described above, we will make any other unused television channels following the incentive auction available for shared wireless microphone and TVWS device use (to the extent consistent with the applicable technical rules), except at those specified times and locations where wireless microphone users have registered their operations for interference protection in the TV bands databases.[941]

310. We will not continue to designate any television channels unused by television stations exclusively for the use of wireless microphones. We disagree with commenters who argue that we should permanently reserve two channels for wireless microphones,[942] as this would significantly reduce the amount of spectrum available for auction and repurposing for wireless services, particularly in many of the larger markets across the nation, and preclude any sharing of the limited television spectrum when it is not being used for wireless microphone operations. The steps we are taking concerning wireless microphone operations in the repacked television bands, taken together with other steps we discuss elsewhere in the Order to accommodate wireless microphone uses, represent a balanced approach to addressing the needs of wireless microphone users and the other users that seek access to the more limited television spectrum that is likely to remain available for use following the incentive auction.[943]

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[937] *See* para. 265.

[938] *See* n.807 and accompanying text.

[939] *See* Letter from Austin Schlick, Director, Communications Law, Google Inc., to Gary Epstein, Chair of the Incentive Auction Task Force, Federal Communications Commission, GN Docket No. 12-268 (filed Apr. 21, 2014) (asking that the FCC preserve up to two vacant channels in each television market that are now being used by wireless microphones and open such channels to use by unlicensed TVWS devices following the incentive auction).

[940] *See* n.809.

[941] *See* n.810.

[942] *See, e.g.*, Broadway League Comments at 12-23; Broadcast Network Comments at 10-11; Collective Wireless Microphone Interests Comments at 5; CP Comm. Comments at 5-6; NAB Comments at 6-7, 47-48 (wireless microphones are essential for broadcasters); NFL Comments at 2-5; Performing Arts Working Group Comments at 4; SAG-AFTRA Comments at 2; Shure Comments at 15; Disney Comments at 46-47; Comcast and NBC Universal Reply at 24-25; Lectrosonics Reply at 4; NAB Reply at 56-57; Sennheiser Reply at 15-17; Shure Reply at 10-11; Sports League Reply at 6-7; TV Programmers Reply at 9-12.

[943] *See, e.g.*, PISC Comments at 41; WSA Comments at 34-35; Google Reply at 13. In addition to the steps we are taking here and in the *Wireless Microphones Second Report and Order*, we note that in many areas there may be several channels available for use by wireless microphones that cannot be used by TVWS devices. *See* n.910. For instance, in channels below channel 21, personal/portable TVWS devices are not permitted to operate. Moreover, unlike wireless microphones, fixed TVWS devices may not operate on any channel immediately adjacent to occupied TV channels. *See* 47 C.F.R. §§ 15.703(c), 15.707, 15.711, and 15.712. In addition, licensed LPAS operators and qualifying unlicensed operators, which will now be eligible for licenses under revised rules, *see Wireless Microphones Second Report and Order*, can reserve the use of channels otherwise available for TVWS devices by registering those needed channels in the TV bands databases for the dates and times that wireless

(continued….)

311. *Improvements Relating to the TV Bands Databases*. Given our decision to no longer designate two unused television channels, where available, exclusively for wireless microphones, we agree with commenters that we should take steps to improve the operation of the TV bands databases.[944] Such improvements would enable licensed LPAS operations (including newly eligible licensees)[945] to obtain more immediate protection from interference from TVWS devices on any available television channels at the times and locations that these wireless microphone users need. We plan to address how best to make these improvements in the 600 MHz and TVWS Part 15 Proceeding that will address the TV bands databases in the reorganized bands (along with related issues such as the rules for low power operations in the guard bands), and we will take into account concerns and suggestions raised by the commenters there.[946]

b. Guard Bands

312. *Background*. In the *NPRM*, the Commission also sought comment on the operation of wireless microphones in spectrum established for 600 MHz Band guard bands.[947] The Commission proposed to make the guard bands available for unlicensed device use,[948] and requested comment on whether wireless microphone operations could co-exist with such unlicensed operations, as well as whether to require wireless microphones to comply with the technical requirements established for unlicensed operations in the guard bands, including the ability to access a database. The Commission also asked whether wireless microphones should be permitted in the guard bands only on an unlicensed basis, or whether those that qualify for registration in the TV bands databases should be able to protect their operations against interference from unlicensed devices operating in these bands.[949]

313. *Discussion.* We are allowing unlicensed devices to operate in the guard bands, including the duplex gap.[950] To make additional spectrum outside of the repacked television bands available for wireless microphone uses, we also will permit wireless microphone devices to operate in the 600 MHz Band guard bands on an unlicensed, unprotected basis provided that they comply with the technical requirements we will adopt for low power device operations in these guard bands in our upcoming

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microphones are needed. *See, e.g.*, Google and Microsoft Comments at 51-52; Spectrum Bridge Comments at 9; Google Reply at 12-14; PISC Reply at 16-19; WSA Reply at 13; WISPA Reply at 11-13.

[944] NAB, for instance, argues that if two television channels are no longer designated for wireless microphones, the Commission should take steps to improve protections for licensed LPAS operations by requiring database administrators to exchange registrations and make changes in the database in real time with all updates made within ten minutes of receipt, and should require unlicensed white space devices to check the database every 20 minutes instead of every 24 hours. NAB Comments at 47-48; NAB Wireless Microphone Comments at 8-9; *see also* Shure Comments at 26-27; Comcast and NBC Universal Reply at 25-26. In addition, several commenters representing unlicensed wireless microphone users argue that the Commission's rules for unlicensed wireless microphone registration, including requiring authorization 30 days in advance of events, do not provide sufficient flexibility for event planning for qualifying unlicensed users. *See, e.g.*, Broadway League Comments at 7-10; Collective Wireless Microphone Interests Comments at 4, CP Comm. Comments at 4, Shure Comments at 25-26; Thompson Engineering Comments at 2; Sports Leagues Reply at 9.

[945] *See generally Wireless Microphones Second Report and Order*.

[946] Based on the limited record before us, and because improvements would involve substantive revisions to the current requirements pertaining to the broadcast TV bands databases, we decline to make these changes at this time.

[947] *NPRM*, 27 FCC Rcd at 12435-12437, paras. 224, 226.

[948] *NPRM*, 27 FCC Rcd at 12440, para. 234. The Spectrum Act authorizes the Commission to permit the use of guard bands for unlicensed operations and provides that unlicensed use must rely on a database or other methodology as determined by the Commission. Spectrum Act §§ 6407(c), (d).

[949] *NPRM*, 27 FCC Rcd at 12435-12437, paras. 224, 226; 12439-12440, para. 234.

[950] *See* § III.C (Unlicensed Operations).

rulemaking. Most commenters support permitting wireless microphones to operate in the guard bands,[951] although they disagree about the precise nature of such operations, including the technical rules that should apply.[952]

314. In addition to permitting unlicensed wireless microphone operations in the guard bands, we will permit certain wireless microphones operations in a portion of the duplex gap on a licensed basis.[953] Broadcasters and cable programming networks contend that without the continued availability of unused television channels for interference-free wireless microphone operations, they will have difficulty providing certain programming, including emergency information, on which their ability to provide vital information to first responders and the public depends.[954] Without access to some guard band spectrum for this purpose, there may be areas in the country where there would be little if any certain access to UHF band spectrum for wireless microphone operations on a protected basis. Accordingly, we conclude that the public interest will be served by allowing broadcasters and cable programming networks using wireless microphones on a licensed basis in a portion of the duplex gap to obtain interference protection from unlicensed devices at specified times and locations, on an as-needed basis. In the 600 MHz and TVWS Part 15 Proceeding, we will examine how best to provide access to a portion of the duplex gap by

[951] *See, e.g.*, Boeing Comments at 5; Broadway League Comments at 12-13; CP Comm. at 2 n.5; NAB Comments, WT Docket Nos. 08-166, 08-167, OET Docket No. 10-24 at 20 (filed Jan. 25, 2013) at 6; Disney Comments at 47; PISC Comments at 43 (permit wireless microphones only if they conform with requirements for unlicensed device operations); Sennheiser Comments at 11-12; SBE Comments at 13; Shure Comments at17-18; WSA Comments at 34; Ericsson Reply at 33; TV Programmers Reply at 13. Certain types of wireless microphone applications can be effective when operating on an unlicensed basis, thus alleviating the need for television spectrum. *See, e.g.*, Sennheiser Comments at 11-12 (the most promising applications for wireless microphones that operate on an unlicensed basis in the guard bands may be those for "non-professional" use). Several commenters specifically support wireless microphone operations in the duplex gap, depending on the band plan adopted. *See, e.g.*, Broadcast TV Affiliates Comments at 46; NAB Comments at 46; WSA Comments at 34; Comcast and NBCUniversal Reply at 24-25; Shure Reply at 9-10, 17.

[952] Some commenters support wireless microphone operations in the guard bands only insofar as they would operate on an unlicensed basis consistent with the rules applicable to unlicensed device operations in the guard bands. *See, e.g.*, PISC Comments at 43; Neul Comments at 5; Spectrum Bridge Comments at 8; WSA Comments at 34; Google Reply Comments at 14. Some commenters support licensed wireless microphone operations in the bands. *See, e.g.*, Broadway League Comments at 12-13 (supporting allowing both licensed and unlicensed wireless microphone operations); NAB Comments, WT Docket Nos. 08-166, 08-167, OET Docket No. 10-24 at 20 (filed Jan. 25, 2013) at 6 (requesting designating and reserving the guard bands only for licensed wireless microphone operations). Some request that wireless microphone users should be permitted to register for interference protection from unlicensed devices in the guard bands. *See, e.g.*, Shure Comments at 17-18; Sennheiser Comments at 11-12; Shure Reply at 16.

[953] With respect to the duplex gap, commenters disagree about the extent to which the spectrum should be made available for wireless microphones and/or unlicensed device operations. Some support only unlicensed operations in the duplex gap, *see, e.g.*, New America/PISC *Ex Parte* at 2 (filed May 7, 2014); WSA *Ex Parte* at 5 (filed May 7, 2014), or request that 40 mW unlicensed operations be permitted in 6 megahertz of the duplex gap, *see* Google/Microsoft *Ex Parte* at 1 (filed May 8, 2014). Others support use of the duplex gap for wireless microphones, but not other unlicensed devices. *See, e.g.*, Letter from Catherine Wang, Counsel, Bingham, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-268 at 4 (filed May 8, 2014) (representing a group of broadcasters, wireless microphone manufacturers, and professional wireless microphone users and frequency coordinators); Qualcomm *Ex Parte* at 1 (filed May 8, 2014) (allowing unlicensed operation in the duplex gap at the levels permitted under the TVWS rules would cause harmful interference to licensed mobile LTE operations).

[954] *See, e.g.*, Letter from Jared S. Sher, VP, Associate General Counsel, 21st Century Fox, Anne Lucey, Senior VP for Regulatory Policy, CBS, Susan Mort, Assistant General Counsel, Time Warner, Kathleen Kirby, Counsel, Radio Television Digital News Association, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 1-2 (filed May 7, 2014) (representatives of news gathering organizations describing critical need of wireless microphones for providing emergency information); Letter from Rick Kaplan, Executive Vice President, Strategic Planning, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 4 (filed Apr. 28, 2014).

licensed wireless microphone users, while also ensuring that unlicensed users of the duplex gap can make use of this spectrum to provide broadband services as described above.[955] We anticipate that the duplex gap would be partitioned such that six megahertz would be available for unlicensed broadband devices to operate under the existing TVWS rules for 40 mW personal/portable devices, and four megahertz adjacent to the 600 MHz Band downlinks would be available for licensed wireless microphone operations.

315. In taking this approach in the guard bands, we seek to promote unlicensed operations generally while also providing access to more spectrum for wireless microphone uses, consistent with the requirement that operations in the guard bands do not cause interference to, and serve to prevent interference to, licensed services outside of the guard bands.[956]

c. Long-Term Needs of Wireless Microphone Users

316. Through the actions described above, we seek to accommodate the needs of wireless microphone users in the reorganized UHF spectrum that will continue to be available for their use. We recognize, however, that much of the UHF spectrum that currently is unused and available for wireless microphone operations may no longer be available following the incentive auction. As discussed in Section V.D.4 below, we will allow wireless microphone users to continue to operate in the spectrum repurposed for wireless service during a transition period following the incentive auction under specified conditions, both to address near-term needs and to help facilitate their transition to spectrum that is available for their use.[957] Considering the important benefits of wireless microphone use, we plan to initiate a proceeding in the near term to explore additional steps we can take, including the use of additional frequency bands by wireless microphones.[958] In that proceeding, we will work with wireless microphone users, both licensed and unlicensed, to accommodate their long-term needs.[959]

E. Allocations

317. *Background.* The radio spectrum is divided into separate frequency bands that are allocated to various terrestrial or space radiocommunication services, such as broadcasting, fixed, mobile, and fixed-satellite.[960] These allocations are shown in the Table of Frequency Allocations ("Table of

[955] *See* para. 273.

[956] As discussed above, we will initiate a proceeding to establish technical parameters for low power operations in the guard bands. In that proceeding, we will fully address concerns about low power operations within the guard bands and the potential for interference from such operations to licensed services outside of the guard bands. *See, e.g.*, NFL Comments at 6; Qualcomm Comments at 22-24; SAG-AFTRA Comments at 3; Qualcomm Reply at 9.

[957] We reject requests that we develop a mechanism for reimbursement of wireless microphone users' relocation costs, *see, e.g.*, Sennheiser *Reassignment Costs PN* Comments at 5-11; CP Comm. *Reassignment Costs PN* Comments at 1-3; *but see* CTIA *Reassignment Costs PN* Reply at 7-9 (opposing any reimbursement), as wireless microphone users are not eligible for any such reimbursement. *See* Spectrum Act § 6403(b)(4)(A); § V.C.5.a (statutory reimbursement mandate applies only to full power and Class A television licensees that are involuntarily reassigned to new channels in the repacking process pursuant to § 6403(b)(1)(B)(i)). Wireless microphone users operate on a secondary or unlicensed basis.

[958] We note that in recent years wireless microphone users have been turning increasingly to frequency bands outside of the UHF band to address some types of their needs, including uses on an unlicensed basis in the 902-928 MHz and 2.4 GHz bands.

[959] Several commenters request that the Commission initiate such a proceeding. *See, e.g.*, Letter from Catherine Wang, Counsel, Bingham, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-268 at 4 (filed May 8, 2014) (representing a group of broadcasters, wireless microphone manufacturers, and professional wireless microphone users and frequency coordinators); Broadway League *Ex Parte* at 2 (filed May 8, 2014).

[960] *See* 47 C.F.R. § 2.1. Some allocations identify a broad category for similar types of radiocommunications; for example, a broadcasting allocation is used for transmission intended to be received directly by the general public

(continued….)

Allocations"),[961] which is, in effect, "the master zoning map for how different parts of the spectrum may be used."[962] Each frequency band may be allocated for multiple services, with each service afforded either primary or secondary interference rights.[963] Although the assignment, licensing and use of a frequency band must be in accordance with the Table of Allocations (except as otherwise provided in section 2.102 of the Commission's rules),[964] service rules govern access to and use of the band within the framework of the Table. The service rules provide for, among other things, the particular type of operation permitted under each allocation in a frequency band and how it will be licensed.[965]

318. Prior to the Spectrum Act's enactment, the Commission proposed to add fixed and mobile services to the Table of Allocations for all of the UHF and VHF broadcast television bands (except for channel 37) on a co-primary basis with broadcast television, as a preliminary step towards carrying out the goals of the National Broadband Plan.[966] The FCC later deferred a decision on its allocations proposal to this proceeding.[967] In the *NPRM*, the Commission invited additional comment on the same proposal in light of the Spectrum Act's enactment and the views expressed by broadcasters in the earlier proceeding.[968] The Commission also proposed to modify the Table in the event of a decision to relocate RAS and WMTS incumbents from Channel 37 (608-614 MHz).[969]

319. *Discussion.* We adopt in part the Commission's proposal to add fixed and mobile allocations to the Table of Allocations on a co-primary basis with broadcast television. Specifically, we will add fixed and mobile services to the Table of Allocations for UHF channels 21-36 (512-608 MHz) and 38-51 (614-698 MHz), but not for UHF channels 14-20 (470-512 MHz) (also known as the "T-Band") or for VHF channels 2-13 (54-72, 76-88, and 174-216 MHz). We conclude that our action addresses the practical requirements of the incentive auction and the concerns raised by broadcasters and

(Continued from previous page)
whether sound (*e.g.,* AM or FM radio) or television. *Id.* Service rules determine which type of broadcasting service is used in a specified frequency band. Other allocations are limited to certain types of uses; for example, satellite allocations are specific as to type of use such as fixed, mobile, broadcasting or maritime mobile satellite.

[961] 47 C.F.R. § 2.106.

[962] *Fostering Innovation and Investment in the Wireless Communications Market*, 24 FCC Rcd 11322, 11326 para. 21 (2009).

[963] For example, the Commission has amended the Table of Allocations to establish co-primary fixed and mobile allocations in frequency bands used by commercial mobile radio services (CMRS), thereby permitting these bands to be used for fixed services, mobile services, or any combination of the two. *Amendment of the Commission's Rules to Permit Flexible Service Offerings in the Commercial Mobile Radio Services*, 11 FCC Rcd 8965 paras. 32-33 (1996). The FCC also has adopted flexible co-primary allocations in several frequency bands used by Miscellaneous Wireless Communications services (Part 27). *See, e.g.*, 47 C.F.R. § 27.2(a).

[964] 47 C.F.R. § 2.102(a).

[965] CMRS service rules typically permit any type of fixed or mobile use, *see, e.g.*, 47 C.F.R. § 24.3, but restrictions apply in some cases. For example, cellular system architecture may not be used in the 775-776/805-806 MHz guard bands under Part 27. 47 C.F.R. § 27.2(b).

[966] *See Innovation in the Broadcast Television Bands: Allocations, Channel Sharing and Improvements to VHF,* Notice of Proposed Rulemaking, 25 FCC Rcd 16498, 16504 para. 16 (2010).

[967] *See Innovation in the Broadcast Television Bands: Allocations, Channel Sharing and Improvements to VHF,* Report and Order, 27 FCC Rcd 4616, 4621 para. 10 (2012) (*Channel Sharing Report and Order*).

[968] *NPRM*, 27 FCC Rcd at 12399-400, paras. 119, 121.

[969] *NPRM*, 27 FCC Rcd at 12401, para. 121-122. The Commission asked about a range of possible frequencies to relocate RAS, including channel 4 (66-72 MHz) in the VHF band. *Id.* at 12429, para. 207.

other parties. We retain the allocations for Channel 37 for the RAS and the Land Mobile Service for WMTS.[970]

320. Adding fixed and mobile services to the Table of Allocations for UHF channels 21-36 and 38-51 is necessary to address the practical requirements of the incentive auction and the UHF band transition that follows it. As stated above, the assignment, licensing and use of frequencies must be in accordance with the Table,[971] yet we cannot know in advance of the incentive auction which frequencies will be repurposed for new uses in which geographic areas because that depends on the outcome of the incentive auction.[972] Further, by adding fixed and mobile services to the Table of Allocations for all of the frequencies that could be repurposed prior to the incentive auction, we will assure forward auction bidders that the frequencies on which they bid will be available for new, flexible uses without the need to conduct additional allocation proceedings post-auction that could risk delaying the transition and the introduction of new services.[973] The Commission has taken similar allocation actions in advance of prior spectrum auctions.[974] Accordingly, we decline NAB's request to defer any allocations decisions until after the auction process is complete.[975] In addition, we also find that, following the incentive auction, co-primary fixed/mobile/broadcasting allocations in the Table also will be necessary to allow users that currently operate on such frequencies on either a primary or secondary basis—including full power, Class A and LPTV stations, TV translator stations, BAS stations, and LPAS—to continue operating for an interim period on frequencies that will be repurposed during the course of the UHF band transition,[976] as well as to allow LPTV and TV translator stations to continue to operate on such frequencies during the reorganization of the UHF band.[977]

321. We believe that our action also addresses concerns raised by broadcasters.[978] First, we will not add fixed and mobile services to the Table of Allocations for VHF channels 2-13 or the T-Band, as originally proposed, because doing so is unnecessary. The Commission did not propose to repurpose any portion of the VHF band or the T-Band for fixed or mobile wireless use, and the 600 MHz Band Plan that we adopt does not provide for the possibility of such repurposing.[979] In addition, consistent with the

[970] *See NPRM*, 27 FCC Rcd at 12427, para. 199.

[971] 47 C.F.R. § 2.102(a).

[972] *See NPRM*, 27 FCC Rcd at 12401, para. 123. *See* CTIA Comments at 17; Verizon Comments at 59-60;; Motorola Comments at 13-14.

[973] *See* CEA Comments at 17.

[974] For example, prior to auctioning both the upper and lower 700 MHz bands, the Commission added allocations for fixed and mobile services on a co-primary basis with broadcasting. *See Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, Fifth Report and Order, 12 FCC Rcd 12809 (1997); *recon*., 13 FCC Rcd 6860 (1998); Sixth Report and Order, 12 FCC Rcd 14588 (1997); *see also Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules*, First Report and Order, 15 FCC Rcd 476 (2000); *Reallocation of Television Channels 60-69, the 746-806 MHz Band*, Report and Order, 12 FCC Rcd 22953 (1997); and *Lower 700 MHz R&O*, 17 FCC Rcd 1022.

[975] *See* NAB Reply at 34-35; *see also* APTS Comments at 36-37.

[976] The Commission took similar action in connection with the digital television transition. *See Lower 700 MHz R&O*, 17 FCC Rcd at 1029–30, para. 14 (retaining an allocation for broadcast television service in the Table for the Lower 700 MHz Band in order to allow broadcasting during the digital television transition).

[977] *See* § V.D.1 (LPTV and TV Translator Stations).

[978] *See* NAB Reply at 34-35 (arguing that a pre-incentive auction allocation decision would signal that the FCC seeks to repurpose all of the broadcast television bands).

[979] Accordingly, we disagree with CTIA that the Commission would sacrifice necessary flexibility by not adding co-primary allocations for fixed and mobile services to the Table of Allocations for all of the broadcast television bands. *See* CTIA Comments at 17-18.

provisions of the Spectrum Act, the Commission expects to act on the T-Band on a separate, later timetable.[980] Second, the service rules for the broadcast and wireless services, as modified in this Order, will ensure that broadcast and mobile wireless operations in the 600 MHz Band do not interfere with or otherwise disrupt one another. Third, to clearly identify where broadcast television and mobile wireless services will be permitted, we will later modify the Table of Allocations promptly to reflect the outcome of the incentive auction. Specifically, we hereby delegate authority to the Chief of the Office of Engineering and Technology to take such actions as are necessary to modify the Table of Allocations to be consistent with the outcome of the incentive auction—e.g., to remove the co-primary fixed and mobile allocations from segments of the UHF band that will remain available only for television broadcast service on a nationwide basis.[981]

IV. THE INCENTIVE AUCTION PROCESS

322. In this Section we discuss the incentive auction process that will determine the availability of spectrum usage rights in the reorganized UHF band and assign rights. We adopt a descending clock format for the reverse auction, which will simplify participation for broadcasters. For the forward auction, we adopt an ascending clock format. As described below, we also adopt rules on bidding procedures and other elements of the reverse and forward auctions. This Section also addresses how the reverse and forward auctions, the spectrum clearing target and the forward auction band plan determination, and the final stage rule will be integrated to determine the final incentive auction results.

323. Consistent with the Commission's practice in past spectrum license auctions, we adopt rules in this Order that will allow subsequent determination of specific final auction procedures.[982] Following this Order, a pre-auction process will precede the bidding process for the incentive auction. This pre-auction process will determine both the specific final auction procedures, based on additional public input, and the auction participants, through an application process. The process will be initiated by the release of the *Incentive Auction Comment PN*, which will solicit public input on final incentive auction procedures, and which will include specific proposals for crucial auction components such as opening prices. Thereafter, the *Incentive Auction Procedures PN* will specify final procedures, including dates, deadlines, and other final details of the application and bidding processes.[983] The rules we adopt in

[980] The Spectrum Act provides for the future relocation of public safety licensees from the T-Band and auctioning of T-Band spectrum separately from the broadcast television spectrum incentive auction, *see* Spectrum Act §§ 6103, 6403, and the Commission's Public Safety and Homeland Security Bureau issued a Public Notice inviting comment on T-Band issues. *See Wireless Telecommunications Bureau and Public Safety and Homeland Security Bureau Seek Comment on Options for 470-512 MHz (T-Band Spectrum)*, PS Docket No. 13-42, Public Notice, 28 FCC Rcd 1130 (2013). Because the Commission will act separately on the T-Band, we also conclude that expanding the existing land mobile allocation for the T-Band is unwarranted at this time. *See NPRM*, 27 FCC Rcd at 12401, para. 122.

[981] In other portions of the UHF bands, the Table of Allocations will continue to reflect co-primary allocations for broadcasting, fixed and mobile services. Although we anticipate that portions of the UHF bands will be cleared of full power and Class A broadcast television stations nationwide or only in certain geographic areas, low power and TV translator stations will continue to operate in these bands with secondary status until they are notified by a new wireless licensee that it is ready to begin operations. *See* § V.D.1 (LPTV and TV Translator Stations). Our foregoing delegation to OET also includes authority to modify the Table to add a footnote indicating that fixed and mobile services are authorized only in band segments and in geographic areas specified in Part 27.

[982] *See* § I (Introduction). For the reverse auction, we adopt new rules that will enable implementation of final, specific auction bidding procedures through the pre-auction process. For the forward auction, we describe existing spectrum license auction rules that permit implementation of specific forward auction procedures, and modify the existing rules or otherwise clarify them so that they can accommodate potentially novel features of the forward auction.

[983] The *Procedures PN* will be released well in advance of the application process for the incentive auction. As noted above, separate public notices may be released to seek comment on and/or to establish final auction procedures if that would more efficiently and effectively dispatch our business and fulfill our goals for the incentive auction. *See* § I (Introduction).

this Order provide for the ability to refine aspects of the reverse and forward auctions if the record developed in response to the *Comment PN* during the pre-auction process reflects the need to do so.

324. Although we concur with Verizon that the incentive auction presents complex auction design issues and that all parties will be best served if the Commission can resolve as many issues as possible sooner rather than later and well in advance of the auction,[984] we disagree that auction procedures need to be finalized in this Order. The Commission's practice of finalizing auction procedures in the pre-auction process provides adequate time for participants to both comment on the final procedures and to develop business plans in advance of the auction.[985] This approach has worked well, and a similar one is all the more necessary for the incentive auction due to its novelty and complexity. Maintaining flexibility in the implementation of final procedures is a prudent approach to assuring that the incentive auction will take place in a timely manner and fulfill the goals we have established by this Order.

A. Overview and Integration of the Reverse and Forward Auctions

325. The incentive auction will consist of a reverse and a forward auction. The reverse auction portion of the broadcast television spectrum incentive auction will collect information about the price at which broadcast television licensees would be willing to voluntarily relinquish some or all of their spectrum usage rights. The forward auction portion of the incentive auction will identify the prices that potential users of repurposed broadcast television spectrum would pay for new licenses to use the spectrum. This information, together with information from the reverse auction and subject to meeting the requirements for repurposing spectrum through the incentive auction, will determine the winning bidders for new flexible use licenses and the prices those bidders will pay for the spectrum licenses.

326. The reverse and forward auctions will be integrated in a series of stages. Each stage will consist of a reverse auction and a forward auction bidding process, and stages will be run until it becomes clear that the overall proceeds requirements for the incentive auction can be satisfied. Prior to the first stage, the initial spectrum clearing target will be determined. Then the first stage of the reverse auction will be run to determine the total amount of incentive payments to broadcasters required to meet that spectrum target. The first stage of the forward auction bidding process will follow the reverse auction bidding process for the first stage. If the proceeds of the forward auction are sufficient to satisfy the final stage rule during the first stage, the forward auction bidding process will continue until there is no excess demand for licenses, and then the incentive auction will close. If the rule is not satisfied, however, a second stage of the incentive auction will be run with a smaller spectrum clearing target in the reverse auction and fewer spectrum licenses available in the forward auction. If the final stage rule again is not met during the second stage, additional stages will be run, with progressively smaller spectrum clearing targets in the reverse auction and fewer licenses available in the forward auction, until the requirements of the rule are satisfied.

327. Here, we address how the reverse and forward auction bidding processes will be integrated through the spectrum clearing target, the stage structure, and the final stage rule. As with other components of the incentive auction, we adopt rules here to enable us to implement these components, and will establish final, specific procedures based on more public input during the pre-auction process.

328. *Initial Spectrum Clearing Target*. The initial clearing target—the maximum amount of spectrum sought to be cleared of television stations and repurposed through the incentive auction—will be determined before commencement of the reverse and forward auction bidding processes.[986] In this

[984] Verizon Comments at 24. *But see* PTV Comments at iii ("PTV also applauds the Commission for recognizing that this NPRM is just the first of many steps in ensuring a successful incentive auction and subsequent repacking. The Commission can help ensure that the process is transparent and fair by developing more detailed proposals through a series of public notices and providing the public additional opportunities to comment . . . .").

[985] *See* 47 U.S.C. § 309(j)(3)(E). Moreover, the transparency of this pre-auction process should reinforce the confidence of potential participants, furthering our goal of facilitating participation to the fullest extent possible.

[986] A similar process was described in Appendix C of the *NPRM*. *See NPRM*, 27 FCC Rcd at 12571.

"initialization step," each participating broadcaster will indicate its willingness to accept the opening price for various bid options.[987] The opening price will be the highest price offer that the broadcaster could receive for a bidding option. The initial clearing target will correspond to one of the spectrum recovery scenarios in our 600 MHz Band Plan.[988] The initial clearing target will be as high as possible given the number of broadcasters participating in the reverse auction and their willingness to bid at their opening prices, considering the parameters established for the repacking process and the amount of market variation to be accommodated.[989]

329. Commenters generally support rules designed to maximize the amount of repurposed spectrum.[990] A few commenters, however, encourage the Commission to establish a specific initial clearing target goal of 120 megahertz.[991] Consistent with our goal of allowing market forces to determine the highest and best use of spectrum, we choose instead to determine the initial clearing target based on information provided to the Commission by broadcast television licensees in the initialization step.

330. Broadcast television licensees' responses to opening prices will determine which licensees participate in the reverse auction for which bid options. A licensee entitled to protection in the repacking process that does not file an application to participate in the reverse auction, as well as any applicant declining to accept an opening price for any option—that is, declining to participate in the reverse auction—will be designated for assignment of a television channel in its pre-auction or home band.[992] Thus, at the conclusion of the initialization step, the Commission will know, at a minimum, which television stations need to be assigned channels in their home bands in the repacking process, and can set the initial spectrum clearing target accordingly. The Commission will use optimization techniques to determine the amount of spectrum that can be cleared or repurposed based on the feasibility of assigning channels to non-participating stations that are entitled to protection in the repacking process, as well as to participating stations that are willing only to move to a lower band.[993]

331. *Stage Structure.* The incentive auction will be conducted in a series of stages.[994] Each stage will be associated with a spectrum clearing target for bidding in the reverse auction and a corresponding license inventory for bidding in the forward auction. The clearing target and license inventory will be reduced from stage to stage, if the final stage rule is not satisfied. We adopt this structure in large part to facilitate bidder participation. Unlike alternatives in which the reverse auction bidding process would be run for all possible clearing targets before the forward auction bidding process, or vice versa, the stage structure does not require bidders in either side of the auction to provide more bid

[987] A bidder that accepts a price for a relinquishment option, whether the opening price or any other price offer in the reverse auction, makes a binding commitment to accept the relinquishment option if the auction system selects that bid as a winning bid. *See* § IV.B.2.d (Reverse Auction – Additional Bidding Procedures). *See also* § IV.B.1.b (Bid Options) (describing bid options for license relinquishment or license modification).

[988] *See* § III.A (600 MHz Band Plan); Technical Appendix.

[989] *See* §§ III.A.2.d (Market Variation), III.B.2 (Implementing the Statutory Preservation Mandate).

[990] For instance, Motorola Mobility states that the Commission should implement an auction process that maximizes the amount of spectrum that can be repurposed for wireless broadband services, and that the Commission should "adopt flexible policies that support spectrum clearing." Motorola Mobility Comments at 2. Likewise, Verizon notes that commenters broadly agree the auction design should maximize the amount of repurposed spectrum, and maximize broadcaster participation. Verizon Reply at vi.

[991] *See, e.g.*, Cisco Comments at 9; EOBC Reply at 14; HTSC Comments at 6; Verizon Comments at 22. *But see* NTA Comments at 13–14; NTA Reply at 4 (stating that the goal of repurposing 120 megahertz seems arbitrary).

[992] *See* § III.B.1 (Repacking Process Overview).

[993] *See* § IV.B.2.b (Reverse Auction Bid Assignment Procedures).

[994] *See NPRM*, 27 FCC Rcd at 12379, para. 67; *see also id.* at 12579 (Appendix C) (referring to an interleaved approach).

information than is needed for the auction to close. Further, bidders in each side of the auction will receive some information about conditions on the other side, facilitating their bidding decisions.[995] In addition, stopping the incentive auction at the earliest stage in which the final stage rule is met avoids prolonging the bidding processes unnecessarily, consistent with our recognition that speed is important to a successful auction outcome. The stage structure also provides a workable framework for determining the greatest amount of spectrum that can be cleared while satisfying the final stage rule.[996]

332. Commenters agree that the stage structure we adopt will facilitate and encourage auction participation by broadcast television licensees.[997] They note the informational advantages of a staged approach, including the importance of price discovery to participants.[998] We disagree with AT&T that running the reverse auction in full for all clearing targets (a "single-pass") before the forward auction commences would simplify participation for reverse auction bidders.[999] On the contrary, we agree with EOBC that the single-pass proposal would deprive broadcast television licensees of any information about the forward auction and require them to reveal more information than necessary during the reverse auction bidding.[1000] Nor are we persuaded by AT&T's claim that the need to conduct forward auction bidding between the reverse auction bidding process in each stage would impose a significant burden on participating broadcasters, particularly given that the stage structure might avoid the need for multiple stages, thereby concluding the entire auction more quickly.[1001]

333. Some wireless carriers contend that the single-pass approach would provide the greatest level of certainty for forward auction participants, thereby enhancing participation in the forward auction.[1002] We recognize that wireless carriers need time for planning and information regarding auction inventories in order to assess auction strategies and obtain financing.[1003] We note, however, that uncertainty about the number of spectrum licenses that will be available is inherent in the incentive auction, and affects parties on both sides of the auction process. We have sought to address this uncertainty in the 600 MHz Band Plan by establishing a set number of potential spectrum recovery

[995] In that regard, we note that the 600 MHz Band Plan is designed to provide potential forward auction participants with as much information as possible prior to the incentive auction so that they may prepare for the various contingencies that may unfold during the bidding.

[996] Because the reverse and forward auction bidding processes will be conducted for a common benchmark amount of cleared spectrum in each stage, the auction mechanism will be able to compare the incentive payments required to clear a given amount of spectrum to the forward auction proceeds available to pay for such clearing.

[997] *See* EOBC Comments at 11; Verizon Comments at 25; *see also* T-Mobile Reply at 72–75 (suggesting that the reverse auction should run for more than one clearing target at a time, but less than all possible targets).

[998] *See, e.g.*, EOBC Comments at 11 (supporting a stage structure to "enhance the information available to participants about the supply and demand on each side of the incentive auction"); EOBC Reply, Eisenach Reply Declaration at 15–16; T-Mobile Reply at 74.

[999] *See generally* AT&T Comments at 63.

[1000] EOBC Reply, Eisenach Declaration at 15–16; *see also* Verizon Comments at 26.

[1001] *Compare* AT&T Reply, Che & Haile Reply Analysis at 13 (suggesting that a "single-pass" auction would create less of a burden on broadcasters' time), *with* Verizon Comments at 27 (arguing that a staged approach actually limits the duration of the auction for broadcasters because they are able to drop out of the auction at various incremental stages), and T-Mobile Reply at 74 (stating that a "single pass" auction would take considerably more time to complete than a staged auction).

[1002] *See, e.g.*, Sprint Comments at 6; *see also* US Cellular Comments at 20; MetroPCS Comments at 8. Both US Cellular and MetroPCS support auction designs that differ from our chosen approach in other significant ways, with US Cellular opposing bidding for generic licenses in the forward auction and MetroPCS advocating an ascending clock reverse auction. Thus, their arguments regarding stage structure have less force. *See* §§ IV.B.2.a (Reverse Auction Bid Collection Procedures), IV.C.2.a (Forward Auction Bid Collection Procedures).

[1003] *See* Leap Reply at 4; MetroPCS at 8; Sprint Comments at 6.

scenarios, limiting the number of contingencies for which potential forward auction participants must plan.[1004] We conclude that the stage structure, which shares information about supply and demand with forward and reverse auction participants at the same time, is the optimal integration method for this incentive auction because it will facilitate broadcaster participation and serve as an effective means of determining whether the final stage rule can be satisfied at various spectrum clearing target levels.

334. Once the initial spectrum clearing target is determined, establishing the initial target for the first stage of the incentive auction, the reverse auction bidding process will begin.[1005] In that process, reverse auction bidders will be asked, in a series of bidding rounds, whether they are willing to accept progressively lower prices for the bid options. This bidding process will determine the total amount of the incentive payments that broadcast television licensees will require in order to voluntarily relinquish spectrum usage rights that will permit clearing of enough television channels to meet the initial clearing target. Generally, the prices for a bid option will descend from round to round until a station's voluntary relinquishment of rights becomes necessary to meet the spectrum clearing target.[1006]

335. Although each stage generally will be associated with a single clearing target, during the first stage of the auction the target may be reduced or modified in certain areas if we implement a "dynamic reserve price," under which bidders would be asked if they are willing to accept lower prices in areas without bidding competition (that is, areas where there is not active bidding by more stations than needed to meet the initial clearing target). If stations in such areas do not accept reduced prices and cannot be assigned a channel in the television bands, then they may be assigned a channel in the repurposed spectrum. Alternatively, the clearing target may have to be adjusted to make channels available for those stations.[1007] Details of the operation of any dynamic reserve price rule would be established in the *Incentive Auction Procedures PN* after an opportunity for comment.

336. Once the reverse auction bidding process has ended, the amount of the incentive payments required to achieve the spectrum clearing target will be known, as will any impairments to that target, and the auction system will announce the inventory of licenses available for bidding in the forward auction. Then the forward auction bidding process will be conducted to determine how much bidders are willing to pay for the inventory of licenses corresponding to the initial clearing target. The final stage rule for the incentive auction (addressed below) will be continuously evaluated during the forward auction bidding process.[1008] If the final stage rule is satisfied, then the incentive auction will end with the first stage. Bidding will continue in the forward auction, however, until there is no excess demand for licenses. If the final stage rule is not satisfied, the incentive auction will proceed to a second stage.[1009]

[1004] We note that the 600 MHz Band Plan we adopt is consistent with different spectrum clearing targets, which targets will determine the scope of potential options for forward auction bidders. *See generally* § III.A (Band Plan for the New 600 MHz Band); Technical Appendix. With respect to specific concerns about time available to prepare for the auction, we further note that we will establish the specific timing, including the lag, if any, between auction stages and between the reverse and forward auction bidding processes within a stage, in the pre-auction process.

[1005] The reverse auction bidding process is addressed in more detail in the next Section. *See* § IV.B.2 (Reverse Auction – Bidding Process).

[1006] *See* §§ III.B.1 (Repacking Process Overview), IV.B.2 (Reverse Auction Bidding Process).

[1007] We will determine whether and how to "impair" spectrum in the pre-auction process. *See* § III.A.2.d (Market Variation).

[1008] *See* § IV.C.2 (Forward Auction Bidding Process). Stopping procedures that specifically define when the bidding in the forward and reverse clock auctions ends will be discussed and established in the pre-auction process.

[1009] *See* § IV.C.2.a (Forward Auction Bid Collection Procedures) (noting the possibility of using extended rounds in some circumstances).

337. In a second stage, the spectrum clearing target in the reverse auction would be smaller than in the first stage. Likewise, the license inventory in the forward auction would be smaller than in the first stage. Reducing the spectrum clearing target will increase the likelihood of satisfying the final stage rule because less spectrum will need to be cleared and, therefore, fewer broadcasters will require incentive payments and prices in the reverse auction will generally fall. If the final stage rule is not satisfied in the second stage, then additional stages would be run with smaller clearing targets in the reverse auction and license inventories in the forward auction, until the final stage rule is satisfied.[1010]

338. *Final Stage Rule.* The earliest auction stage that meets the "final stage rule" will be the final stage of the auction.[1011] The final stage rule is a reserve price with two components. The current auction stage (and associated clearing target) will be designated as the *final stage* if the requirements of both components are met. In the pre-auction process, we will consider whether to apply the final stage rule solely to "major markets" and, if so, how to identify such markets. This approach could significantly speed up the determination of whether the final stage rule is satisfied.

339. The first component of the rule will be satisfied by the average price per MHz-pop[1012] for licenses in the forward auction or the total proceeds associated with those licenses, depending on the amount of spectrum cleared in that stage.

340. Specifically, the first component of the reserve price will be satisfied if, for a given stage of the auction:

- the average price per MHz-pop for licenses in the forward auction meets a price benchmark that will be set by the Commission in the pre-auction process,[1013] *or*
- the total proceeds associated with licenses in the forward auction exceed the product of the price benchmark, the spectrum clearing benchmark, and the total number of pops for those licenses.[1014]

The price and spectrum clearing benchmarks will be established by the Commission in the *Procedures PN*, after an opportunity for additional comment.

341. The second component of the final stage rule requires that, under either of the prongs of the first component above, the proceeds of the forward auction also must be sufficient to meet the clearing costs identified in the reverse auction, the other expenses set forth in section 6403(c)(2) of the Spectrum Act,[1015] and any Public Safety Trust Fund amounts still needed in connection with FirstNet after the close

[1010] *See* § III.A.2 (600 MHz Band Plan). The *Procedures PN* will determine, after additional opportunity for comment, how clearing targets for any subsequent stages will be established.

[1011] As noted above, after the final stage rule is satisfied, bidding will continue in the forward auction until there is no excess demand for licenses.

[1012] The term "MHz-pop" is defined as the product derived from multiplying the number of megahertz associated with a license by the population ("pop" or "pops") of the license's service area.

[1013] This version of the first component will apply when the clearing target for the given stage of the auction is at or below the Commission's specified spectrum clearing benchmark.

[1014] That is, if $p is the benchmark average price per MHz-pop, and Q is the spectrum clearing benchmark, the alternative version of the first component will be satisfied if the total proceeds from the licenses are at least $p times Q times the total pops in those licenses. The alternative version of the first component will apply only when the spectrum clearing target for a given stage of the auction is above the Commission's spectrum clearing benchmark.

[1015] The Spectrum Act requires that the forward auction generate proceeds sufficient to pay winning bidders in the reverse auction and cover relevant administrative costs of the auction and an estimate of relocation costs subject to reimbursement. *See* Spectrum Act § 6403(c)(2).

of the H Block and AWS-3 auctions.[1016] If the requirements of both components are met, then the final stage rule is satisfied.

342. The final stage rule advances our goal of allowing market forces to determine the highest and best use of spectrum. The approach described above will allow the incentive auction to determine the best balance of spectrum cleared and spectrum license prices attained through competition, while ensuring that the auction meets the statutory requirements. The first component's alternative conditions are designed to address the unique nature of the incentive auction, in particular the fact that we will not know how much spectrum will be available for the forward auction when establishing the price and spectrum benchmarks before the auction. This approach recognizes that if the incentive auction repurposes a relatively large amount of spectrum for flexible uses, per-unit market prices may be expected to decline consistent with the increase in available supply. The alternative formulation allows the first component to be satisfied in a stage with a high spectrum clearing target based on the total proceeds of the forward auction, even if the per-MHz-pop price is less than the benchmark price.

343. We establish the final stage rule pursuant to the underlying auction provisions in the Communications Act, which direct the Commission to establish methods for requiring a reserve price unless it determines that it is not in the public interest to do so.[1017] An objective common to all FCC auctions of spectrum licenses is that auction prices generally reflect competitive market values for comparable spectrum licenses.[1018] The reserve price approach described above will serve the public interest and this goal. The first component of the final stage rule's reserve price ensures that the forward auction recovers "a portion of the value of the public spectrum resource," as required by the Communications Act.[1019] Our approach based on the specific price and spectrum clearing benchmarks aims to assure that prices for licenses in the forward auction reflect competitive values without reducing the amount of spectrum repurposed for new, flexible-use licenses.

344. The second component of the final stage rule's reserve price ensures that the forward auction recovers the clearing costs and other expenses identified by the Spectrum Act.[1020] We also

[1016] The Spectrum Act establishes the priority for making payments or deposits from the Public Safety Trust Fund as amounts are deposited into the Fund, including to fund FirstNet, but does not mandate additional deposits. *See* Spectrum Act § 6413(b). Section 6413(b) specifies that the first $7.135 billion of the proceeds from auctions authorized under the Spectrum Act and deposited into the Fund will be used for FirstNet-related purposes.

[1017] 47 U.S.C. § 309(j)(4)(F). In our spectrum license auctions, a reserve price establishes the price below which a license or licenses subject to auction will not be awarded. *See* 47 C.F.R. § 1.2104(c). The Commission has, in recent auctions, established a reserve price in order to help ensure that auction prices reflected competitive market values for spectrum licenses. Typically, the amount of a reserve price(s) and the way in which it will be applied during the auction are established in the pre-auction process. *See, e.g.*, *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150, Second Report and Order, 22 FCC Rcd 15289, 15400-01, para. 304 (2007) (directing the Wireless Bureau to adopt aggregate reserve prices reflecting the potential market value of the 700 MHz Band spectrum based on a variety of factors); *see also Auction of H Block Licenses in the 1915-1920 MHz and 1995-2000 MHz Bands Scheduled for January 14, 2014; Notice and Filing Requirements, Reserve Price, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auction 96*, AU Docket No. 13-178, Public Notice, 28 FCC Rcd 13019, 13063–64, paras. 169–74 (2013) (setting a reserve price to recover for the public a portion of the value of the spectrum), *recon. denied*, 28 FCC Rcd 16108 (2013).

[1018] We will base the benchmark average per-unit price on factors including, but not limited to, prices received in auctions of comparable spectrum licenses. As stated above, the *Procedures PN* will determine the specific parameters of the final stage rule after further notice and comment in the pre-auction process.

[1019] 47 U.S.C. § 309(j)(3)(C).

[1020] We will assess the satisfaction of these statutory expenses in the aggregate. *See, e.g.*, Anon. Broadcaster 2 Comments at ii, 8–10; EOBC Comments at 12–13; EOBC Reply at 23 (arguing that a national measure will provide the Commission with "the greatest flexibility to utilize spectrum in the largest markets to unlock the value of spectrum in smaller markets throughout the country"). We reject Sinclair's contention that an allocated share of these expenses should be satisfied independently in each license area. Sinclair Comments at 14.

include FirstNet funding in the second component of the reserve price, consistent with section 309(j)(3)'s express command that in designing our auction rules we "seek to promote the purposes specified in [section 1 of the Communications Act]."[1021] Those purposes include "promoting safety of life and property through the use of . . . radio communications."[1022] Among the funding priorities identified in the Spectrum Act, including other public safety-related priorities, ensuring the build-out of FirstNet uniquely clearly furthers this purpose, as confirmed by examination of the public safety provisions of the Spectrum Act, which is part of the same "overall statutory scheme."[1023] Congress specifically directed the Commission to reallocate spectrum to and license FirstNet, instructed the Commission to "take all actions necessary to facilitate the transition of the existing public safety broadband spectrum to [FirstNet]," and authorized the Commission to "take any action necessary to assist [FirstNet] in effectuating its duties and responsibilities" under the Spectrum Act.[1024]

345. We also note that the auctions authorized by the Spectrum Act, including incentive auctions, are the sole source of federal funding identified by Congress for FirstNet.[1025] At this time, there are no additional incentive auctions planned prior to the end of fiscal year 2022. Thus, unless FirstNet funding is part of the final stage rule for the broadcast television spectrum incentive auction, full funding of the Public Safety Trust Fund ("PSTF") for FirstNet may be deferred indefinitely. We are optimistic that the proceeds from the H Block and AWS-3 auctions will be sufficient to fully fund amounts for FirstNet. Nonetheless, we include PSTF funding for FirstNet as part of the final stage rule to address the possibility that such amounts will not be fully funded from the proceeds of those earlier auctions, and pursuant to the explicit public safety goals set forth above. For the reasons explained above, we disagree with commenters that contend the Commission should not apply a final stage rule or conditions beyond the expenses enumerated in the Spectrum Act.[1026]

346. Once the final stage rule is satisfied, and bidding has continued in the forward auction until there is no excess demand for licenses, winners of generic licenses in the forward auction will participate in an assignment round for specific frequency assignment.[1027] Final prices for forward auction licenses will be set in the assignment round.[1028] Results of the final stage of the reverse auction will determine which broadcasters will relinquish which spectrum usage rights and how much of the auction

[1021] 47 U.S.C. § 309(j)(3).

[1022] 47 U.S.C. § 151. *See also Nuvio Corp. v. FCC*, 473 F.3d 302, 312 (D.C. Cir. 2007) (Kavanaugh, J., concurring) ("broad public safety and [9-1-1] authority Congress has granted the FCC").

[1023] *See FDA v. Brown and Williamson Tobacco Corp.*, 529 U.S. 120, 132–33 (2000). *See also Maricich v. Spears*, 133 S. Ct. 2191, 2203 (2013) ("[I]n expounding a statute, we . . . look to the provisions of the whole law, and to its object and policy[.]") (quoting *U.S. Nat'l Bank of Ore v. Indep. Ins. Agents of America, Inc.*, 508 U.S. 439, 455 (1993)).

[1024] Spectrum Act §§ 6201(a), 6201(c), 6213.

[1025] *See* 47 U.S.C. §§ 309(j)(8)(D)(ii), 309(j)(8)(F), 309(j)(8)(G)(iii)(II)(aa) (added by the Spectrum Act) (directing that proceeds from the auctions required by the Spectrum Act and incentive auctions held prior to the end of fiscal year 2022 be deposited in the Public Safety Trust Fund).

[1026] *See, e.g.*, Verizon Comments at 55–56; Anon. Broadcaster 2 Comments at 8; EOBC Comments at 12–13. We read § 6403(c)(2) of the Spectrum Act as simply requiring that the incentive auction recover the expenses specified therein, i.e., payments to the reverse auction winning bidders, the Commission's administrative expenses, and the estimated costs of relocation. We do not construe the Spectrum Act to repeal the Commission's broad authority under § 309(j)(3) to promote the public safety goals outlined in § 1 of the Communications Act, which is the basis for our inclusion of FirstNet support in the final stage rule.

[1027] *See* § IV.C.2.b (Forward Auction Bid Assignment Procedures).

[1028] *See id.*; *see also* § IV.C.2.c (Forward Auction Procedures to Determine Payments).

proceeds they will receive in exchange.[1029] Stations that will remain on the air will proceed to the final channel assignment process.[1030]

B. Reverse Auction

347. The reverse auction portion of the incentive auction will collect information about the price at which broadcast television licensees would be willing to voluntarily relinquish some or all of their spectrum usage rights. We describe below the pre-auction and bidding processes for the reverse auction.

1. Pre-Auction Process

348. We adopt a pre-auction application filing process for reverse auction participants, similar to that used in spectrum license auctions. The process will, among other things, require broadcast television licensees to make disclosures and certifications establishing their eligibility to participate in the reverse auction. Such an approach will ensure serious participation without being unduly burdensome. Below, we discuss these eligibility requirements and what information a broadcast television licensee must provide to the Commission to demonstrate its eligibility to participate in the reverse auction.

349. We also discuss the Commission's obligation to keep confidential the participation of broadcasters in the reverse auction. In addition, we address the adoption of a rule prohibiting full power and Class A television licensees from communicating with each other or with forward auction applicants about bids or bidding strategies for a specified period of time. Further, we discuss the statutory requirement for two participants to compete in the reverse auction and the processing of pre-auction applications to participate in the reverse auction.

a. Eligibility

350. We identify which broadcast television licensees will be eligible to participate in the reverse auction and the spectrum usage rights eligible for relinquishment by those licensees. We limit reverse auction participation to the licensees of full power and Class A television stations that we will protect in the repacking process.[1031] For each station, the rights eligible for voluntary relinquishment will be the same as those associated with the facilities that we will protect in the repacking process absent relinquishment of those rights.

(i) Licensees Eligible to Participate

351. *Background*. In the *NPRM*, the Commission tentatively concluded that the Spectrum Act limits reverse auction participation to full power and Class A licensees.[1032] It also tentatively decided that stations operating on a noncommercial educational ("NCE")-reserved channel or with NCE status on a non-reserved channel will be eligible to participate in the reverse auction.[1033] Although the Spectrum Act requires all reasonable efforts to preserve a full power or Class A licensee's coverage area and population served as of February 22, 2012,[1034] it does not establish an analogous date for reverse auction eligibility.

[1029] *See* §§ IV.B.2.b (Reverse Auction Bid Assignment Procedures), IV.B.2.c (Reverse Auction Procedures to Determine Payments).

[1030] *See* § III.B.1 (Repacking Process Overview).

[1031] *See* Spectrum Act § 6403(b)(2) (mandating the Commission to "make all reasonable efforts to preserve, as of the date of the enactment of this Act, the coverage area and population served of each broadcast television licensee"); *see also* § III.B.3 (Facilities to Be Protected).

[1032] *NPRM,* 27 FCC Rcd at 12380–81, para. 74.

[1033] *Id.* at 12381, para. 76. We do not designate Class A television station licenses as NCE, although a Class A licensee may operate its station on a noncommercial educational basis.

[1034] *See* Spectrum Act § 6403(b)(2).

In the *NPRM*, the Commission proposed to create parity between repacking protection and reverse auction eligibility by limiting eligibility to stations that would be protected in the repacking process.[1035]

352. *Discussion*. We adopt the proposal to limit reverse auction participation to licensees of commercial and NCE full power and Class A stations.[1036] Limiting reverse auction eligibility in this manner comports with the plain language of the Spectrum Act as well as the policies underlying it. Section 6403(a)(1) directs the Commission to conduct "a reverse auction to determine the amount of compensation that each broadcast television licensee would accept in return for voluntarily relinquishing some or all of its broadcast television spectrum usage rights." The Spectrum Act defines "broadcast television licensee" as "the licensee of (A) a full-power television station; or (B) a low-power television station that has been accorded primary status as a Class A television licensee."[1037] Because this definition does not exclude NCE licensees, we find that the Spectrum Act extends reverse auction eligibility to NCE licensees of full power and Class A stations.[1038] The definition of "broadcast television licensee" does not include LPTV and TV translator stations, however.[1039] Accordingly, licensees of such stations will not be eligible to participate in the reverse auction.[1040] Our decision to limit reverse auction eligibility to licensees of commercial and NCE full power and Class A stations is consistent with our mandate to make all reasonable efforts to preserve the coverage area and population served of only these stations in the repacking process.[1041] It also comports with our decision not to exercise our discretionary authority to extend repacking protection to LPTV and TV translator stations. As discussed below in connection with spectrum usage rights, harmonizing qualifications for reverse auction eligibility with those for repacking protection will further the goals of the Spectrum Act.

353. Although the Spectrum Act does not define the term "licensee," we interpret "licensee" to mean "the holder of a . . . station license," as it is defined in the Communications Act.[1042] We therefore

[1035] *NPRM,* 27 FCC Rcd at 12382–83, para. 79.

[1036] *Id.* at 12380–81, paras. 73–74.

[1037] Spectrum Act §§ 6001(6)(A)–(B).

[1038] *NPRM,* 27 FCC Rcd at 12381, para. 76; *see also* Spectrum Act § 6001(6)(A). Furthermore, the statute protects the cable and satellite carriage rights of channel sharing NCE stations, implying the eligibility of NCEs to participate in the reverse auction. Section 6403(a)(4) protects the "carriage rights under section . . . 615 of the Communications Act" of licensees that relinquish spectrum usage rights in order to share a channel. Section 615 of the Communications Act applies only to NCE stations. *See* 47 U.S.C. § 535. The Communications Act exempts NCE stations from the FCC's general authority to grant "initial licenses or construction permits" through competitive bidding. *Id.* § 309(j)(2)(C); *see NPR v. FCC*, 254 F.3d 226, 228–229 (D.C. Cir. 2001) ("[T]he [Communications] Act unambiguously forbids the Commission from requiring NCEs to participate in auctions to obtain licenses for any channel, reserved or unreserved."). That exemption, however, does not apply to the voluntary relinquishment of spectrum usage rights pursuant to § 6403(a) of the Spectrum Act. Some commenters specifically support the conclusion that NCE stations are eligible to participate in the reverse auction. *See* EOBC Comments at 15; T-Mobile Comments at 37. Although commenters do not contest our tentative decision to permit NCE stations to participate in the reverse auction, some express concern about the impact of reverse auction participation on NCE coverage. *See* § IV.B.1.b (Reverse Auction Bid Options).

[1039] *NPRM,* 27 FCC Rcd at 12380, para. 73.

[1040] Several commenters note that LPTV stations are excluded from reverse auction eligibility. *See* CTIA Comments at 33; Spectrum Bridge Comments at 7; MSGPR Comments at 5; NRB Comments at 5; TechAmerica Reply at 5–6; *cf.* M. Gravino Comments at 2 (requesting that Congress allow reverse auction participation by LPTV stations). We note that, as with TV translators, digital replacement translators (DRTs) will not be reverse auction eligible.

[1041] *See* Spectrum Act § 6403(b)(2) (requiring the Commission to make "all reasonable efforts" to preserve the coverage area and population served of full power and Class A television licensees only); *id*. § 6403(b)(4)(A)(i) (requiring reimbursement of certain "broadcast television licensee[s]").

[1042] 47 U.S.C. § 153(30).

conclude that to be a "licensee" of a full power or Class A station eligible to participate in the reverse auction, a broadcaster must hold a license for the station it wishes to offer.[1043] Because the Spectrum Act does not mandate a time by which a license must be obtained to be a "licensee," we have discretion to adopt a licensing deadline. We conclude that, in order for a broadcaster to be a reverse auction eligible "licensee," it must hold a license for the full power or Class A station it wishes to offer at auction on or before the Pre-Auction Licensing Deadline.[1044] Thus, the small number of entities that held construction permits but not licenses for new full power television stations as of February 22, 2012 must obtain licenses for these stations on or before the Pre-Auction Licensing Deadline in order to be eligible to participate in the reverse auction. In addition to being consistent with the statutory language, this approach creates consistency between reverse auction eligibility and repacking protections.[1045]

(ii) Spectrum Usage Rights That Will Be Eligible for Relinquishment

354. *Background*. While the Spectrum Act identifies who can participate in the reverse auction (i.e., a full power or Class A "broadcast television licensee"[1046]), it does not describe which "spectrum usage rights"[1047] are eligible for relinquishment. Nor does it establish a date by which a station must secure such rights in order to relinquish them in the reverse auction.[1048] In the *NPRM*, the Commission linked the proposals regarding the spectrum usage rights it would recognize for bidding purposes with the facilities being protected in the repacking process.[1049] Consistent with its proposals for repacking protections, the Commission proposed to limit eligible relinquishment to licensed facilities.[1050]

[1043] An entity building a new broadcast station first receives a construction permit authorizing construction of the facility, at which point the entity becomes a "permittee." It does not become a "licensee," however, until the Commission grants the entity its initial license after the facility has been constructed.

[1044] *See* § III.B.3 (Facilities to Be Protected) (delegating authority to the Media Bureau to issue a Public Notice specifying the Pre-Auction Licensing Deadline). This subsection addresses only who may participate in the reverse auction. We address what rights may be relinquished in the next subsection. For example, licensees authorized to change channels or communities of license and Class A licensees authorized to convert to digital are reverse-auction-eligible "licensees" even if they do not obtain a license for their authorized modification by the Pre-Auction Licensing Deadline. With limited exceptions, however, such licensees must at least have a license-to-cover application for their modified facility on file by the Pre-Auction Licensing Deadline in order for the spectrum usage rights covered by such facility to be recognized for relinquishment. *See* § IV.B.1.a.ii (Spectrum Usage Rights That Will Be Eligible for Relinquishment).

[1045] This consistency will further the statutory goal of making spectrum available for the forward auction. Denying reverse auction eligibility to a licensee whose station we will make all reasonable efforts to preserve in repacking would make it impossible to reclaim this spectrum through the mechanism established in the Spectrum Act, thereby undermining the goal of using market forces to repurpose UHF spectrum for new uses. Conversely, allowing the licensee of a non-protected station to participate in the reverse auction could undermine the success of the auction since such facilities may be displaced in the repacking process without compensation. *See* §§ III.B.3.d.iii (LPTV and TV Translator Stations), V.D.1 (Transition Procedures for LPTV and TV Translator Stations).

[1046] Spectrum Act § 6403(a)(1).

[1047] *Id*.

[1048] *Id*.

[1049] *See NPRM*, 27 FCC Rcd at 12382, para. 77 n.110 (proposing parity between a full power station's spectrum usage rights protected in the repacking process and recognized for relinquishment) and 12383, para. 80 n.120 (proposing parity between a Class A station's spectrum usage rights protected in the repacking process and recognized for relinquishment).

[1050] In the *NPRM*, the Commission proposed to entertain bids to relinquish spectrum usage rights associated with: (1) full power licenses held as of February 22, 2012; (2) the original license for new stations granted construction permits by February 22, 2012, if licensed by the date of submission of the pre-auction application; (3) the initial digital license of a digitally transitioning Class A station regardless of whether the Commission granted it before or

(continued….)

It also proposed not to entertain bids to relinquish spectrum usage rights associated with construction permits or pending applications for construction permits for which a license was not granted as of February 22, 2012.[1051]

355. *Discussion*. We will recognize for voluntary relinquishment in the reverse auction those spectrum usage rights associated with facilities entitled to repacking protection, including those that we must protect under the Spectrum Act and those that we will afford discretionary protection. As discussed earlier, we conclude that a facility must be licensed by the Pre-Auction Licensing Deadline in all but a few cases in order to be protected in the repacking process.[1052] We reach the same conclusion here: in all but the same few cases, a facility must be licensed by the Pre-Auction Licensing Deadline in order for the spectrum usage rights covered by that facility to be recognized for relinquishment.[1053]

356. As stated above, although section 6403(a)(1) requires a reverse auction in which broadcasters may accept compensation for "voluntarily relinquishing some or all of [their] broadcast television spectrum usage rights,"[1054] the Spectrum Act does not define the term spectrum usage rights. Under the Communications Act, however, only a station license confers on the holder the right to "use" the station to transmit signals.[1055] We similarly interpret the term "spectrum usage rights" in the Spectrum Act to mean the rights of a broadcaster to use spectrum pursuant to a station's license.[1056] Under our interpretation, spectrum usage rights may include a licensee's existing or prospective licensed rights to use spectrum.[1057]

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after February 22, 2012; and (4) the analog license of a Class A station that has not received a digital license prior to the auction. *NPRM,* 27 FCC Rcd at 12381–83, para. 77–80.

[1051] *Id.* at 12382–83, para. 79.

[1052] As discussed in § III.B.3 (Facilities to Be Protected), "licensed" facilities for purposes of protection in the repacking process include those subject to a license-to-cover application. Facilities subject to a license-to-cover application that will be protected in the repacking process also will be eligible for relinquishment in the reverse auction.

[1053] As discussed above, with one exception, we will not protect LPTV stations that were eligible for a Class A license but that did not file an application for such license until after February 22, 2012. *See* § III.B.3.d.ii (Out-of-Core Class A Eligible LPTV Stations). Although such entities may hold Class A licenses before the Pre-Auction Licensing Deadline, their facilities will not be protected in the repacking process, and thus the spectrum usage rights covered by such facilities will not be recognized for relinquishment.

[1054] Spectrum Act § 6403(a)(1). Section 6403 of the Spectrum Act references "spectrum usage rights" or simply "usage rights." *See* Spectrum Act §§ 6403(a)(1) ("broadcast television spectrum usage rights"), 6403(a)(2)(A)–(C) ("usage rights"), 6403(a)(4) ("spectrum usage rights"), 6403(b)(4)(A)(ii)(II)-(III) ("spectrum usage rights"), and 6403(g)(1)(A) ("spectrum usage rights"); *see also* Spectrum Act § 6001(30) ("broadcast television spectrum usage rights"). Section 6402 refers to "*licensed* spectrum usage rights," as well as "spectrum usage rights." *Compare* Spectrum Act § 6402, adding 47 U.S.C. § 309(j)(8)(G)(i) (referring to "licensed spectrum usage rights") *with id.* § 309(j)(8)(G)(i)–(ii) (referring to "spectrum usage rights"). Because we are conducting the broadcast television spectrum incentive auction under § 6403, we need not address the meaning of "licensed spectrum usage rights" in § 6402.

[1055] *See* 47 U.S.C. § 153(49) (defining "license" as an "instrument of authorization . . . for the use or operation of apparatus for transmission of energy, or communications, or signals by radio"). A construction permit merely authorizes the "construction of a station" for the transmission of signals. 47 U.S.C. § 153(13).

[1056] We conclude that STAs and experimental licenses do not qualify as "spectrum usage rights" for purposes of § 6403(a)(1) for the same reasons discussed above with respect to protection in the repacking process. *See* § III.B.3.d.iv (Special Temporary and Experimental Authorizations).

[1057] The Spectrum Act does not specify a date by which a broadcaster must secure its spectrum usage rights in order to be able to relinquish them at auction, and we do not believe the statute requires that these rights be licensed by a specific date. To maintain consistency with our repacking approach, we will recognize for relinquishment, even if
(continued….)

357. Parity between repacking protections and reverse auction eligibility will further the goals of the incentive auction.[1058] If the Commission protected rights in the repacking process that a broadcaster could not be compensated for relinquishing in the reverse auction, broadcasters' incentive to bid in the reverse auction would be reduced because they would not be eligible for compensation for the full value of their rights. This, in turn, could undermine Congress's goals for the incentive auction.[1059] At the same time, it would be meaningless for us to recognize for relinquishment broader rights than those which we would protect in the repacking process. Unprotected usage rights will not affect our repacking flexibility or our ability to repurpose spectrum and thus will have no value in the reverse auction.

(iii) Pending Renewal and Enforcement Proceedings

358. *Background*. In the *NPRM*, the Commission sought comment on how to treat a station offered in a license relinquishment bid in the reverse auction that is the subject of a pending renewal application or enforcement matter.[1060] The Commission has a longstanding policy restricting the sale of stations in these situations.[1061] While noting the importance of preventing a licensee from evading the consequences of wrongdoing through a station sale, thus undermining the deterrent effect of our rules, the Commission stated that the public interest in maximizing participation in the reverse auction may justify permitting license relinquishment bids in such situations.[1062] It also noted that, although it generally does not permit the sale of a broadcast license in the face of unresolved complaints involving the license,

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they are not licensed by the Pre-Auction Licensing Deadline, the facilities authorized in a construction permit to modify the existing licenses of stations affected by the destruction of the World Trade Center that seek to relocate to the new 1 World Trade Center site if they elect to have such facility protected in the repacking process and a construction permit for a new full power station on channel 3 at Middletown Township, New Jersey that was allotted pursuant to a court order. *See* § III.B.3.b.v (Additional Cases). All other facilities must be licensed by the Pre-Auction Licensing Deadline for the usage rights covered by that facility to be recognized for relinquishment. Some commenters assert that they should not have to expend funds to construct a facility that they will offer in the reverse auction. *See* Vision Comments at 8. We reject this argument for the same reasons that we generally decline to protect facilities in the repacking process that are not licensed by the Pre-Auction Licensing Deadline.

[1058] Consistent with our repacking approach, the rights eligible for relinquishment will include those reflected in permits granted by the April 5, 2013 issuance of the Media Bureau's *Freeze PN*, so long as the relevant facilities are licensed by the Pre-Auction Licensing Deadline. Class A licensees that received initial authorizations for their digital facilities prior to April 5, 2013 are subject to the *Freeze PN*, while such licensees obtaining initial digital authorizations after this date are not. *See* § III.B.3.b.iii (Facility Modifications). Contrary to the arguments of some commenters, this approach does not impermissibly provide disparate treatment to similarly situated entities. *See* Polnet Reply at 1–3; Local Media Reply at 2–4 (citing *Melody Music, Inc. v. FCC*, 345 F.2d 730, 733 (D.C. Cir. 1965)). Rather, our approach ensures that all initial Class A digital conversion applications will be processed consistently, using the same standards and procedures regardless of the timing of the application, so long as the application complies with our existing rules.

[1059] *See Morton v. Ruiz*, 415 U.S. 199, 237 (1974) ("In order for an agency interpretation to be granted deference, it must be consistent with the congressional purpose.") (citation omitted).

[1060] This issue is not relevant for winning UHF-to-VHF, high-VHF-to-low-VHF, or channel sharing bidders because they will remain Commission licensees after the reverse auction and, therefore, would remain subject to a pending license renewal or enforcement proceeding regardless of the outcome of the reverse auction.

[1061] *See NPRM*, 27 FCC Rcd at 12383–84, paras. 81–82; *see also Questions Concerning Basic Qualifications of Broadcast Applicants*, Public Notice, 28 R.R.2d (P&F) 705, 706 (1973) (providing for "deferral of action on transfer applications, where the prospective seller is involved in a pending renewal, revocation or investigative proceeding regarding the particular station to be sold"); *Jefferson Radio Co. v. FCC*, 340 F.2d 781 (D.C. Cir. 1964) (resolution of outstanding question concerning the seller's qualifications is a condition precedent to consideration of a transfer application).

[1062] *See NPRM*, 27 FCC Rcd at 12383–84, paras. 81–82.

exceptions have been made to this practice in order to serve competing public objectives.[1063] When it has permitted such exceptions, the Commission often has placed conditions on grant of the transaction. For example, if the seller will hold other broadcast licenses after a sale, the Commission has conditioned its grant on the seller's agreement to remain liable for the outcome of a renewal proceeding or enforcement action involving the station sold.[1064] If the seller no longer will hold any broadcast licenses upon consummation of the sale, the Commission has required the seller to place funds into escrow pending the outcome of the proceeding.[1065]

359. *Discussion*. We will allow a broadcaster with a pending enforcement matter or a pending license renewal application that raises an enforcement issue to participate in the reverse auction,[1066] on condition that such a broadcaster who no longer would hold any broadcast licenses upon acceptance of a license relinquishment bid agrees that a share of its reverse auction proceeds be placed by the Commission in escrow to cover potential forfeiture costs.[1067] This escrow approach is based on procedures already familiar to broadcasters in the sales context. It also will streamline reverse auction participation by allowing broadcasters to participate without first fully resolving license renewal or enforcement matters. Furthermore, as indicated below, this approach will provide certainty concerning maximum enforcement liability, allowing the potential bidder to factor this potential liability into its bid amount. Finally, consistent with longstanding Commission policy, holding a license relinquishment bidder liable for the outcome of an enforcement issue even if it sells its last broadcast license ensures that a broadcaster cannot evade the consequence of its wrongdoing by reverse auction participation.

360. To implement this policy, if a broadcaster indicates in its pre-auction application that (1) it might place one or more license relinquishment bids, and (2) it would not control any other broadcast stations if its bid or bids were accepted, then we will review our records to determine whether any outstanding enforcement matters exist pertaining to the broadcaster's stations, including complaints for which a proceeding has not yet been initiated and violations disclosed during the license renewal process.[1068] If appropriate and feasible under the circumstances, we will dispose of pending enforcement

[1063] For example, the Commission has permitted a bankrupt licensee to sell a station involved in an enforcement proceeding in order to protect creditors, provided the seller does not retain the proceeds of the sale. *See, e.g., Second Thursday Corp.,* 25 F.C.C.2d 112, 113–115, paras. 1–7 (1970). Similarly, the Commission has permitted the sale of stations to protect innocent stockholders even outside the context of bankruptcy on condition that the malefactor will receive no benefit from the sale and will not hold other licenses. *Mountain View Communications, Inc.*, 24 FCC Rcd 13516, 13521, para. 18 (2009).

[1064] *See, e.g., Applications of Comcast Corp., General Electric Co., and NBC Universal, Inc.*, MB Docket No. 10-56, Memorandum Opinion and Order,, 26 FCC Rcd 4238, 4349, para. 275 nn.701, 702 (2011).

[1065] *See, e.g., Bela TV, LLC*, Consent Decree, 25 FCC Rcd 400, para. 1 n.3 (2010) (noting that prior to grant of television station assignment, Commission required seller to enter into agreement to place funds in escrow in order to cover potential liability for alleged indecency violation in 2006).

[1066] License renewal applications are subject to a three-month petition to deny period. *See* 47 C.F.R. § 73.3516(e). Other than in unique circumstances, if a renewal application is uncontested and does not raise enforcement issues, the Media Bureau will grant it shortly after the end of this period. Given the unique circumstances involving the incentive auction, we will permit stations to be offered in the reverse auction even if they are subject to a pending renewal application for which the petition to deny period has not yet expired at the commencement of the auction. Any special procedures needed to address stations in this situation will be addressed in the *Procedures PN*.

[1067] Verizon and Entravision support allowing such broadcasters to participate in the reverse auction. Verizon Comments at 35; Entravision Comments at 5–6. We received no comments opposing participation by such stations. As noted above, reverse auction bidders that hold multiple broadcast licenses and will continue to hold at least one Commission license upon acceptance of their bids will remain subject to any pending license renewal, as well as any enforcement action against the station offered at auction. Such participants will be required to acknowledge this continuing liability in their pre-auction application.

[1068] This includes matters pending in the Media Bureau, such as violations revealed during the license renewal process, as well as complaints being addressed in the Enforcement Bureau.

matters prior to the reverse auction, such as in cases that do not require further inquiry and can be dismissed or resolved with the issuance of an admonishment or the execution of a consent decree.[1069]

361. We delegate authority to the Wireless Telecommunications, Media, and Enforcement Bureaus to include information about any pending enforcement matters against a reverse auction applicant that cannot be resolved before the reverse auction when notifying an applicant of its eligibility to participate in the auction. Along with that notice, the Bureaus will indicate the amount of reverse auction proceeds that will be placed in escrow should the broadcaster submit a winning license relinquishment bid. This sum will represent the maximum amount necessary to cover a potential forfeiture based on enforcement matters existing at that time.[1070] The escrow agreement will terminate: (1) at the later of (i) two years after the date on which the licensee relinquishes the station's license, or (ii) after the resolution of a complaint filed to collect a forfeiture;[1071] or (2) when all of the escrow funds are distributed.[1072] At termination of the escrow agreement, any funds remaining in the account will be remitted to the reverse auction winner. The broadcaster must agree to the escrow arrangement in order to participate in the reverse auction. More detailed procedures and the exact form of the escrow agreement will be discussed in the *Procedures PN*. This procedure will streamline the process of handling outstanding enforcement matters and provide a measure of certainty to license relinquishment bidders. It therefore will help us facilitate broadcaster participation, while still ensuring that a licensee cannot avoid the consequences of violations through reverse auction participation.[1073]

(iv) Relinquishment of Expired or Revoked Licenses and Downgraded Class A Licenses

362. *Background*. In the *NPRM*, the Commission invited comment on how we should treat stations in the reverse auction if a question exists concerning the validity of a license because it has expired,[1074] has been revoked in an enforcement proceeding,[1075] or has been modified from Class A to

[1069] *See, e.g.,* Letter from Barbara A. Kreisman, Chief, Video Division to Atlanta Television Station WUPA, Inc., 2013 WL 2146010 (dated May 17, 2013) (admonishing licensee for the station's isolated violation of the children's television commercial limits as reported in station's license renewal application).

[1070] In the rare event that an enforcement matter raises an issue for which license revocation would be the likely outcome of the proceeding, or in a situation where the proceeding likely would result in the modification of a Class A station license to low power status, then the Bureau handling the matter may, at its discretion, require the entire amount of the reverse auction proceeds to be placed in escrow and the procedures outlined in the next subsection for stations involved in such enforcement matters would be followed.

[1071] To the extent necessary, the two-year term of the escrow agreement also will extend the Statute of Limitations applicable to the FCC and to collection actions by the Department of Justice (DOJ). S*ee* 47 U.S.C. § 503(b)(6); 28 U.S.C. § 2462. This limited extension will provide certainty to potential bidders by assuring that the Commission must complete any enforcement action within two years and any collections action by DOJ also must be filed within the two-year period. It also will protect the FCC by allowing the judicial collections process, once started, to continue to completion, thus preventing intentional delay by the subject of an enforcement action in an attempt to avoid payment through expiration of the escrow agreement during the pendency of an action to collect a forfeiture.

[1072] Escrow funds may be distributed to satisfy a forfeiture or a voluntary contribution in connection with a Consent Decree and Order, or may be returned to the former licensee if the pending matters are closed without an enforcement action.

[1073] Few commenters respond to the questions raised in the *NPRM* about pending enforcement matters, other than to advocate adoption of a streamlined approach for handling these matters. *See* Verizon Comments at 35. Verizon supports settlement of pending enforcement proceedings at a fixed amount based on the nature of the alleged violation in order to provide broadcasters with certainty for bid valuation purposes. *Id.* We conclude, however, that the procedure outlined above provides sufficient information to broadcasters for bid valuation purposes.

[1074] A license expires as a matter of law when the station ceases operations for any consecutive 12-month period. 47 U.S.C. § 312(g). It also expires when a licensee fails to file a license renewal application for its station prior to the license expiration date. *See* 47 U.S.C. § 307(c)(1) (requiring the filing of a license renewal application); *id.* §

(continued….)

LPTV status. To prevent a broadcaster from receiving payment for relinquishing spectrum to which it no longer has usage rights, or in connection with a Class A station which has been reclassified to LPTV status, the *NPRM* proposed that such licenses could not be offered in the reverse auction whether or not the expiration, revocation, or downgrade determination has become final and unappealable.[1076]

363. *Discussion*. We will not allow a station to participate in the reverse auction if its license has expired,[1077] is subject to a revocation order (collectively a "license validity proceeding"), or is for a Class A station that is subject to a downgrade order, provided the license validity proceeding or Class A downgrade order has become final and non-reviewable by a date prior to commencement of the auction that will be specified in the *Procedures PN*.[1078] If such a proceeding or order has not become final and non-reviewable by that date, we will allow the licensee to voluntarily relinquish its spectrum usage rights in the reverse auction.[1079] Should the licensee submit a winning bid, we will place its reverse auction proceeds in escrow using the procedures outlined above pending the final outcome of the proceeding or order. If the decision becomes final and non-reviewable, then the money held in escrow will be deposited with the other incentive auction proceeds.[1080] In the event that a winning bidder subject to a pending license validity proceeding or Class A downgrade order prevails in its appeal, we will release from escrow to the licensee its reverse auction payment less any forfeiture that may result.[1081]

364. Adopting this approach ensures that we do not unfairly deny reverse auction eligibility to a broadcaster that might prevail in its challenge of a license validity proceeding or Class A downgrade decision.[1082] Additionally, it ensures that spectrum usage rights that otherwise would be protected in the

(Continued from previous page)
307(c)(3) (noting that the filing of a license renewal application continues the effectiveness of the existing license beyond its expiration date).

[1075] Although an exceedingly rare occurrence, the Commission has revoked a television license where the licensee displayed "an egregious lack of candor." *See RKO General, Inc. v. FCC,* 670 F.2d 215, 235 (D.C. Cir. 1981), *cert. denied*, 456 U.S. 927 (1982)..

[1076] *NPRM,* 27 FCC Rcd at 12381, para. 75 & n.105 (Class A downgrade) and 12382, para. 78 & n.112 (license expired, canceled or revoked).

[1077] If the Media Bureau cancels a license because the licensee has failed to file a renewal application or the station has been off the air for more than 12 consecutive months, the licensee has 30 days to file a petition for reconsideration or an application for review requesting reinstatement of the license. *See* 47 C.F.R. §§ 1.106(b), 1.115(d); *see also ETC Communications, Inc.*, 24 FCC Rcd 3021, 3022 (2009) (staff letter determining that television station's license had expired pursuant to § 312(g), and dismissing as moot application to assign that license).

[1078] If the license invalidity determination becomes final between the time a broadcaster is found to be qualified to participate in the reverse auction and commencement of reverse auction bidding, the broadcaster will be excluded from participating in the reverse auction.

[1079] *NRPM,* 27 FCC Rcd at 12382, para. 78 n.112.

[1080] *See* Spectrum Act § 6402.

[1081] Any forfeiture amount will remain in escrow pending finality of the forfeiture proceeding.

[1082] Several broadcasters assert that precluding reverse auction participation by a Class A station that is downgraded to LPTV status before the modification order becomes final and non-reviewable would effectively cut off a downgraded Class A station's appeal rights. Entravision Comments at 6–7; UVM Reply at 18–20.

repacking process can be relinquished at auction.[1083] Finally, it is consistent with our longstanding policy of preventing a station from avoiding the consequences of its misdeeds through a station sale.[1084]

b. Bid Options

365. Section 6403(a)(2) of the Spectrum Act requires the Commission to make available three voluntary relinquishment options to eligible full power and Class A broadcast television licensees: (1) "all usage rights with respect to a particular television channel without receiving in return any usage rights with respect to another television channel" ("license relinquishment bid"); (2) "all usage rights with respect to an ultra-high frequency television channel in return for receiving usage rights with respect to a very high frequency television channel" ("UHF-to-VHF bid"); and (3) "usage rights in order to share a television channel with another licensee" ("channel sharing bid").[1085] We address these three options below, as well as additional bid options on which the Commission sought comment in the *NPRM*.

(i) License Relinquishment Bid

366. *Background*. In the *NPRM*, the Commission recognized the statutory mandate to offer a license relinquishment bid option.[1086] It also inquired about whether and how it should address the potential loss of service by broadcast television stations as a result of the acceptance of license relinquishment bids in light of section 307(b) of the Communications Act, which requires the Commission to make a "fair, efficient, and equitable" distribution of television service when considering applications for licenses.[1087] The Commission also sought comment on the practical obstacles to factoring into the reverse auction bidding and repacking processes consideration of whether a given broadcaster going off the air would lead to loss of service.[1088]

367. *Discussion*. We will offer a license relinquishment bid option as required by the statute regardless of whether it may lead to a loss of service.[1089] We decline to restrict acceptance of such bids based on the potential loss of television service or specific programming. Any such restrictions could reduce the amount of spectrum available to carry out the forward auction, and undermine our goal of

[1083] We will protect in the repacking process a station involved in a license validity or Class A downgrade proceeding until the determination becomes final and non-reviewable. *See* § III.B.3.c (Non-Final License Revocation or Downgrade Proceedings).

[1084] *See M&M Broadcasting, Ltd*., 25 FCC Rcd 4942, 4945 (2010)*; see also Cellular System One of Tulsa, Inc.*, Memorandum Opinion and Order, 102 F.C.C.2d 86, 90, para. 7 (1985) ("To permit a licensee to sell out from under a potential disqualification would significantly impair the Commission's ability to police and deter licensee misconduct."); *Jefferson Radio*, 340 F.2d at 783 ("It is the recognized policy of the Commission that assignment of broadcast authorization will not be considered until the Commission has determined that the assignor has not forfeited the authorization.")*.*

[1085] Spectrum Act § 6403(a)(2).

[1086] *See NPRM,* 27 FCC Rcd at 12385, para. 84.

[1087] *See* 47 U.S.C. § 307(b) ("In considering applications for licenses, and modifications and renewals thereof, when and insofar as there is demand for the same, the Commission shall make such distribution of licenses, frequencies, hours of operation, and of power among the several States and communities as to provide a fair, efficient, and equitable distribution of radio service to each of the same."). Pursuant to this mandate, the Commission has strongly disfavored modification of a station's facilities that would create a "white" or "gray" area (an area where the population does not receive any over-the-air television service or only one over-the-air service, respectively), or an "underserved" area (where the population in the loss area would receive fewer than five over-the-air television signals). *See Channel Sharing NPRM*, 25 FCC Rcd at 16507, para. 26.

[1088] *See NPRM,* 27 FCC Rcd at 12375–76, para. 48.

[1089] *See* Spectrum Act § 6403(a)(2)(A).

allowing market forces to determine the highest and best use of spectrum.[1090] Any such restrictions would also be inconsistent with the statutory mandate to offer a license relinquishment bid option. The decision whether to participate in the reverse auction and to submit a license relinquishment bid is a voluntary, market-based decision left to broadcast stations under the Spectrum Act. Declining to consider a station's license relinquishment bid because of a potential loss of service would force that station to involuntarily forgo this opportunity. In mandating that the Commission accept license relinquishment bids, Congress adopted no restrictions on such bids, thus recognizing that loss of service might be a potential outcome of the reverse auction.[1091] Moreover, neither section 307(b) nor our policies disfavoring loss of service require us to restrict bids based on loss of service.[1092]

368. Accordingly, we reject the proposal to consider on a case-by-case basis the extent to which acceptance of a license relinquishment bid would create loss of service, including whether the loss involves specialized programming.[1093] Likewise, we disagree that we should reject a bid if it would leave a DMA unserved by any NCE stations eligible to receive a community service grant from the CPB.[1094]

[1090] In addition, any such restrictions would undermine the speed and certainty that are critical to the success of the incentive auction. *See* § III.B (Repacking the Broadcast Television Bands). Consideration of service losses during the reverse auction bidding would slow the auction and the repacking process by complicating the feasibility check. *See* § III.B.1 (Repacking Process Overview). For example, under APTS's proposal that we reject bids that would leave a DMA unserved by any NCE stations eligible to receive a community service grant from the Corporation for Public Broadcasting (CPB) (*see* Letter from Lonna Thompson, Association of Public Television Stations, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2–3 (filed Jan. 23, 2014)), the feasibility check would have to take into account whether acceptance of a license relinquishment bid would cause another participating station to be the only "qualified NCE station" in a DMA. On the other hand, consideration of service losses after the bidding is complete would undermine the certainty of the reverse auction outcome.

[1091] *See* Spectrum Act § 6403(a)(2)(A). *See* Anon. Broadcaster 3 Comments at 4 ("While the Commission has previously disfavored loss of service in city of license change proceedings, Congress has determined that service losses, which are an inescapable byproduct of the incentive auction, are required to address a critical national need for alternative communications services.").

[1092] As an initial matter, § 6403 of the Spectrum Act contains no reference to § 307(b). Moreover, § 307(b) applies only when the Commission is "considering applications for licenses, and modifications and renewals thereof," which are not presented during the reverse auction and repacking process. 47 U.S.C. § 307(b). In addition, neither § 307(b), nor our implementing policies that have disfavored service losses, are inflexible mandates. As the courts have explained, the Commission "has a broad measure of discretion in dealing with the many and complicated problems of allocation and distribution of service." *Television Corp. of Michigan v. FCC*, 294 F.2d 730, 733 (1961) ("Neither [§ 307(b)] nor the [allotment priorities] express rigid and inflexible standards."). On balance, the public interest benefits of allowing stations to submit license relinquishment bids, thereby utilizing market forces to repurpose spectrum for new, flexible use, outweigh the detriments of potential service losses. We also note that, in addition to the goals of the Spectrum Act and § 307(b), we are obligated under § 303(g) to "generally encourage the larger and more effective use of radio in the public interest," which will be furthered by the incentive auction. 47 U.S.C. § 303(g); *Loyola University v. FCC*, 670 F.2d 1222, 1226 (D.C. Cir. 1982) (rejecting claim that Commission decision to allow additional sharing of clear channels rather than allowing higher power and exclusivity on existing channels violated § 307(b); stating that "this is precisely the sort of determination Congress intended, through §§ 307(b) and 303(g), to leave to the broad discretion of the Commission").

[1093] NRB Comments at 11–12. Examining potential loss of specific programming formats as a factor in bid acceptance could run afoul of the long-standing policy of not considering formats in the analogous context of reviewing an assignment application. *WDCU(FM)*, 12 FCC Rcd 15242 (1997); *see also Changes in the Entertainment Formats of Broadcast Stations*, 60 FCC 2d 858, 865, para. 21 (1976), *recon. denied*, 66 FCC 2d 78 (1977), *rev'd sub nom. WNCN Listeners Guild v. FCC*, 610 F.2d 838 (D.C. Cir 1970), *rev'd*, 450 U.S. 582 (1981) (regulation of entertainment formats as an aspect of the public interest consideration of a sales application would produce an unnecessary and menacing entanglement in matters that Congress meant to leave to private discretion).

[1094] PTV Comments at 6–7. PTV suggests that, because the Public Broadcasting Act of 1967 that created the CPB notes the importance of ubiquitous access to public telecommunications services, the Commission has a duty to

(continued….)

Nevertheless, we remain committed to the goals of section 307(b). To the extent that any loss in service results from the reverse auction, we will consider appropriate actions to address such losses, such as by inviting applications to serve areas that have lost service.[1095]

(ii) UHF-to-VHF Bid

369. *Background*. In the *NPRM,* the Commission recognized the statutory mandate to offer a UHF-to-VHF bid option, and invited comment on whether to refine the option to allow bidders to limit their bids to a "high VHF channel" (channels 7-13).[1096] The Commission stated that doing so might encourage UHF-to-VHF bids because broadcasting on "low VHF channels" (channels 2-6) is often difficult due to increased signal interference caused by the higher levels of ambient noise from electronic devices operating on or near the low VHF frequency range.[1097] To make this bid option more attractive, the Commission also proposed to favor grant of post-incentive auction requests for waivers of the VHF power and height limits for winning UHF-to-VHF bidders that experience unusual coverage problems on their new VHF channels.

370. *Discussion.* In addition to allowing bids to move from a UHF to a VHF channel as required by the Spectrum Act, we adopt refinements to the UHF-to-VHF bid option that will allow bidders to limit their bid to the high VHF band or the low VHF band. In order to preserve needed flexibility in the repacking process, however, a bidder will not be able to specify the exact channel in the high- or low-VHF band to which it will be reassigned. Allowing licensees to specify the upper VHF band or lower VHF band will not unduly constrain our repacking flexibility. A number of commenters agree that offering the option to specify the low VHF band or the high VHF band would make it more attractive to submit a UHF-to-VHF bid.[1098] Although some commenters express concern that additional bid options would introduce unwanted complexity to the reverse auction,[1099] we conclude that this option is simple enough to avoid undue complexity. Allowing broadcasters to select either the high VHF band or the low VHF band will encourage reverse auction participation by granting potential bidders greater control over the channels to which we ultimately reassign them.[1100] We conclude that this option strikes the correct balance between providing flexibility in the reverse auction process for broadcasters and avoiding unnecessary complexity.

371. In addition, we adopt the proposal to afford favorable consideration to post-incentive auction requests for waivers of the VHF power and height limits for winning UHF-to-VHF bidders that

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prevent loss of such service through reverse auction relinquishments. This reading incorrectly elevates the Public Broadcasting Act's declaration of policy into a binding mandate. *See id*. (citing 47 U.S.C. § 396(a)(5), (a)(7)). Moreover, because Congress designed the laws governing the CPB to provide financial and developmental assistance for public broadcasting free from government control, reading those laws as dictating Commission policy with respect to public broadcasting stations would frustrate this purpose. *Revision of Programming Policies and Reporting Requirements Related to Public Broadcasting Licensees*, BC Docket No. 81-496, Notice of Proposed Rulemaking, 87 FCC 2d 716, 730–31, para. 34 (1981); Report and Order, 98 FCC 2d 746 (1984); *see also* 47 U.S.C. § 398(a) (expressing intent of Congress that the Commission shall have no direct jurisdiction over the CPB).

[1095] As discussed in § V.D.1 (Transition Procedures for LPTV and TV Translator Stations), because we recognize the importance of minimizing service disruption to viewers, we adopt expedited processing standards for displaced LPTV and TV translator stations as part of the post-auction band transition.

[1096] *NPRM,* 27 FCC Rcd at 12385, paras. 84–85. *See* Spectrum Act § 6403(a)(2)(B).

[1097] *NPRM,* 27 FCC Rcd at 12385, paras. 84–85 (citing *Channel Sharing NPRM*, 25 FCC Rcd at 16512, para. 43).

[1098] PTV Comments at 35; PTV Reply at 11–12; R. Brey Comments at 4; Entravision Comments at 9; Mobile Future Reply at 11; US Cellular Comments at 6; Verizon Comments at 32.

[1099] EOBC Comments at 17 (adopting additional bid options risks overcomplicating the reverse auction and undermining its purposes).

[1100] *See NPRM,* 27 FCC Rcd at 12385, paras. 84–85.

may be necessary to resolve coverage problems on their new channels.[1101] We decline, however, to establish a rebuttable presumption that such waivers are in the public interest, as Entravision requests.[1102] As NPR argues, this type of presumption would not be appropriate because such waivers are granted only when they will not cause interference to adjacent channel services, including NCE FM radio stations that operate adjacent to low VHF channel 6.[1103] Thus, we will consider such waiver requests on a case-by-case basis after the winning bidder has completed construction of its VHF facilities and determined that its viewers are experiencing reception problems. We will afford such requests favorable consideration and grant them where possible.

(iii) Channel Sharing Bid

372. *Background*. The final bid option identified in the Spectrum Act allows broadcasters to relinquish "usage rights in order to share a television channel with another licensee."[1104] The Commission proposed to allow channel sharing bids provided that they would not require changes in a station's community of license or Designated Market Area (DMA).[1105] Under the Commission's rules, a full power television station must locate its transmitter at a site from which it can place a principal community contour over its entire community of license.[1106] Thus, the proposal in the *NPRM* would limit a broadcaster to partnering with a host station from which it could deliver a principal community contour to its community of license.

373. The Commission anticipated that this limitation would not unduly constrain the ability of stations to find a channel sharing partner because the size of the area served by a broadcast signal would allow stations to move their transmission facilities several miles in order to collocate with a channel sharing partner while still placing the requisite signal over their licensed communities.[1107] The Commission further suggested that, before accepting a bid that proposed a community of license change, it would have to consider whether the change would result in a "fair, efficient and equitable distribution" of television service under section 307(b) of the Communications Act, and that such consideration could

[1101] Several commenters support the adoption of such a waiver policy. PTV Comments at 35; Verizon Comments at 32–33; US Cellular Comments at 7; Qualcomm Comments at 25; Motorola Mobility Comments at 7. We granted similar waivers in some circumstances following the conclusion of the DTV transition to assist stations on post-transition VHF channels in resolving reception issues. *See, e.g.*, Letter from Barbara A. Kreisman, Chief, Video Division, Media Bureau, to ABC, Inc. and Freedom Broadcasting of New York Licensee, LLC (dated Mar. 16, 2011) (http://licensing.fcc.gov/cgi-bin/prod/cdbs/forms/prod/getimportletter_exh.cgi?import_letter_id=24963).

[1102] Entravision Comments at 10. Also, we will not adopt WLFM, LLC's request that a licensee which agrees to surrender a UHF channel in return for operation on VHF channel 6 be given additional flexibility to use Axcera's Bandwidth Enhancement Technology (Axcera BET). WLFM Reply at 1. Such a waiver of the Advanced Television Systems Committee (ATSC) transmission standard is beyond the scope of this proceeding other than in the context of a request for a service rule waiver in lieu of reimbursement, as provided in § 6403(b)(4)(B) of the Spectrum Act. *See* § V.C.5.e (Service Rule Waiver in Lieu of Reimbursement); *see also* Letter from Hossein Hashemzadeh, Deputy Chief, Video Division, Media Bureau to Venture Technologies Group, LLC (Aug. 2, 2012) (rejecting request by party to use the Axcera BET because the television signal would not comply with the standards for such transmissions set forth by ATSC in violation of § 73.682(d) of the Commission's rules) (http://licensing.fcc.gov/cgi-bin/prod/cdbs/forms/prod/getimportletter_exh.cgi?import_letter_id=35147).

[1103] NPR Reply at 2–3.

[1104] Spectrum Act § 6403(a)(2)(C).

[1105] *See NPRM,* 27 FCC Rcd at 12386–87, para. 89. A DMA is composed of groups of counties whose largest share of television viewing belongs to stations located in that market area.

[1106] *See* 47 C.F.R. § 73.625 (defining the principal community contour of a full power television station). Class A television stations do not have a contour coverage requirement.

[1107] *NPRM,* 27 FCC Rcd at 12386–87, para 89.

complicate bid acceptance.[1108] In addition, the Commission stated that disallowing DMA changes would minimize the potential impact of channel sharing on MVPDs because carriage rights on a particular MVPD system generally depend on the station's DMA.[1109]

374. *Discussion*. We will allow a channel sharing bidder (i.e., a "sharee") to change its community of license in cases where it cannot satisfy the community of license signal requirement operating from the host (i.e., the "sharer") transmission site, provided that the sharee chooses a new community of license that, at a minimum, meets the same allotment priorities as its current community.[1110] We will not, however, allow a bidder to make a community of license change that will change its DMA.[1111]

375. Neither the Spectrum Act nor the Communications Act requires us to restrict community of license changes in the channel sharing context.[1112] Moreover, an absolute prohibition on changes in communities of license would undermine the goals of the reverse auction. Although a sharee station could move its transmission facility several miles in some cases in order to channel share while still serving its original community of license,[1113] several commenters express concern that as a practical matter a broadcaster's ability to find a channel sharing partner would be severely constrained under this prohibition.[1114] Indeed, one anonymous broadcaster operating on the outskirts of a top market points out that it would have only one potential channel sharing partner absent the flexibility to change its community of license.[1115] Allowing a community of license change likely will help facilitate channel sharing arrangements, thus facilitating broadcaster auction participation.

376. Although an absolute prohibition on changes in communities of license would undermine the goals of the reverse auction, we are imposing reasonable restrictions on such changes in order to promote the goals underlying section 307(b) while at the same time avoiding any detrimental impact on the speed and certainty of the auction or discouraging reverse auction participation. First, a bidder may not make a community of license change that will result in a change in its DMA.[1116] Second, a sharee

[1108] *Id*.

[1109] *Id*.; *see also* 47 U.S.C. §§ 325(b), 338, 534(h).

[1110] These allotment priorities are to: (1) provide at least one television service to all parts of the country; (2) provide each community with at least one television broadcast station; (3) provide a choice of at least two television services to all parts of the country; (4) provide each community with at least two television broadcast stations; and (5) assign any remaining channels to communities based on population, geographic location, and the number of television services available to the community from stations located in other communities. *Amendment of Section 3.606 of the Commission's Rules and Regulations*, Sixth Report and Order, 41 F.C.C. 148, 167 (1952).

[1111] Thus, to prevent a DMA change, a channel sharee may not select a community of license located in another DMA. Moreover, as discussed § VI.A.1.a (Media Ownership Rules), absent a waiver of the rules, we will not accept a channel sharing bid in the reverse auction that would cause a media ownership rule violation by a party to the channel sharing arrangement based on the rules and facts as they exist at the time of filing of the pre-auction application.

[1112] *See* Spectrum Act § 6403(i) (stating that nothing in § 6403(b) "shall be construed to expand or contract the authority of the Commission, except as otherwise expressly provided"); *see also* n.1092 (explaining the relationship between the Spectrum Act and §§ 307(b) and 303(g) of the Communications Act). On balance, the public interest benefits from allowing stations to submit channel sharing bids that would result in a change in community of license subject to the conditions we describe outweigh the detriments of potential service losses.

[1113] *NPRM,* 27 FCC Rcd at 12386–87, para 89.

[1114] *See* Anon. Broadcaster 3 Comments at 3–5; Entravision Comments at 10–12; EOBC Comments at 20–22.

[1115] *See* Anon. Broadcaster 3 Comments at 3–4.

[1116] We received no comments asserting the need to allow DMA changes in order to increase the likelihood of a broadcaster availing itself of the channel sharing bid option. We note, however, that the Spectrum Act does not restrict us from allowing DMA changes in the channel sharing context.

may change its current community of license only in cases where it cannot satisfy the community of license signal requirement operating from the host (i.e., the "sharer") transmitter site. A channel sharee will be asked to indicate in its pre-auction application whether it can meet its community of license requirements from the proposed sharer's site. An applicant that indicates its inability to do so must provide the name of the new community of license it proposes to select if its channel sharing bid is accepted, and certify in the application that the new community meets the same, or a higher, allotment priority as its current community.[1117] This approach will take account of our allotment policies under section 307(b) in advance of the auction while providing flexibility and certainty to channel sharing bidders. This approach may result in service loss in some areas, but the public interest benefits that will stem from maximizing broadcasters' participation in the reverse auction through channel sharing outweighs the detriment of potential service losses.[1118]

377. In addition, the record does not support the argument made by some MVPDs that allowing community of license changes will cause capacity problems and increased carriage costs.[1119] The impact on MVPDs resulting from community of license moves in limited circumstances will be minimal due to our requirement that sharee stations remain within their existing DMAs.[1120] Because satellite and cable carriage rights on a particular MVPD system generally depend on the station's DMA,[1121] prohibiting moves that would result in a change of DMA will minimize the potential impact of channel sharing on MVPDs.[1122] Moreover, MVPDs will be eligible for reimbursement from the Reimbursement Fund for any reasonably incurred costs associated with implementing carriage changes

[1117] For example, if a sharee is serving community of license X prior to the auction, to which it provides a second local television service (allotment priority 4), and it proposes a channel sharing arrangement with a sharer from whose transmission site it can no longer meet the community of license coverage requirements over X, then the sharee must choose a new community of license to which it will provide a second local television service, or which meets a higher allotment priority (such as the provision of a first local service, priority 2). In the unlikely event that the sharee cannot identify any community that meets the same or a higher allotment priority at its new shared site, it must choose a new community of license to which it will provide the next highest priority. Thus, if a sharee serving a community to which it provides allotment priority 2 moves to a channel sharing site from which it cannot meet the community of license coverage requirements over any allotment priority 1 or 2 communities, then it must choose an allotment priority 3 community.

[1118] In the case of channel sharing, we note that service loss to one area (i.e., all or a portion of the area previously served by the sharee) necessarily will result in a gain in service to a different area (i.e., that served by the sharer).

[1119] NCTA Reply at 16. We note that DIRECTV/DISH assert that "any change to a station's DMA would also have substantial costly consequences for DBS operators," but make no such similar assertion for a community of license change. DIRECTV/DISH Comments at 4.

[1120] In § VI.A.2 (Channel Sharing Operating Rules), we discuss in more detail the impact that station relocations made to implement a channel sharing arrangement may have on a station's MVPD carriage rights.

[1121] *See* 47 U.S.C. §§ 534 (cable carriage of a commercial station), 338 (satellite carriage of a commercial or NCE station). As implemented, the references to local markets in these provisions are defined as a station's DMA. 47 C.F.R. §§ 76.66(e), 76.55(e)(2). Cable carriage of NCE and "qualified low power stations" does not depend on DMA; rather, it depends on, among other things, the distance between the cable headend and either the station's community of license or transmission facility. *See* 47 U.S.C. §§ 534(h)(2) (cable carriage of qualified low power stations), 535(l)(2) (cable carriage of NCE stations).

[1122] In some instances, an NCE or a Class A station may gain carriage on some cable systems, but lose carriage on other systems, as a result of a change of location within a DMA. Likewise, a full power commercial station that moves within its DMA may gain or lose carriage on a cable system as a result of a market modification request. *See* § VI.A.2 (Channel Sharing Operating Rules). Whether a channel sharing station will be able to exercise its carriage rights also will depend on whether it can meet the relevant Part 76 requirements, including the provision from its channel sharing site of a good quality signal to the cable operator's principal headend or the satellite provider's receive facility. *See* 47 C.F.R. §§ 76.55(c)(3) & 76.66(g), respectively.

resulting from channel sharing.[1123] We also note that any concerns about capacity problems arising from new carriage obligations occurring as a result of channel sharing could be more than offset by license relinquishment bidders going off air and vacating their space on the satellite transponders or cable systems.[1124] Thus, allowing certain community of license changes, while precluding DMA changes, strikes an appropriate balance between enabling broadcasters to take advantage of the opportunity to channel share and limiting the impact of channel sharing on MVPDs.

378. Finally, we clarify that we will allow VHF-to-UHF channel sharing bids.[1125] Neither the Spectrum Act's channel sharing provision, nor any other statutory provision, precludes such a bid.[1126] This option is consistent with our goal of allowing market forces to determine the highest and best use of spectrum. Allowing a UHF station that does not wish otherwise to participate in the reverse auction to be a channel sharer by hosting a VHF station that is willing to vacate its existing spectrum will also facilitate the clearing of additional spectrum by creating an opportunity for another UHF station to submit a UHF-to-VHF bid.[1127]

(iv) Additional Bid Options

379. *Background.* In the *NPRM*, the Commission sought comment on additional bid options not specified in the Spectrum Act.[1128] We already have discussed our decision to enable a bidder opting to move from UHF to VHF, as provided in the Spectrum Act, to specify that it will move only to either a high VHF channel or a low VHF channel. In addition, the Commission asked in the *NPRM* whether to offer reverse auction participants other possibilities. Specifically, the Commission asked for comment on enabling high VHF stations to move to a low VHF channel.[1129] The Commission also asked more broadly for comment on potential ways to incorporate bidding in exchange for accepting such broadcast limitations as additional interference or a smaller service area.[1130]

380. *Discussion.* We will offer an option for high VHF stations to move to low VHF channels.[1131] This option does not create any new complexity from the perspective of auction participants. Rather, it simply expands the set of stations that will have the option of moving to a low VHF station, and

[1123] *See* § V.C.5 (Reimbursement of Relocation Costs).

[1124] DIRECTV/DISH express concern about the impact of market moves given the lack of excess satellite transponder capacity in "virtually all markets," as well as the cost of switching a station from one market to another. DIRECTV/DISH Comments at 4–5.

[1125] *See* PTV Comments at 35 (supporting VHF-to-UHF channel sharing bids).

[1126] Spectrum Act § 6403(a)(2)(C). The *NPRM* did not suggest foreclosing this option. *NPRM*, 27 FCC Rcd at 12385–87, paras. 84–90.

[1127] The Commission will not develop a confidential program for matching stations interested in channel sharing arrangements, as suggested by one commenter. *See* Anon. Broadcaster 4 Comments at 5. First, it would be difficult for the Commission to devise a system to help pair broadcasters interested in placing channel sharing bids given the Spectrum Act mandate that the Commission withhold the identity of licensees participating in the reverse auction. Spectrum Act § 6403(a)(3). Beyond this impediment, we do not believe it would be practical or prudent for the Commission to become involved in establishing complex and long-term private business relationships.

[1128] *NPRM*, 27 FCC Rcd at 12385–86, paras. 85–88.

[1129] *Id.* at 12386, para. 86.

[1130] *Id.* at 12386, paras. 87–88.

[1131] As with UHF-to-VHF bids, we will afford favorable consideration to post-incentive auction requests for waivers of the VHF power and height limits for winning high-VHF-to-low-VHF bidders that may be necessary to resolve coverage problems on their new channels. *See* § IV.B.1.b.ii (UHF-to-VHF Bid).

in so doing, may facilitate greater efficiency in repacking existing VHF stations and repurposing 600 MHz spectrum.[1132]

381. Harris Broadcast opposes making this option available, based on its alternative proposal for different uses of the low VHF band, which is premised on its view of the best use of the relevant frequencies.[1133] We need not resolve here Harris Broadcast's claims regarding the most effective use of low VHF channels. We concur with Verizon's view that Harris Broadcast's vision for low VHF channels would unduly restrict our ability to use market forces to repurpose 600 MHz spectrum for new uses.[1134]

382. With respect to any additional bid options beyond going off the air, channel sharing, or moving to a lower band, we conclude that, whatever merits any particular option might have for any particular licensee, the complexity created for auction participants would outweigh potential benefits. The record as a whole supports our conclusion. While parties voice support for various options, such as agreeing to accept additional interference, a smaller service area, or reduced population coverage,[1135] almost all agree on the overriding importance of auction simplicity in order to facilitate broadcaster participation.[1136] Almost all commenters are in agreement that additional options must not be offered if they will result in excessive complexity. T-Mobile asserts that allowing broadcasters to have additional bidding options would complicate the auction process, introduce uncertainty that could chill broadcaster participation in the auction, and make it difficult for forward auction participants to understand what items are available for bid.[1137] Others note the difficulty in making sufficiently accurate forecasts of interference environments to enable offering detailed levels of additional interference as a meaningful option.[1138]

383. The reverse auction bidding options afforded by the Spectrum Act, together with allowing broadcasters moving from a UHF channel to specify a high or low VHF channel and allowing broadcasters to move from a high to a low VHF channel, provide meaningful options for broadcasters that will achieve the goals of the auction. We conclude that the complexity and cost of introducing additional bid options would outweigh any benefits.

c. Confidentiality and Prohibition of Certain Communications

(i) Confidentiality

384. *Background*. Section 6403(a)(3) of the Spectrum Act requires the Commission to "take all reasonable steps necessary to protect the confidentiality of Commission-held data of a licensee participating in the reverse auction . . . including withholding the identity of such licensee until the [spectrum] reassignments and reallocations (if any) . . . become effective, as described in subsection

[1132] As noted in the *NPRM*, we are expressly prohibited by the Spectrum Act from involuntarily reassigning a station from a high to a low VHF channel as part of the repacking process. *See NPRM*, 27 FCC Rcd at 12386, para. 86; Spectrum Act § 6403(b)(3)(B). By offering this bid option, we create a mechanism by which high VHF stations may volunteer to be reassigned, as well as an incentive for doing so. Although the Spectrum Act does not specifically list high-VHF-to-low-VHF bids as one of the reverse auction bid options, it does not preclude the Commission from adopting this additional bid option pursuant to its broad spectrum management authority.

[1133] *See* Harris Broadcast Comments at 23–24, 27–29; Harris Broadcast Reply at 12.

[1134] *See* Verizon Reply at 37.

[1135] *See, e.g.*, Tribune Comments at 4 (listing various options). *See also* Entravision Comments at 13; Harris Broadcast Comments at 23; Mobile Future Comments at 8; Mobile Future Reply at 11–12; Qualcomm Comments at 24–25; TIA Comments at 14; US Cellular Reply at 11–12.

[1136] *See, e.g.*, TIA Comments at 15; Verizon Reply at 35–37 (citing additional comments).

[1137] T-Mobile Reply at 75–77. *See also* Sprint Comments at 6 (arguing that additional bidding options would make the auction more confusing for forward auction participants).

[1138] EOBC Comments at 17–18.

(f)(2)."[1139] That subsection provides that these reassignments and reallocations may not become effective "until the completion" of both the reverse and forward auctions.[1140]

385. In the *NPRM*, the Commission proposed to incorporate the confidentiality requirement into the competitive bidding rules for the broadcast television spectrum reverse auction and sought comment on the parameters of such a rule,[1141] including what types of information the Commission should withhold from public disclosure in order to protect the identities of participating licensees; what "reasonable steps" the Commission should take to protect confidentiality and for how long; whether any exemptions from disclosure under the Freedom of Information Act ("FOIA") would apply; whether applicants should be prohibited from disclosing information regarding their own or other licensees' participation in the reverse auction; and whether participants may have any legal reporting obligations, such as the disclosure requirements of the Securities and Exchange Commission ("SEC"), that would create any conflict with the Commission's confidentiality obligations under the Spectrum Act.[1142]

386. *Discussion*. We will take all reasonable steps necessary to protect the confidentiality of Commission-held data of broadcast television licensees participating in the reverse auction. The Spectrum Act provides that at a minimum, the Commission must withhold the identities of participating broadcast television licensees until the spectrum reassignments and reallocations (if any) become effective.[1143] We will protect the confidential information of all reverse auction applicants, whether or not the Commission determines that their applications are complete and in compliance with our rules. In addition, we will continue to protect confidential information pertaining to unsuccessful bids until two years after the effective date.[1144] We also amend the Commission's FOIA disclosure rules to accommodate the confidentiality rules that we adopt today. We note that the Commission may disclose confidential information if it is required to do so by law, such as by court order.

387. Consistent with PTV's suggestion, we will protect the confidential information of all reverse auction applicants, whether or not the Commission determines that their applications are complete and in compliance with our rules.[1145] We note that, as described below, for the purpose of the statutory requirement that at least two competing licensees "participate" in the reverse auction,[1146] we will consider a broadcast television licensee to be a participant only if its application is found to be complete and in compliance with our application rules.[1147] However, for the purpose of the statutory confidentiality requirement, we interpret the protections afforded to broadcast television licensees "participating" in the reverse auction more broadly in order to facilitate broadcaster participation. The difference in our interpretation of the terms "participate" (section 6402) and "participating" (section 6403(a)(3)) arises

[1139] Spectrum Act § 6403(a)(3).

[1140] *Id.* § 6403(f)(2). In addition, no reassignments or reallocations of broadcast television spectrum may become effective unless the proceeds of the forward auction exceed the sum specified in Spectrum Act § 6403(c)(2).

[1141] *NPRM*, 27 FCC Rcd at 12446, para. 258.

[1142] *Id.* at 12446–48, paras. 258–63.

[1143] Spectrum Act § 6403(a)(3).

[1144] In the event that there is no effective date, *see id.* § 6403(c)(2), we will continue to protect confidential information pertaining to the reverse auction until two years after the completion of the reverse auction.

[1145] *See* PTV Comments at 20; *see also NPRM*, 27 FCC Rcd at 12445, para. 253 (asking whether broadcast television licensees whose pre-auction applications are dismissed should be considered "participants" for purposes of the proposed confidentiality rule).

[1146] *See* Spectrum Act § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(ii)).

[1147] *See* § IV.B.1.d (Two Competing Participants Requirement).

from the difference between the underlying purpose of each provision.[1148] Whereas section 6402 ensures a minimum level of competition in the reverse auction, a purpose which weighs in favor of including only those applicants that will be permitted to submit bids in the reverse auction, section 6403(a)(3) promotes broadcaster participation by ensuring that licensees' identities will not be revealed until after the auction, a purpose which weighs in favor of protecting any applicant whether or not it is permitted to submit bids in the auction. In any event, we exercise our discretion to treat such information as confidential consistent with the principle that disclosure of this information would likely "cause substantial harm to the competitive position of the person from whom the information was obtained."[1149]

388. From the time a broadcast television licensee applies to participate in the reverse auction until the spectrum reassignments and reallocations become effective,[1150] we will deem the following information confidential and subject to protection by the Commission: the name of the applicant licensee; the licensee's channel number, call sign, facility identification number, and network affiliation; and any other information that may reasonably be withheld to protect the identity of the licensee, as determined by the Commission.[1151] When the spectrum reassignments and reallocations become effective, the Commission will disclose the identities of the winning bidders and their winning bid amounts. Until two years after the effective date,[1152] the Commission will continue to protect the above-referenced confidential information pertaining to any unsuccessful bid.

389. As noted above, the Spectrum Act provides that at a minimum, the necessary, "reasonable steps" the Commission must take to protect the confidentiality of licensee data include withholding the identities of participating broadcast television licensees until the spectrum reassignments and reallocations become effective.[1153] The additional steps set forth here are necessary and are reasonable under the circumstances to protect the confidentiality of licensee data.[1154] Participants in the reverse auction will submit bids to exit an ongoing business, or to make significant changes to that

[1148] *See, e.g., Gen. Dynamics Land Sys., Inc. v. Cline*, 540 U.S. 581, 595 (2004) (explaining that the presumption that identical words used in different parts of same statute are intended to be read the same way "readily yields whenever there is such variation in the connection in which the words are used as reasonably to warrant the conclusion that they were employed in different parts of the act with different intent") (quoting *Atl. Cleaners & Dyers, Inc. v. United States*, 286 U.S. 427, 433 (1932)).

[1149] *Examination of Current Policy Concerning the Treatment of Confidential Information Submitted to the Commission*, GC Docket No. 96-55, Report and Order, 13 FCC Rcd 24816, 24819, para. 4 (1998) (quoting *Nat'l Parks and Conservation Ass'n v. Morton*, 498 F.2d 765, 770 (D.C. Cir. 1974)).

[1150] *See* § V.A (Auction Completion and Effective Date of the Repacking Process).

[1151] *See, e.g.*, Tribune Comments at 6–7 (listing types of broadcaster information that should be withheld from public disclosure). We note that other than a broadcast television licensee's actual identity, any particular information about an individual characteristic of a licensee may or may not facilitate identification of the licensee. Some commenters request that we protect non-identifying information about licensees in addition to clearly identifying information. *See, e.g.*, Anon. Broadcaster 4 Comments at 4; Entravision Comments at 7; PTV Comments at 20 (advocating protection of any information that does not directly identify the licensee's identity but could lead to disclosure of its identity). We will protect non-identifying information to the extent that it may reasonably be withheld to protect the identity of the licensee, as determined by the Commission.

[1152] As we noted above, in the event that there is no effective date, *see* Spectrum Act § 6403(c)(2), we will continue to protect confidential information pertaining to the reverse auction until two years after the completion of the reverse auction. In that event, the Commission may release data aggregating confidential information if needed to explain the outcome of the auction—e.g., the aggregate share of proceeds unsuccessfully sought by reverse auction bidders.

[1153] Spectrum Act § 6403(a)(3).

[1154] *See* § III.B.2.a ("All Reasonable Efforts").

business (e.g., by changing the channels on which they operate or agreeing to share a channel).[1155] Section 6403(a)(3) of the Spectrum Act recognizes the potential competitive sensitivities of the information that such existing licensee bidders provide to the Commission in this context.[1156]

390. Although the Spectrum Act requires that we protect the identities of participating broadcasters only until the spectrum reassignments and reallocations become effective, several commenters argue in favor of maintaining confidentiality beyond the effective date, particularly for unsuccessful bidders.[1157] Broadcasters point out that if an unsuccessful bidder's participation were made public, it could be construed by competitors, investors, advertisers, employees, viewers, and others as a statement by the licensee that it is no longer committed to investing in the station's programming and operations going forward.[1158] PTV argues that disclosure of reverse auction applicants' information could be particularly harmful immediately after the incentive auction is complete and reassignments and reallocations are effective, as unsuccessful bidders are working diligently to continue their businesses while they adjust their facilities for new channel assignments, if necessary.[1159] Several commenters suggest that concern about this eventual, potentially harmful disclosure could ultimately discourage broadcasters from participating in the reverse auction.[1160] State Broadcaster Associations argue that in the event that a broadcaster is unsuccessful in its bid to relinquish its spectrum usage rights, the Commission must ensure that its decision to participate in the reverse auction process will remain confidential in perpetuity unless the licensee self-discloses its participation or otherwise authorizes the Commission to disclose its identity.[1161]

391. Delaying the release of confidential information regarding unsuccessful bids until two years after the effective date will permit sufficient time to pass to ameliorate the potential competitive harms identified by commenters. Two years after the incentive auction, after substantial market changes have occurred and as the post-auction relocation process nears completion, competitors, investors, and others will be less likely to make assumptions based solely on a particular broadcast television licensee's participation in the reverse auction or the bid amounts that it submitted at that time. For example, if the information released two years after the auction indicates that a currently operating broadcaster participated in the auction two years previously and submitted a license relinquishment bid, it is unlikely that third parties would presume that the station is no longer committed to investing in the station's programming and operations going forward, and it is unlikely that potential investors would find the amount of the losing bid to be particularly relevant to the station's current value. Moreover, the record contains no evidence contradicting this conclusion. By providing confidentiality protection regarding

[1155] A broadcaster that opts to participate in the forward auction will not be subject to the same competitive sensitivities. Thus, we decline to adopt a confidentiality provision that would apply to broadcasters participating in the forward auction. *See* Tribune Comments at 6–7 & n.12 (requesting some similar accommodation for broadcasters seeking to participate as bidders in the forward auction).

[1156] *See NPRM*, 27 FCC Rcd at 12446, para. 257.

[1157] PTV Comments at 20–21; *see also* CCA Reply at 17 (arguing that the Commission should take steps to protect the identities of reverse auction bidders and their bid amounts, both during and after the incentive auction); Verizon Comments at 29 (arguing that the identity of reverse auction bidders and their bids should be exempt from public disclosure both during and after the incentive auction); Belo Comments at 21–22 (stating that once a bid is accepted, the terms of such bid may be appropriately considered public information, but noting that public disclosure of bids submitted by unsuccessful bidders could create unintended negative consequences).

[1158] *See, e.g.*, State Broadcaster Associations Comments at 16; Tribune Comments at 7.

[1159] PTV Comments at 20–21.

[1160] *See, e.g.*, EOBC Comments at 22; PTV Comments at 19, 21; Verizon Comments at 29; Verizon Reply at 30 & n.99 (listing commenters that support broad confidentiality protections in order to encourage broadcaster participation).

[1161] State Broadcaster Associations Comments at 16.

unsuccessful bids beyond the effective date, we hope to facilitate participation by broadcast television licensees that are eligible to participate in the reverse auction but that may be concerned about the consequences of public disclosure of their participation.

392. We will not keep confidential the identities of unsuccessful reverse auction participants in perpetuity, as State Broadcaster Associations suggest.[1162] Protecting the identities of unsuccessful bidders in perpetuity would not be a "reasonable step[]" necessary to protect the confidentiality of participating broadcasters' data.[1163] Protecting confidentiality is an important statutory objective that will facilitate broadcaster participation and promote the success of the incentive auction. But in determining what steps to protect participants' information are "reasonable" to take, we also consider the other objectives of the Spectrum Act, including the goal of using market forces to repurpose spectrum for mobile broadband—an objective that requires public trust in the auction process, and therefore militates in favor of transparency into the process.[1164] As Anon. Citizen argues, particularly given the novelty and complexity of this new system of competitive bidding, it is imperative that we eventually release as much information as possible about the bids and the bidding process.[1165] The bidding information that we release will allow winning bidders, unsuccessful bidders, and other interested third parties to review and test the auction results bid-by-bid. By committing to releasing this information in the future, we hope to facilitate participation in the auction by providing assurance that the process will be fair and in accordance with Commission rules.[1166] Although it is appropriate to delay the opportunity for such analysis given the unique circumstances here, it would not be reasonable to prevent this analysis entirely.[1167] Further, the full transparency of the auction process should not be delayed for a lengthier period of time given the public interest in transparency and public trust and confidence in the auction system. Delaying the availability of specific bidding information for two years is a reasonable step necessary to protect participants' confidentiality in light of the circumstances, including our interest in promoting broadcaster participation in the reverse auction and the public interest in transparency.

393. We amend our FOIA disclosure rules to accommodate the confidentiality rules that we adopt in this Order. Specifically, the information that is protected by the confidentiality rules described above will be added to the list of materials accepted by the Commission on a confidential basis.[1168] Thus, if reverse auction applicants are satisfied with the scope of the protection afforded by these confidentiality rules, it will be unnecessary for them to submit a request for non-disclosure.[1169] We also amend section 0.457(d) of our rules to include such records in the list of those not routinely available for public inspection. Because FOIA exemption three is inapplicable to such records,[1170] we will permit disclosure

[1162] *Id.*

[1163] *See* § III.B.2.a ("All Reasonable Efforts").

[1164] *See id.*

[1165] Anon. Citizen Comments at 3–4, 8.

[1166] The Commission routinely releases bidding information after auctions to allow for such analyses to take place. *See, e.g., Auction of 700 MHz Band Licenses Closes; Winning Bidders Announced for Auction 73*, Public Notice, 23 FCC Rcd 4572, 4573–74, para. 5 (2008) (announcing availability of auction results files including the identities of bidders and the net amounts of bids); *see also* FCC, Round Results for Auctions Held From July 2005–Present, http://wireless fcc.gov/auctions/default htm?job=round_results_all (last visited Apr. 3, 2014) (providing bidding results for each round of FCC spectrum license auctions).

[1167] *See, e.g.*, Anon. Citizen Comments at 3–4, 8 (emphasizing the importance of transparency).

[1168] *See* 47 C.F.R. § 0.457(d)(1).

[1169] *Id.*

[1170] FOIA exemption three permits agencies to withhold "matters that are . . . specifically exempted from disclosure by [a] statute" other than FOIA itself. 5 U.S.C. § 552(b)(3). However, for statutes such as the Spectrum Act enacted after the OPEN FOIA Act of 2009, exemption three applies only if the statute specifically cites to the

(continued….)

of such records under FOIA only pursuant to a "persuasive showing" under section 0.457(d), and note that in this context any response by a reverse auction participant within the relevant time period will be exempted from our *ex parte* rules to the extent necessary to protect the licensee's confidentiality.[1171] Given the legislative judgment reflected in the Spectrum Act, we would not expect such a showing to succeed unless it included a demonstration either that the relevant time period for protection of the confidential information has passed or that nondisclosure of the particular data sought is otherwise beyond the "reasonable steps necessary" to protect the confidentiality of Commission-held data of a reverse auction participant.[1172]

394. We note that the confidentiality rules that we adopt impose restrictions on the Commission's disclosure of certain information during certain time periods. We decline to extend the confidentiality requirements that we adopt here beyond the Commission to applicants and parties to the auction.[1173] The Commission's confidentiality obligations, along with the rule prohibiting certain communications and auction procedures regarding available information, will provide ample protection to the identities and other confidential information of reverse auction participants. We do not wish to burden auction participants with additional communications prohibitions or other confidentiality requirements after the spectrum reassignments and reallocations (if any) become effective, particularly given that any such restrictions would provide only a minimal benefit to the unsuccessful reverse auction participants—namely, protection from the educated guesses of other auction participants.

395. The confidentiality rules do not prohibit a broadcast television licensee from disclosing before the auction the mere fact that it intends to participate in the auction, or, after the auction, the results of its participation. However, other rules independently may prohibit certain communications relating to auction participation. In particular, pursuant to the rule prohibiting certain communications described below, beginning on the reverse auction application filing deadline and until a public notice announces the results of the incentive auction, all full power and Class A broadcast television licensees are prohibited from directly or indirectly disclosing incentive auction applicants' bids or bidding strategies to any forward auction applicant or to any other full power or Class A broadcast television licensee, subject to certain specific exceptions.[1174]

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relevant paragraph of FOIA. 5 U.S.C. § 552(b)(3)(B); *Newport Aeronautical Sales v. Dep't of the Air Force*, 684 F.3d 160, 165 n.2 (D.C. Cir. 2012).

[1171] Ordinarily, FOIA request proceedings are subject to our permit-but-disclose procedures. 47 C.F.R. § 1.1206(a)(7). However, we may modify the applicable *ex parte* rules by order, letter, or public notice. *Id.* § 1.1200(a). In this unique context, where the party's identity itself has been treated as confidential, such a modification is warranted. *See also Media Bureau Issues Limited Modification to* Ex Parte *Requirements for Broadcasters Filing Notices in the Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions Proceeding*, GN Docket No. 12-268, Public Notice, 29 FCC Rcd 2002 (2014).

[1172] We agree with PTV that it is appropriate to adopt a rule to implement FOIA's exemption for confidential trade secrets and commercial or financial information for the purposes of the reverse auction; however, we tailor the amendment to the Commission's FOIA disclosure rules to conform to the scope of the confidentiality rules that we adopt here. *See* PTV Comments at 23 (encouraging the Commission to add to the list of materials in 47 C.F.R. § 0.457(d)(1) of its rules as automatically accepted by the Commission on a confidential basis "the identities of participants (non-qualifying and qualifying) who do not submit winning bids in the 600 MHz Reverse Auction . . . , as well as all identifying and non-identifying information provided therein").

[1173] *See, e.g.*, J. Pratt Comments at 24–25 ("Reverse auction participants should not have to adopt burdensome confidentiality processes in order to avoid disclosing their own participation in the reverse auction unless they desire anonymity."); *but see* Entravision Comments at 7–8 (supporting restrictions on applicants and parties to the auction prohibiting disclosure of any confidential identifying information that could reveal the confidential information and identities of other applicants participating in the auction); Anon. Broadcaster 4 Comments at 4.

[1174] *See* § IV.B.1.c.ii (Reverse Auction Prohibition of Certain Communications). Given the importance of the confidentiality protections to promote broadcaster participation in the reverse auction, we decline to adopt the
(continued….)

396. As the Commission noted in the *NPRM*, participants in the reverse auction may have legal obligations to disclose information that the Commission may be required to keep confidential.[1175] For example, the SEC requires that a public company disclose on Form 8-K any "Material Definitive Agreement."[1176] We decline to design the competitive bidding rules solely to avoid disclosure obligations imposed by other governmental entities. Tribune argues that the Commission could eliminate the need for broadcasters to report auction-related contracts on SEC Form 8-K by ruling that no bid, channel sharing agreement, or other auction-related contract shall be binding on, or enforceable against, a broadcaster until the Commission has accepted the bid by paying the compensation due to a broadcaster for its winning bid.[1177] Rather, we agree with T-Mobile and CTIA that we should treat reverse auction bids as irrevocable, binding offers to relinquish spectrum usage rights in order to ensure that broadcasters will bid truthfully in the reverse auction and to provide certainty to forward auction bidders.[1178] Furthermore, we note that notwithstanding the irrevocable nature of a broadcaster's offer, the offer has no consequence unless the Commission accepts it.[1179] But neither we, nor the commenters, have the power to determine parties' precise obligations under rules enforced by other agencies.

(ii) Prohibition of Certain Communications

397. *Background*. The Commission's existing rule prohibiting certain communications in spectrum license auctions is intended to reinforce existing antitrust laws, facilitate detection of collusive conduct, and deter anticompetitive behavior, without being so strict as to discourage pro-competitive arrangements between auction participants.[1180] The rule attempts to avoid harms that antitrust enforcement may only address in retrospect. It also helps assure participants that the auction process will be fair and objective, and not subject to collusion.

398. In the *NPRM*, the Commission proposed to prohibit applicants in the reverse auction from directly or indirectly disclosing to one another the substance of their bids or bidding strategies during a time period commencing on or after the pre-auction application deadline and ending on a date specified

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proposal to render information publicly released by a licensee about its participation in the reverse auction no longer confidential and therefore no longer subject to protection by the Commission. *See NPRM*, 27 FCC Rcd at 12447, para. 262. However, we caution licensees that although the confidential information that they file with the Commission in their pre-auction applications will not be made available publicly while the confidentiality rule applies, documents that are filed through the Commission's Electronic Comment Filing System (ECFS) and other FCC databases are publicly available.

[1175] *NPRM*, 27 FCC Rcd at 12447–48, para. 263; *see also* PTV Comments at 19 n.43 ("Of course, stations should be permitted to waive these [confidentiality] protections where, for example, they are required to disclose such information under law, including state open records laws and laws governing the disposition of station assets.").

[1176] *NPRM*, 27 FCC Rcd at 12447–48, para. 263; *see* SEC, Form 8-K, http://www.sec.gov/about/forms/form8-k.pdf (last visited Apr. 3, 2014).

[1177] Tribune Comments at 8–9. *But see NPRM*, 27 FCC Rcd at 12444, 12452, paras. 249, 282 (proposing that all bids submitted in the reverse auction are irrevocable, binding offers to relinquish spectrum usage rights, and that reverse auction applicants must certify acknowledgement of this in the pre-auction application).

[1178] *See* § IV.B.2.d (Additional Reverse Auction Bidding Procedures); T-Mobile Reply at 84–85; CTIA Reply at 53; *see also* Verizon Comments at 68 (supporting the Commission's proposal that all reverse auction bids be deemed irrevocable, binding offers).

[1179] In addition, even if the Commission accepts a broadcaster's irrevocable, binding offer, this offer has no consequence unless the final stage rule is satisfied and the reallocations and reassignments based on the bidding become effective.

[1180] *See* 47 C.F.R. § 1.2105(c); *Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, PP Docket No. 93-253, Second Report and Order, 9 FCC Rcd 2348, 2386–88, paras. 221, 225 (1994) (*Competitive Bidding Second R&O*).

by public notice.[1181] The Commission sought comment on how to define "applicant" for these purposes; whether to limit the prohibition to applicants within the same geographic region and, if so, how to define such regions; whether to adopt any specific exceptions where an applicant has attributable and/or controlling interests in, or cooperative arrangements with, other stations, or a more general exception allowing parties to communicate about bids and bidding strategies so long as they disclose to the Commission the existence of any relevant agreements between them; how the rule should address channel sharing relationships; whether and how any applicable antitrust laws should affect the prohibition; whether to apply the prohibition to communications by reverse auction applicants with applicants in the forward auction; and the effect of the Commission's obligation to maintain the confidentiality of reverse auction participants' identities.[1182]

399. *Discussion*. Beginning at the deadline for submitting applications to participate in the reverse auction and until the results of the incentive auction have been announced by public notice,[1183] all full power and Class A broadcast television licensees (collectively "covered television licensees") are prohibited from communicating directly or indirectly any incentive auction applicant's bids or bidding strategies to any other covered television licensee or to any forward auction applicant,[1184] subject to certain exceptions described below.[1185] The rule that we adopt here is intended to reinforce existing antitrust laws, facilitate detection of collusive conduct, and assure incentive auction participants that the auction process will be fair and objective.[1186] The rule applies solely to communications that directly or indirectly disclose an incentive auction applicant's bids or bidding strategies to any covered television licensee or to any forward auction applicant. Business discussions and negotiations that are *unrelated* to bids and bidding strategies or to post-auction market structure are not prohibited by the rule.[1187] The prohibition applies during a limited period of time, which we expect will be only a matter of months. We anticipate that the rule will serve our purposes with minimal intrusion into broadcasters' routine business practices, since covered television licensees may structure their business practices as needed to avoid violations, such as by instituting internal controls with respect to any information about incentive auction applicants' bids and bidding strategies.[1188]

[1181] *NPRM*, 27 FCC Rcd at 12448, para. 264.

[1182] *Id.* at 12448–50, paras. 264–70.

[1183] *See* § V.A (Auction Completion and Effective Date of the Repacking Process).

[1184] For the purposes of the rule that we adopt here, we will apply the same definition of forward auction "applicant" that applies to the rule for spectrum license auctions generally. *See* 47 C.F.R. § 1.2105(c)(7)(i); *see also* § IV.C.1.c (Forward Auction Prohibition of Certain Communications).

[1185] "Covered television licensees" include all broadcast television licensees that are or could become eligible to participate in the reverse auction, *see* § IV.B.1.a (Eligibility), as well as all channel sharers.

[1186] *See Competitive Bidding Second R&O*, 9 FCC Rcd at 2386–88, paras. 221, 225.

[1187] *See NPRM*, 27 FCC Rcd at 12448, para. 264 & n.405; *see also* § IV.C.1.c (Forward Auction Prohibition of Certain Communications) (discussing Commission precedent regarding the scope of the prohibition). *Cf.* Verizon Comments at 51 (suggesting with respect to analogous forward auction rule that there is "uncertainty as to whether discussions not related to bids or bidding strategies or post-auction market structure could violate the rule").

[1188] *See* Verizon Comments at 52–53; *see also Application of Nevada Wireless for a License to Provide 800 MHz Specialized Mobile Radio Service in the Farmington, NM-CO Economic Area (EA-155) Frequency Band A*, Memorandum Opinion and Order, 13 FCC Rcd 11973, 11977–78, paras. 11–13 (1998) (*Nevada Wireless MO&O*) (strongly recommending that where competing applicants' authorized bidders are different individuals employed by the same organization—e.g., the same law firm—those applicants each certify in their applications what measures have been taken to prevent communications between authorized bidders, but cautioning that merely filing a certifying statement as part of an application will not outweigh specific evidence that collusive behavior has occurred nor will it preclude the initiation of an investigation when warranted).

400. This provision prohibits certain communications between covered television licensees, not just reverse auction applicants. Given the Commission's statutory obligation to protect the identities of reverse auction participants, it is not practicable to limit the prohibition to communications between reverse auction applicants, since doing so would require disclosing their identities.[1189] Nor is the rule limited to communications between covered television licensees within the same geographic area.[1190] Reverse auction participants will compete on a national basis for the limited funds that forward auction participants will contribute for new flexible-use licenses, and, due in part to the consequences that the repacking of broadcast television licensees may have across multiple geographic areas, all reverse auction participants will compete with each other for the auction system to accept their offers to relinquish spectrum usage rights.[1191] Thus, it is appropriate to limit communications between covered television licensees on a national level.[1192]

401. The rule also prohibits specified communications between a covered television licensee and a forward auction applicant. Verizon asserts that there is "no reason why discussions between reverse and forward auction applicants could make either auction less competitive."[1193] However, we agree with Sprint that "any information that reache[s] forward auction participants could create dangerous and anti-competitive informational asymmetries among bidders."[1194] And as T-Mobile points out, "allowing unfettered communications between forward and reverse auction participants could generate opportunities for inequitable gaming of the auction framework."[1195] To promote a fair and competitive auction, the prohibition against communicating information regarding incentive auction applicants' bids and bidding strategies will apply across the reverse and forward auctions.[1196]

402. This prohibition across the reverse and forward auctions applies regardless of the geographic license areas where forward auction applicants intend to bid. As noted above, the results of the reverse auction for one participant may have effects across multiple geographic areas. This restriction will inhibit the ability of covered television licensees and forward auction applicants to form side agreements which could have anticompetitive effects and could alter the outcome of the incentive auction.

403. With respect to covered television licensees, the prohibition includes all controlling interests in the licensee,[1197] and all directors, officers, and governing board members of the licensee.[1198]

[1189] Spectrum Act § 6403(a)(3).

[1190] *See, e.g.*, Anon. Broadcaster 4 Comments at 4–5; Entravision Comments at 7–8 (supporting a prohibition of communications between reverse auction applicants located within the same DMA).

[1191] *See* § IV.B.1.d (Two Competing Participants Requirement).

[1192] *Cf. Mobility Fund Phase I Auction Scheduled for September 27, 2012; Notice and Filing Requirements and Other Procedures for Auction 901*, AU Docket No. 12-25, Public Notice, 27 FCC Rcd 4725, 4742, para. 49 (2012) (applying a similar rule prohibiting certain communications to all bidders, regardless of the geographic areas where they sought support, because all bidders were competing with all other bidders for support from limited funds).

[1193] Verizon Comments at 54; *see also* Verizon Reply at 29.

[1194] Sprint Comments at 5–6 n.11.

[1195] Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene Dortch, Secretary, FCC, GN Docket No. 12-268 at 1 (filed Apr. 23, 2013) (T-Mobile Apr. 23, 2013 *Ex Parte* Letter).

[1196] In the *NPRM*, the Commission sought comment on whether to require reverse auction applicants to identify in their pre-auction applications any relationships with wireless companies. *NPRM*, 27 FCC Rcd at 12449, para. 269. The rules that we adopt below regarding the ownership disclosures required in the pre-auction application to participate in the reverse auction include disclosures regarding certain relationships with other FCC-regulated entities. *See* § IV.B.1.e.iii (Information and Certifications Required in Application to Participate in Reverse Auction); *see also* 47 C.F.R. § 1.2112(a)(7).

[1197] Controlling interests include individuals or entities with positive or negative *de jure* or *de facto* control of the licensee. *De jure* control includes holding 50 percent or more of the voting stock of a corporation or holding a

(continued….)

That is, for purposes of this rule, such parties will be considered to be the covered television licensee based on their relationship with such a licensee.[1199] Members of the licensee's governing board are included in recognition that NCE stations and certain other stations may be operated by non-profit entities.[1200] There is not a sufficient justification for excluding governing board members from the prohibition. The prohibition that we adopt is narrowly tailored in that it is limited in time and applies only to communications that may disclose incentive auction applicants' bids and bidding strategies. Contrary to PTV's view, we do not anticipate that the prohibition will be so burdensome as to prevent volunteer board members from continuing to serve on the board solely to avoid being subject to the rule.[1201] Members of a governing board may be apprised of incentive auction applicants' bids and bidding strategies, and they should not be permitted to communicate such information to other covered television licensees or to forward auction applicants unless an exception to the prohibition applies.

404. We note that the list of parties deemed to be the covered television licensee is not an exclusive list of parties that might engage in prohibited communications on behalf of a licensee. While communications by a listed party will necessarily be attributed to the associated covered television licensee, whether any potentially prohibited communications by other associated parties (or employees) are attributed to a licensee would be a fact-based determination. Specifically, a covered television licensee may not use agents or other conduits to convey information to any other covered television licensee or to any forward auction applicant that would otherwise be prohibited if communicated by the covered television licensee.[1202] For example, an employee who is involved in the bidding process and who is acting with the authority of a covered television licensee may not communicate any incentive auction applicant's bids or bidding strategies to another covered television licensee or to a forward auction applicant during the auction process unless an exception to the prohibition applies.

405. We adopt two exceptions to this rule prohibiting certain communications. First, covered television licensees that share a common controlling interest, director, officer, or governing board member as of the deadline for submitting applications to participate in the reverse auction may

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general partnership interest in a partnership. Ownership interests that are held indirectly by any party through one or more intervening corporations may be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, except that if the ownership percentage for an interest in any link in the chain meets or exceeds 50 percent or represents actual control, it may be treated as if it were a 100 percent interest. *De facto* control is determined on a case-by-case basis. Examples of *de facto* control include constituting or appointing 50 percent or more of the board of directors or management committee; having authority to appoint, promote, demote, and fire senior executives that control the day-to-day activities of the licensee; or playing an integral role in management decisions.

[1198] This approach is analogous to the definition of "applicant" that applies to spectrum license auctions and that was proposed for purposes of the rule prohibiting certain communications in the reverse auction. *See* 47 C.F.R. § 1.2105(c)(7)(i); *see also NPRM*, 27 FCC Rcd at 12448, para. 265. We note that broadcast television licensees are required to electronically file Ownership Reports (Form 323) with the Commission. *See* 47 C.F.R. § 73.3615.

[1199] This includes the controlling interests, directors, officers, and governing board members of a covered television licensee as of the deadline for submitting applications to participate in the reverse auction, and any additional such parties at any subsequent point prior to the date when the prohibition ends. For example, if a covered television licensee appoints a new officer after the application deadline, that new officer would be subject to the prohibition.

[1200] *See NPRM*, 27 FCC Rcd at 12448, para. 265.

[1201] *See* PTV Comments at 33–34; Public TV Licensees Reply at 7.

[1202] *See, e.g., Wireless Telecommunications Bureau Responds to Questions About the Local Multipoint Distribution Service Auction*, Public Notice, 13 FCC Rcd 341, 347–48 (1998) (explaining that public statements may give rise to collusion concerns, and that a violation of the anti-collusion rule could also occur if an individual acts as the authorized bidder for two or more competing applicants); *see also Nevada Wireless MO&O*, 13 FCC Rcd at 11976–81, paras. 8–19 (assessing facts regarding alleged improper communications where different individuals from the same law firm were listed as authorized bidders for two auction applicants).

communicate with each other regarding incentive auction applicants' bids and bidding strategies without violating the prohibition. Similarly, if a controlling interest, director, officer, or governing board member of a covered television licensee is also a controlling interest, director, officer, or holder of any 10 percent or greater ownership interest in a forward auction applicant, communications between the covered television licensee and the forward auction applicant will qualify for this exception.[1203] An overly broad prohibition restricting communications between a broadcast television licensee and its controlling interests during the reverse auction could unduly restrict bidders' flexibility.[1204] This exception to the prohibition recognizes various interrelationships that may exist between covered television licensees and permits communications between such licensees that will facilitate strategic decisions regarding multiple licensees in real time as various contingencies unfold during the auction. Thus, the exception will allow such licensees to participate more fully, particularly in a multiple-round auction, such as a descending clock auction.

406. Second, all parties to a channel sharing agreement disclosed on a reverse auction application may communicate with each other about reverse auction applicants' (but not any forward auction applicants') bids and bidding strategies. Allowing such communications will encourage channel sharing relationships, allowing potential channel sharers to fully engage as various options are presented during the auction process.[1205] Our exception takes into account EOBC's point that once a station has entered into a channel sharing agreement, it should be permitted to communicate with parties to that agreement about auction strategy in preparation for and throughout the course of the reverse auction.[1206] However, allowing channel sharing negotiations to commence during the auction, as PTV requests, presents too high of a risk of agreements to reduce competition in response to auction conditions.[1207] Thus, the exception to the prohibition for parties to a channel sharing agreement will apply only if the agreement has been executed prior to the reverse auction application filing deadline and has been disclosed on the application.

407. We decline to adopt any exceptions based on the existence of other particular types of agreements or arrangements between covered television licensees, such as local marketing agreements ("LMAs"), joint sales agreements ("JSAs"), shared services agreements ("SSAs"), network affiliation agreements, or any other similar cooperative arrangements.[1208] As described above, covered television licensees with such agreements may continue to communicate during the relevant time period so long as

[1203] This exception only applies to controlling interests, directors, officers, and governing board members of a covered television licensee *as of the deadline for submitting applications to participate in the reverse auction*, and to controlling interests, directors, officers, and holders of any 10 percent or greater ownership interest in a forward auction applicant *as of the deadline for submitting short-form applications to participate in the forward auction*. Consequently, if a covered television licensee appoints a new officer after the application deadline, that new officer would be subject to the rule and *not* included within the exception.

[1204] *Cf.* EOBC Comments at 24 (arguing that the prohibition should account for the myriad broadcast ownership and management structures that may require communications regarding auction strategy, such as communications between licensees and their investors or other commercial partners).

[1205] *See* Spectrum Act § 6403(a)(2)(C) (permitting broadcasters to relinquish spectrum usage rights in order to share a television channel with another licensee); *see also Channel Sharing Report and Order*, 27 FCC Rcd at 4622, para. 12 (describing potential benefits of channel sharing for participating broadcasters).

[1206] EOBC Comments at 24; *see also* PTV Comments at 32–33 (cautioning the Commission to avoid chilling good faith discussions regarding channel sharing arrangements); Sprint Comments at 5 & n.11 (supporting a carefully targeted relaxation of the rule prohibiting certain communications to facilitate productive communications between channel sharing partners).

[1207] PTV Comments at 34; *see also* Public TV Licensees Reply at 7.

[1208] *See NPRM*, 27 FCC Rcd at 12448, para. 266.

their communications do not directly or indirectly disclose incentive auction applicants' bids or bidding strategies.[1209]

408. We also decline to adopt an exception based on any pre-auction agreement, other than a channel sharing agreement, disclosed on an application to participate in the reverse auction. Although, as PTV points out,[1210] the Commission's rules apply an exception for disclosed agreements in our typical spectrum license auctions,[1211] the reverse auction warrants a different approach. The purpose of this exception in the spectrum license auction context is to permit the formation of legitimate efficiency-enhancing bidding consortia, which reduce entry barriers for smaller firms and improve their ability to compete in the auction process and in the provision of service.[1212] But in the reverse auction, participants are relinquishing spectrum usage rights, not seeking licenses, and there is not the same need for agreements to promote competition. Accordingly, and in light of the exceptions discussed above, a general exception for other disclosed agreements is not warranted in the reverse auction.

409. We disagree with EOBC that the *NPRM* "does not include sufficient information to allow for comment on how to apply the Commission's anti-collusion rules to the reverse auction context."[1213] The Commission both discussed the proposed prohibition at length and included the language of a proposed rule in the *NPRM*.[1214] Furthermore, the proposed rule and the associated discussion in the *NPRM* were based on the Commission's existing rule for spectrum license auctions, with respect to which there is ample precedent.[1215] As noted above, the *NPRM* also explicitly asked how the rule might be adjusted in light of the specific features unique to the reverse auction, including the geographic scope of the rule and its application to channel sharing and other cooperative arrangements with other stations. The purpose of the *NPRM* was precisely to solicit comment on whether the reverse auction context warrants any changes to the Commission's established rule.

410. Any party that makes or receives a communication regarding an incentive auction applicant's bids or bidding strategies that may violate this rule must report such communication in writing to the Commission immediately, and in no case later than five business days after the communication occurs. The obligation to make a report continues until the report is made and a failure to make a timely report constitutes a continuing violation.[1216] Parties must adhere to any applicable antitrust laws, including any additional communications restrictions. Where specific instances of collusion in the competitive bidding process are alleged, the Commission may conduct an investigation or refer such complaints to DOJ for investigation.[1217] Parties who are found to have violated the antitrust laws or the

[1209] We did not receive any comments specifically supporting an exception based on the existence of an LMA, JSA, SSA, network affiliation agreement, or other similar cooperative arrangement, or addressing why broadcasters with these sorts of arrangements would need to discuss bidding information during the reverse auction.

[1210] PTV Comments at 33; *see also* Anon. Broadcaster 4 Comments at 4–5; Entravision Comments at 7–8; Public TV Licensees Reply at 7.

[1211] *See* 47 C.F.R. § 1.2105(c)(1) (exempting members of a bidding consortium or other joint bidding arrangement identified on the bidder's short-form application from the rule prohibiting certain communications).

[1212] *See Competitive Bidding Second R&O*, 9 FCC Rcd at 2387, para. 223.

[1213] EOBC Comments at 23; *see also* PTV Comments at 34–35 (encouraging the Commission to issue a further notice of proposed rulemaking that proposes specific language for the rule prohibiting certain communications and provides clearer guidance on how the rule might be applied).

[1214] *NPRM*, 27 FCC Rcd at 12448–50, paras. 264–70; *id.* at 12507 (proposed rule 47 C.F.R. § 1.22005).

[1215] *See* § IV.C.1.c (Forward Auction Prohibition of Certain Communications).

[1216] *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150, Second Report and Order, 22 FCC Rcd 15289, 15403–04, paras. 285–86 (2007).

[1217] *See Competitive Bidding Second R&O*, 9 FCC Rcd at 2388, para. 226; *see also* Press Release, DOJ, *Justice Department Sues Three Firms Over FCC Auction Practices: Coded Bids Used to Signal Competitors* (Nov. 10, (continued….)

Commission's rules in connection with participation in the auction process may, among other things, be subject to forfeiture of their winning bid incentive payments and revocation of their licenses, where applicable, and may be prohibited from participating in any other auctions.[1218]

411. We recognize that many broadcasters are new to auction processes, and that all are new to the reverse auction process.[1219] We have conducted and will continue to conduct extensive efforts to educate broadcasters about important aspects of the auction process, including the prohibition of certain communications we adopt here.

d. Two Competing Participants Requirement

412. *Background*. Pursuant to the Spectrum Act, the Commission cannot accept the relinquishment of spectrum usage rights unless at least two competing licensees participate in the reverse auction. Specifically, section 6402 of the Spectrum Act provides that "[t]he Commission may not enter into an agreement for a licensee to relinquish spectrum usage rights in exchange for a share of auction proceeds . . . unless . . . at least two competing licensees participate in the reverse auction."[1220] In the *NPRM*, the Commission proposed to incorporate this requirement into the competitive bidding rules for the broadcast television spectrum reverse auction and sought comment on the parameters of the rule, including what should constitute "participation" and "competing" for the purposes of this requirement.[1221]

413. *Discussion.* We conclude that "two competing licensees participate" in the reverse auction portion of the broadcast television spectrum incentive auction if more than one broadcast television licensee's pre-auction application is found to be complete and in compliance with the application rules, and if at least two such licensees are not commonly controlled. Our conclusion is based on two supporting conclusions. First, we conclude that a broadcast television licensee will be a "participant" if it has submitted a pre-auction application to be able to bid in the reverse auction that is found to be complete and in compliance with the application rules.[1222] The fact that an applicant has the ability to submit a bid in the reverse auction as designed under our rules, regardless of whether it ultimately chooses to do so, is sufficient to satisfy the "participation" component of this statutory requirement.[1223] As discussed below, the knowledge that another party might bid will create competitive pressure for a second bidder to accept lower incentive payments than it would absent any competition.

414. Second, we conclude that any broadcast television licensees that participate in the reverse auction and that are not commonly controlled will "compete" with one another. Under our auction design

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1998), *available at* http://www.justice.gov/opa/pr/1998/November/536at.htm (announcing lawsuits against bidders that allegedly agreed not to bid against each other and used coded bids to communicate during the auction).

[1218] *See Competitive Bidding Second R&O*, 9 FCC Rcd at 2388, para. 226.

[1219] *See* PTV Comments at 35 (asking the Commission to work closely with DOJ to issue guidance on how the antitrust laws will apply in the context of the incentive auction).

[1220] *See* 47 U.S.C. § 309(j)(8)(G)(ii).

[1221] *NPRM*, 27 FCC Rcd at 12446, para. 256.

[1222] For the purpose of the competing participants requirement, we decline to consider applicants whose applications are found incomplete as "participants" because they will not be permitted to submit bids during the reverse auction and, thus, cannot "participate." *But see* Vision Comments at 9–10 (arguing that the two competing participants requirement should be satisfied "if there are at least two broadcasters nationwide that *elect* to participate in the reverse auction") (emphasis added). *Cf.* § IV.B.1.c.i (Confidentiality) (interpreting statutory confidentiality protections afforded to "participating" licensees more broadly in order to facilitate broadcaster participation).

[1223] We agree with Anon. Broadcaster 2 that applicants who submit applications that are deemed complete need not place bids to be considered participants for the purpose of this requirement. *See* Anon. Broadcaster 2 Comments at 11 (supporting the approach to define a "participant" as "any licensee that submits an application to participate in the reverse auction and is deemed qualified to bid").

framework, regardless of their pre-auction geographic or channel location, all participants in the reverse auction will compete to receive incentive payments from the same limited source—the aggregate proceeds of the forward auction.[1224] Bidders in the reverse auction would prevent the incentive auction from closing if together they were to request compensation exceeding amounts available from the forward auction proceeds. Hence, one bidder's request for compensation affects what other bidders can be paid and, indeed, whether the final stage rule can be satisfied. Moreover, the interdependent nature of the repacking process, where repacking one station may have widespread effects across geographic areas with possible nationwide band plan implications, means that participants will be affecting, and competing with, licensees far beyond their contour, DMA, or channel. This competition for the forward auction proceeds satisfies the Spectrum Act's requirement that "at least two competing licensees participate in the reverse auction."[1225]

415. The comments submitted in the record support our interpretation. For example, Anon. Broadcaster 2, T-Mobile, and Vision all agree that the Commission should construe the participation requirement broadly by requiring at least two competing licensees across all markets to participate in the reverse auction, and reject a reading of the statute that would define competing licensees by reference to their competition in the provision of television service, such as operating in the same DMA, rather than their competition in the reverse auction.[1226] Further, we agree with T-Mobile that a rule requiring at least two bidders to participate in the same market, however defined, could mean that an otherwise willing and eligible broadcast television licensee would not be allowed to bid in the reverse auction if it is the only participant in its DMA.[1227] Such an approach would limit the Commission's ability to allow market forces to determine the highest and best use of spectrum, and to satisfy the final stage rule. Sinclair nevertheless argues in favor of a narrower interpretation of the statute, asserting that "licensees 'compete' only when they have substantially overlapping contours."[1228] The competition among broadcast television licensees to which Sinclair apparently refers is not relevant to how participants will compete in the reverse auction, and therefore the Spectrum Act does not require such a construction of the participation requirement.[1229]

[1224] *See* Spectrum Act § 6403(c)(2). We note that the two competing participants requirement applies to any reverse auction component of an incentive auction conducted under § 6402 of the Spectrum Act, including the broadcast television spectrum incentive auction. *See* Spectrum Act § 6402. It was therefore not crafted with specific reference to the design of the broadcast television spectrum incentive auction, much less to the reverse auction design framework adopted by the Commission here. The above analysis is based on the statutory conditions applicable to the broadcast television spectrum incentive auction and, thus, may not apply to different incentive auctions. *See* Spectrum Act § 6403. As the two competing participants requirement is a "generic" provision applicable to any incentive auction conducted under § 6402 of the Spectrum Act, the Commission may apply this requirement differently in other reverse auctions, depending upon the particular eligibility criteria, auction design, and other circumstances involved in such reverse auctions.

[1225] *See* Anon. Broadcaster 2 Comments at 11 (explaining that "[a]s long as multiple licensees are bidding for payments from the same source of funds, no single licensee can unilaterally dictate the amount of money to which it is entitled").

[1226] T-Mobile Comments at 37–38; Vision Comments at 9–10; Anon. Broadcaster 2 Comments at 10–11.

[1227] *See* T-Mobile Comments at 37–38.

[1228] Sinclair Comments at 14.

[1229] *See* Spectrum Act § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(ii)). *See also* Anon. Broadcaster 2 Comments at 11 ("A narrower interpretation, such as requiring multiple licensees in the same market, is not supported by the language of the statute and would unnecessarily restrict the FCC's ability to maximize the amount of spectrum auctioned."); T-Mobile Comments at 37 (explaining that same-market competition is not essential for determining the amount of compensation owed to a broadcaster for voluntarily relinquishing its spectrum); Vision Comments at 9–10 ("The legislative history of the Spectrum Act is silent on this provision. . . . [T]here does not appear to have been any Congressional deliberation on whether the intent was to withhold payment if only one broadcaster in a market participates in the reverse auction . . . . In the absence of a clear directive from Congress, the Commission is free to interpret intent.").

e. Information and Certifications Required in Application to Participate

416. *Background*. In the *NPRM*, the Commission proposed to require submission of a pre-auction application by entities interested in participating in the reverse auction, explaining that information provided on the pre-auction application would allow it to evaluate whether the parties are qualified to participate in accordance with the auction rules.[1230] The Commission sought comment on proposed rules regarding the contents of the pre-auction application for the reverse auction, such as the appropriate party to consider as the applicant.[1231] In addition, the Commission sought comment on what information applicants should be required to provide and what certifications they should be required to make regarding their qualifications to participate.[1232]

417. *Discussion*. We adopt the proposal to require potential bidders to submit a pre-auction application to establish their eligibility to participate in the reverse auction. This requirement will provide an appropriate screen to ensure serious participation without being unduly burdensome. Based on our experience with spectrum license auctions, such a requirement balances the need to collect essential information with administrative efficiency. We envision that the pre-auction application would be due on the dates specified by the *Procedures PN* and would be filed electronically as in Commission spectrum license auctions.

418. In addition, we adopt the proposals regarding the types of information broadcast television licensees should be required to disclose in the pre-auction application. Thus, as discussed in more detail below, we will require that each auction applicant submit information to establish its identity, information concerning the relevant license(s) and associated spectrum usage rights, and information regarding the parties with ownership interest in the applicant. Additionally, an applicant that is proposing to share a channel with another station must confirm that the proposed arrangement will not violate the Commission's media ownership rules[1233] and provide information concerning the channel sharing arrangement, including a copy of the executed channel sharing agreement. Based on our experience with spectrum license auctions, such information is needed to determine whether an applicant is qualified to participate and to implement rules that are fundamental to the auction, such as the prohibition of certain communications. And the information relied upon for the auction must be up-to-date, making it appropriate to require submission in the period leading up to the auction.

419. We emphasize that we seek to make participation in the reverse auction as easy as possible for broadcasters. However, the need for sufficient and up-to-date information regarding broadcast television licensees that may make binding bids to relinquish spectrum usage rights leads us to decline various suggestions to further streamline or simplify the pre-auction application process.[1234] As US Cellular notes, applicants to participate in the reverse auction already have certain information on file because they hold Commission-issued authorizations.[1235] Nevertheless, as noted below, information required by the Commission for other purposes is not necessarily sufficient for the reverse auction. Moreover, significant changes may have taken place in the applicant, or in the parties with ownership

[1230] *NPRM*, 27 FCC Rcd at 12442, para. 242.

[1231] *Id*. at 12442, paras. 242, 244–45.

[1232] *Id*. at 12443–45, paras. 246–52.

[1233] *See* § VI.A.1.a (Post-Transition Media Ownership Rules).

[1234] *See, e.g.*, CTIA Comments at 32–33 (suggesting that the Commission consider whether any "application" process is necessary at all for the reverse auction and, instead, only require "the filing of any agreements by reverse auction participants"); Motorola Mobility Comments at 7 (arguing that preparation of the pre-auction application package would be costly and time consuming and could deter some participation, and that simplified certifications and notifications should suffice); TechAmerica Reply at 5; US Cellular Comments at 10; US Cellular Reply at 10.

[1235] *See* US Cellular Comments at 10.

interests in the applicant, since the most recent submission of such information to the Commission. Any attempt to rely on other filings would necessitate requiring potential participants to confirm that all information on file with the Commission is current and, if necessary, update any information that is outdated. Even then, such updates may not obviate the need for an auction application. Consequently, requiring parties to file an application to participate in the reverse auction that is focused on the relevant information is more efficient and less burdensome for potential participants.

420. Commission experience with spectrum license auctions indicates that a pre-auction application process is critical to ensuring the success of the incentive auction. Completing an application helps an applicant focus on the significance of any actions it may take should it choose to bid. Similarly, requiring a potential bidder to submit an application and to affirmatively make the various certifications required helps to ensure that the applicant is sincere about its intent to participate.

421. We decline to require applicants to provide a two year program history log in order to help the Commission consider the ramifications of accepting a particular relinquishment bid.[1236] We will not consider whether acceptance of such bids will result in loss of service for the reasons discussed above in the License Relinquishment Bid Section.[1237] Therefore, a bidder's two-year program history log will be irrelevant.

422. We also decline to adopt NHMC and the Leadership Conference's suggestion to require applicants to provide additional information about their ownership interests for the purpose of determining the potential impact of the incentive auction on broadcast ownership diversity.[1238] We recognize the importance of diversity in broadcast ownership and support efforts to maintain such diversity. The suggested requirement, however, would go beyond the scope of information necessary to determine whether an applicant is qualified to participate in the reverse auction or to implement the Commission's auction rules. Our interest in simplifying and thereby facilitating participation and reducing burdens associated with the application process militates against imposing broader information collection requirements than are necessary for the purposes of such a collection. In addition, these proposals would not provide a complete or reliable picture of broadcast ownership diversity, even for television, because they would not include any broadcast station electing not to participate in the reverse auction. For a more detailed discussion concerning public interest and diversity considerations, see the Diversity of Media Ownership Section below.[1239]

423. We will require an applicant to make certain certifications on its pre-auction application as to its legal, technical, and other qualifications and eligibility to participate in the reverse auction, including a certification as to the applicant's compliance with the national security restriction in section 6004 of the Spectrum Act. Requiring a certification of an applicant's qualifications will help to ensure that applicants submit accurate information.[1240] Applicants making false certifications to the Commission expose themselves to liability. Applicants should take care to review their licenses and the information in their pre-auction applications before making the required certifications and be prepared to document their review confirming that they meet the applicable requirements, if necessary.

[1236] *See* Anon. Citizen Comments at 8–9 (arguing that this information will be helpful to consider if any stations face local backlash for voluntary relinquishment of rights).

[1237] *See* § IV.B.1.b.i (Reverse Auction License Relinquishment Bid).

[1238] *See* NHMC Comments at 5–6; NHMC Reply at 2–3; Leadership Conference Comments at 1, 5 (urging the Commission to collect data that track ownership diversity in broadcasting now and after the auction).

[1239] *See* § VI.A.1.b (Post-Transition Diversity of Media Ownership).

[1240] *See Amendment of Part 1 of the Commission's Rules – Competitive Bidding Procedures*, WT Docket No. 97-82, *Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use*, ET Docket No. 94-32, Third Report and Order and Second Further Notice of Proposed Rule Making, 13 FCC Rcd 374, 391, para. 24 (1997) (*Part I Third Report and Order*).

424. We note that for spectrum license auctions, the Commission typically releases an interactive auction tutorial. The tutorial typically demonstrates the Commission's web-based auction application. Consistent with prior practice, we anticipate offering a similar type of tutorial for the incentive auction so that potential participants have the opportunity to become familiar with the auction application system prior to the pre-auction application deadline.

(i) Applicant

425. *Background.* The Commission proposed that the applicant identified on the pre-auction application for the reverse auction must be the licensee.[1241] As the Commission explained in the *NPRM*, under this approach, a corporate parent would not be able to file one application for licenses held by different licensee subsidiaries; however, a licensee holding multiple licenses would only be required to file one application for all such licenses for which it wishes to submit bids in the reverse auction.[1242]

426. For broadcast television licensees that would relinquish spectrum usage rights in exchange for an incentive payment and subsequently share a channel with another broadcaster, the Commission proposed that only the sharee(s)—the station(s) that would relinquish their frequencies in order to move to the sharers' frequencies—must apply to participate in the reverse auction.[1243]

427. *Discussion.* We adopt the above proposals as set forth in the *NPRM*. Requiring the applicant to be the licensee will promote accountability and transparency since the licensee is the entity that holds the spectrum usage rights that may be relinquished in the reverse auction.[1244] This decision is consistent with the Spectrum Act's use of the term "broadcast television licensee."[1245]

428. With respect to channel sharers, since the sharer station will not change channels as part of the channel sharing arrangement,[1246] it is unnecessary for the sharer to submit an application to participate in the reverse auction with respect to the shared station unless it intends to submit its own bid.[1247] We will, however, require prospective sharers to provide any necessary certifications with respect to the channel sharing agreement in addition to sharees.[1248] It is reasonable and not unduly burdensome to require sharers to make such certifications because, as Commission licensees, they are required to comply

[1241] *NPRM,* 27 FCC Rcd at 12442, para. 244.

[1242] *Id.*

[1243] *Id.* at 12442, para. 245. More than two stations may share a channel. Thus, although there would be only one sharer in each channel sharing relationship, there could be multiple sharees.

[1244] No commenter addressed this issue directly. EOBC proposes volume credits to encourage multi-station owners to participate in the auction and submit bids for stations in several highly-desirable markets. *See* EOBC Reply at 21, Eisenach Declaration at paras. 21–24. EOBC does not explain how the proposed volume credits would work, however, or address how the credits would affect the pre-auction application process, including whether the multi-station owner would be the licensee (i.e., the applicant) or the licensee's parent company or affiliate. Thus, it is unclear what type of information the Commission would need to request from an applicant during the pre-auction application process to implement EOBC's proposal.

[1245] *See, e.g.*, Spectrum Act §§ 6001(6) (defining "broadcast television licensee" as "the licensee" of the relevant station), 6403(a)(1) (directing the Commission to conduct a reverse auction to determine the amount of compensation that each "broadcast television licensee" would accept in return for voluntarily relinquishing some or all of its broadcast television spectrum usage rights).

[1246] We note that a sharer station may be reassigned a new channel during the repacking process. *See* § III.B (Repacking the Broadcast Television Bands).

[1247] The limited comment we received on this issue supports our decision. *See, e.g.*, ITI Comments at 6 (arguing that the Commission should not require both parties to file pre-auction applications).

[1248] *See* §§ IV.B.1.b.iii (Reverse Auction Channel Sharing Bid), IV.B.1.e.iv (Channel Sharing Agreement) (identifying specific certifications required with respect to channel sharing agreements).

with all applicable Commission rules and regulations, including the rules we adopt in this Order concerning channel sharing arrangements. Further, as a sharer voluntarily enters into a channel sharing arrangement, it is reasonable to require a sharer to make certifications in exchange for the ability to share a channel with another broadcaster. We acknowledge ITI's concern that overly burdensome certifications relating to channel sharing agreements could have a negative effect on participation in the reverse auction.[1249] We do not anticipate, however, that requiring a sharer to make basic certifications about a channel sharing agreement that it voluntarily negotiated and entered into will be overly burdensome to the sharer or to any sharees that are parties to the agreement. Moreover, the benefit of requiring a sharer to make certifications that are designed to ensure compliance with the Commission's rules and regulations concerning channel sharing arrangements outweighs the unlikely risk of potentially deterring broadcaster participation in the reverse auction.

(ii) Spectrum Usage Rights to Be Offered

429. *Background.* In the *NPRM*, the Commission proposed to require information in the pre-auction application concerning the license(s) and associated spectrum usage rights that may be offered in the reverse auction, including station and channel information, full power or Class A status, and NCE status, and whether the applicant intends to bid to relinquish all of its spectrum usage rights, to channel share, to move from UHF to VHF frequencies, and/or to offer any other permissible relinquishments.[1250]

430. *Discussion*. We adopt the proposal to require reverse auction applicants to specify which license(s) and associated spectrum usage rights they might offer in the reverse auction. We further require that a reverse auction applicant shall provide any information needed to assure that the offered relinquishment pursuant to the application is consistent with any applicable Commission rules or action to enforce its rules.[1251] The Commission needs this information in order to evaluate bids and run the various repacking algorithms. In addition, the Commission can utilize the information to assist in identifying auction participants offering spectrum usage rights subject to a pending license renewal application or an enforcement action, which may subject participants to liabilities that will have to be addressed before such participants can relinquish their licenses in exchange for an incentive payment.[1252]

(iii) Ownership Information

431. *Background*. The Commission proposed to require a potential bidder to include in its pre-auction application its ownership information as set forth in section 1.2112(a) of the rules, and for NCE stations, information regarding the licensee's governing board and any educational institution or governmental entity with a controlling interest in the station, if applicable.[1253] The Commission also asked whether, in lieu of the information set forth in section 1.2112(a), it should require reverse auction applicants to provide different ownership information.[1254] In particular, the Commission asked if it should request ownership information based on the attribution rules for broadcast television licensees, or whether it should require applicants to provide updated information to supplement existing disclosures on file with the Commission, such as the information contained in the licensee's most recently filed Biennial Ownership Report Forms 323 or 323-E.[1255]

[1249] *See* ITI Comments at 6.

[1250] *NPRM*, 27 FCC Rcd at 12443, para. 247.

[1251] Such information may include but is not limited to anything related to ownership of, or an enforcement action concerning, the license(s) identified in the application to participate.

[1252] *See* § IV.B.1.a.iii (Pending Renewal and Enforcement Proceedings).

[1253] *NPRM*, 27 FCC Rcd at 12443, para. 247.

[1254] *Id.*

[1255] *Id.*

432. *Discussion*. We adopt the proposed rule requiring a reverse auction applicant to include in its pre-auction application its ownership information as set forth in section 1.2112(a) of the Commission's rules. In recognition that NCE stations and certain other stations may be operated by non-profit entities, we will require a non-profit licensee to submit information regarding its governing board and to identify any educational institution or governmental entity with a controlling interest in the applicant, if applicable. For the purpose of the incentive auction, the Commission needs to be informed of an applicant's ownership structure for several reasons, including: (1) to confirm that the applicant is who it claims to be and actually has rights to the license(s) it may offer to relinquish; and (2) to implement the prohibition of certain communications adopted above.[1256] Thus, the integrity and success of the auction require that reverse auction applicants submit current ownership information in their pre-auction applications.[1257]

433. The ownership information we currently have on file under our existing broadcast television rules is inadequate for the purposes of evaluating an applicant's eligibility to participate in the broadcast television spectrum reverse auction and for implementing the competitive bidding rules. Broadcasters file existing Forms 323 and 323-E only biennially, and thus are required to update ownership information in the event of a license assignment or transfer of control.[1258] The existing rules governing competitive bidding participants and the new rules we adopt in this proceeding similarly require current information regarding any ownership interests in an applicant, in this case for the purposes of conducting the reverse auction and enforcing the rules associated therewith.[1259] Consequently, we cannot utilize information on file in an applicant's most recent Form 323 or 323-E without, at a minimum, requiring the applicant to review and update the information. Moreover, as those forms were not designed to collect information for competitive bidding purposes, the forms may be over- and/or under-inclusive for auction purposes, even if an applicant's form is up-to-date.

434. We also decline to adopt NHMC's proposal to collect the same ownership information required by Forms 323 and 323-E.[1260] While we appreciate that broadcast television licensees are familiar with these forms and the information required, more streamlined ownership information is warranted solely for the purpose of the reverse auction. For further discussion regarding ownership diversity issues, see the Diversity of Media Ownership Section below.[1261]

(iv) Channel Sharing Agreement

435. *Background*. In the *NPRM*, the Commission sought comment on what information regarding channel sharing agreements it should require in order to assess an applicant's eligibility to participate in the reverse auction, including whether to require submission of the channel sharing agreement with the pre-auction application.[1262]

436. *Discussion*. We will require a channel sharing applicant to provide sufficient information and certifications to enable the Commission to evaluate and accept a channel-sharing bid. For example, a

[1256] *See* § IV.B.1.c.ii (Reverse Auction Prohibition of Certain Communications).

[1257] Accordingly, we reject CTIA's assertion that there is no need to collect an applicant's ownership information since it is already a Commission licensee. *See* CTIA Comments at 32–33.

[1258] 47 C.F.R. § 73.3615(c).

[1259] *See* 47 C.F.R. §§ 1.2105(a), (c), 1.2112(a).

[1260] *See* NHMC Comments at 5–6 (arguing that the data obtained through this type of collection will allow the Commission to analyze ownership information in a manner consistent with established practices and make trend analysis possible).

[1261] *See* § VI.A.1.b (Post-Transition Diversity of Media Ownership).

[1262] *See NPRM*, 27 FCC Rcd at 12444, para. 248.

channel sharing applicant must submit an executed copy of the channel sharing agreement.[1263] It also must certify whether it can meet its community of license requirements from the proposed sharer's site, and if not, that the new community of license proposed meets the same, or a higher, allotment priority as its current community.[1264] As discussed in the Channel Sharing Operating Rules Section,[1265] and as noted by PTV, public interest considerations demand that the Commission impose certain basic requirements on the terms and conditions of channel sharing agreements.[1266] Therefore, we will require a channel sharing applicant to certify that the channel sharing agreement is consistent with all relevant Commission rules and policies, and that the applicant accepts any risk that the implementation of the channel sharing agreement may not be feasible for any reason, including any conflict with requirements for operation on the shared channel.

437. We disagree with ITI's unsupported assertion that requiring parties to produce information relating to channel sharing agreements could have a negative effect on participation in the reverse auction.[1267] As channel sharing agreements will contain information that identifies broadcast television licensees participating in the reverse auction, the Commission will take all reasonable steps necessary to maintain the confidentiality of such agreements in accordance with section 6403(a)(3) of the Spectrum Act and the rules adopted in this proceeding.[1268] Thus, we do not anticipate that parties will be discouraged from participating in the reverse auction by the requirements we adopt in this Order. Further, it is reasonable to require a channel sharing applicant to submit an executed copy of its channel sharing agreement as an indication of its good faith and intent to follow through with the channel sharing arrangement in the event the Commission accepts its channel sharing bid.

(v) National Security Certification

438. *Background.* To implement the national security restriction in section 6004 of the Spectrum Act,[1269] the Commission proposed that a reverse auction applicant be required to certify, under penalty of perjury, that it and all of the related individuals and entities required to be disclosed on the pre-auction application are not persons who have "been, for reasons of national security, barred by any

[1263] *See* § VI.A.2 (Channel Sharing Operating Rules). We note that several commenters supported this requirement. *See, e.g.*, Anon. Citizen Comments at 9 (urging the Commission to require applicants to provide their channel sharing agreement with their pre-auction application and arguing that proof of such agreements will provide greater assurance in the repacking and forward auction process); CTIA Comments at 32 (supporting a requirement for applicants to file channel sharing agreements with the Commission one or two weeks prior to the start of the auction). As already discussed, though we will not require prospective channel sharers to apply to participate in the reverse auction, we will require such parties to provide any certifications that are necessary with respect to the channel sharing agreement. *See* § IV.B.1.e.i (Applicant).

[1264] *See* § IV.B.1.b.iii (Reverse Auction Channel Sharing Bid).

[1265] *See* § VI.A.2 (Post-Transition Channel Sharing Operating Rules).

[1266] *See* PTV Comments at 18 (noting that public interest considerations may require some baseline requirements for channel sharing so that one sharing participant's actions would not unduly disrupt the other participant's broadcast services). *See also* § VI.A.2 (Post-Transition Channel Sharing Operating Rules). Ordinarily, the Commission does not involve itself in private contractual agreements between stations, and we agree with ITI that channel sharing agreements should be developed through private negotiations. *See* ITI Comments at 6.

[1267] ITI Comments at 6.

[1268] *See* § IV.B.1.c.i (Confidentiality).

[1269] The Spectrum Act specifies that "a person who has been, for reasons of national security, barred by any agency of the Federal Government from bidding on a contract, participating in an auction, or receiving a grant" may not participate in a system of competitive bidding that is required to be conducted by Title VI of the Spectrum Act. Spectrum Act § 6004. This national security restriction applies to the broadcast television spectrum reverse and forward auctions since Title VI requires the Commission to conduct both auctions. *See* Spectrum Act §§ 6403(a), (c). *See also NPRM*, 27 FCC Rcd at 12444–45, para. 251.

agency of the Federal Government from bidding on a contract, participating in an auction, or receiving a grant."[1270] For purposes of this certification, the Commission proposed to define "person" as an individual, partnership, association, joint-stock company, trust, or corporation.[1271] It also proposed to define "reasons of national security" to mean matters relating to the national defense and foreign relations of the United States.[1272]

439. *Discussion.* No commenters address our proposals for implementing section 6004, and we adopt them.[1273] Requiring potential bidders to make this certification is a reasonable way to implement this statutory restriction. In the context of spectrum license auctions, the Commission has relied successfully on certifications to ensure certain regulatory and legal obligations have been met by the applicants. Such an approach is appropriate here as well. Further, the definitions of "person" and "reasons of national security" we adopt are consistent with how those terms are used in other federal programs and are a reasonable interpretation of those terms in section 6004.[1274]

440. All of the related individuals and entities required to be disclosed on a potential bidder's pre-auction application are "persons" subject to this statutory participation restriction. Where the applicant is a legal entity rather than an individual, it has been the Commission's practice to consider the legal entity's controlling interests, holders of partnership and ownership interests, certain shareholders, and officers and directors to be applicants by extension.[1275] Including these related individuals and entities within the definition of "person" is entirely consistent with the intent of the national security restriction. Indeed, if such related individuals and entities were not considered "persons," parties that are statutorily prohibited from participating in the reverse auction could circumvent the national security restriction simply through the creation of a separate entity to act as the "applicant."[1276]

441. As with other required certifications, a reverse auction applicant's failure to include the required national security certification by the applicable filing deadline would render its pre-auction application unacceptable for filing, and its application to participate in the reverse auction would be dismissed with prejudice.[1277]

[1270] *NPRM*, 27 FCC Rcd at 12445, para. 252. *See* Spectrum Act § 6004.

[1271] *NPRM*, 27 FCC Rcd at 12445, para. 252.

[1272] *Id.*

[1273] We note that in the recent H Block proceeding, the Commission adopted a nearly identical requirement in Part 1 of our rules to implement the national security restriction as required by § 6004 of the Spectrum Act. *See H Block Report and Order*, 28 FCC Rcd at 9578, para. 254. Specifically, the Commission added the new certification to the various other certifications that a party must make in any application to participate in certain statutorily-specified systems of competitive bidding as required under our existing Part 1 rules. *Id.* Thus, as discussed in § IV.C.1.d (National Security Certification), forward auction applicants must certify as to their compliance with the national security restriction in accordance with the Commission's recently adopted certification rule in 47 C.F.R. §1.2105(a)(2)(xii), as amended in this proceeding.

[1274] *See, e.g.*, 47 U.S.C. § 153(39) ("The term 'person' includes an individual, partnership, association, joint-stock company trust or corporation."); 18 U.S.C. App. 3 § 1(b) (defining "national security" as "the national defense and foreign relations of the United States").

[1275] *See* 47 C.F.R. §§ 1.2002(b), 1.2105(c)(7)(i).

[1276] *See, e.g., Implementation of Section 309(j) of the Communications Act — Competitive Bidding*, PP Docket No. 93-253, Fifth Memorandum Opinion and Order, 10 FCC Rcd 403, 453–54, para. 90 (1994).

[1277] *See* 47 C.F.R. § 1.2105(b)(1). As discussed in the following Section, changes to the required certifications are considered to be major amendments to the pre-auction application and, thus, would not be permitted.

f. Procedures for Processing Pre-Auction Application

442. *Background.* In the *NPRM*, the Commission proposed to process applications to participate in the reverse auction in a manner similar to the processing of applications to participate in spectrum license auctions. More specifically, the Commission proposed that no application would be accepted if, by the initial deadline, the applicant had failed to make the required certifications.[1278] Applicants would be afforded an opportunity to cure defects identified by the Commission after an initial review of the application to participate.[1279] If an applicant fails to make necessary corrections before a resubmission deadline, its application would be dismissed.[1280]

443. The Commission further proposed that the applicant must amend or modify the application as promptly as possible, and in any event within five business days, whenever the information furnished in a pending pre-auction application is no longer substantially accurate and complete in all significant respects.[1281] Certain minor changes would be permitted subject to a deadline specified by public notice, but major changes to the pre-auction application would not be permitted.[1282] Major amendments would include, but would not be limited to, changes in ownership of the applicant or the licensee that would constitute a substantial assignment or transfer of control.[1283] In addition, major amendments would include changes to any of the required certifications and the addition or removal of licenses or authorizations identified on the pre-auction application for which the applicant intends to submit bids.[1284] Minor amendments would include any changes that are not major, such as correcting typographical errors and supplying or correcting information requested by the Commission to support the certifications made in the application.[1285] Finally, to protect the confidentiality of the identities of all reverse auction participants,[1286] the Commission proposed to notify the applicants individually as to the status of their applications and whether they are qualified bidders, i.e., are qualified to participate in the reverse auction.[1287]

444. *Discussion.* We adopt the proposals in the *NPRM*. The process we adopt has proven effective in the Commission's experience with spectrum license auctions. Pre-auction application processing provides an opportunity to address concerns regarding information provided by applicants, and helps to assure their eligibility to participate, without unduly limiting participation by qualified parties. Only a few commenters addressed this aspect of the reverse auction. These commenters made suggestions intended to facilitate participation in the reverse auction.[1288] We concur in the purpose behind

[1278] *NPRM*, 27 FCC Rcd at 12445, para. 253.

[1279] *Id.*

[1280] *Id.*

[1281] *Id.* at 12445, para. 254.

[1282] *Id.*

[1283] *Id.* Precluding such changes in ownership after the submission of the application would ensure that all of the relevant parties are clearly identified for the purposes of applying the reverse auction rules. *Id.*

[1284] *NPRM*, 27 FCC Rcd at 12445, para. 254.

[1285] *Id. See also* 47 C.F.R. § 1.2105(b)(2).

[1286] *See* Spectrum Act § 6403(a)(3).

[1287] *NPRM*, 27 FCC Rcd at 12446, para. 255. *See also* Entravision Comments at 7.

[1288] CTIA suggests that the Commission's information on file regarding broadcast television licensees might obviate the need for any application process. CTIA Comments at 32–33. CIT, a source of financing for broadcast television licensees, suggests eliminating any restrictions on changes in ownership during the course of the auction. CIT Comments at 7. And MetroPCS, as part of its larger proposal to conduct an ascending price reverse auction, urges the FCC to adopt procedures that would allow broadcasters that previously opted not to participate to jump into the auction as it is ongoing, in the event that prices rise above pre-auction expectations. MetroPCS Comments at 8.

these suggestions—facilitating to the greatest extent possible participation in the reverse auction consistent with the Commission's polices—and our action serves this purpose. We decline, however, to adopt the specific suggestions. As discussed above, based on our experience with spectrum license auctions, requiring the submission of an application to participate is important for a number of reasons, including ensuring that the information the Commission relies on is up-to-date. Limiting permissible changes in the ownership of auction applicants likewise assures that the Commission's review of applicant qualifications remains valid over the course of the auction.

445. Finally, we decline to adopt one commenter's suggestion that any otherwise-eligible broadcast television licensee who initially opted not to participate in the reverse auction ought to be able to enter the "ongoing" reverse auction without first applying to participate.[1289] As discussed above, the application process is critical to determining whether a broadcast television licensee is both technically and legally qualified to participate in the reverse auction. Allowing broadcast television licensees who have not applied to participate in the reverse auction, and thus have not been vetted by Commission staff, to enter the "ongoing" auction presents an unwarranted risk that ineligible parties might bid in the auction and would add unnecessary complexity to the reverse auction design.

2. Bidding Process

446. Here, we address the reverse auction bidding process and adopt rules to provide for the necessary bidding procedures. The reverse auction will use a descending clock auction format. The record to date demonstrates several important advantages of a descending clock auction format. Most importantly, it facilitates broadcaster participation by presenting the bidder with a series of simple decisions, rather than requiring a more complicated bidding strategy. The descending clock format makes it easy for bidders to choose among multiple bid options. And the format allows pricing procedures that give the bidder strong incentives to bid straightforwardly, regardless of what other bidders may choose to do. We will discuss these benefits in more detail below.

447. We address the basic structure of our chosen descending clock auction design in terms of three basic elements: (i) bid collection procedures that determine how bids are gathered using a descending clock auction format; (ii) assignment procedures that evaluate bids sequentially, taking into account interference potential, to determine which bids for relinquishment are accepted; and (iii) pricing procedures that determine the payment that a broadcaster relinquishing spectrum usage rights will receive.[1290] Below, we address these three elements from the perspective of a single television station bidding in a single stage of the auction.[1291] The format for reverse auction bidding in each stage will be a descending clock auction incorporating multiple bidding rounds.

a. Bid Collection Procedures: Descending Clock Format

448. *Background*. In the *NPRM*, the Commission discussed two basic reverse auction bid collection procedures.[1292] The first was a single round mechanism, in which a bidder would specify the minimum payment it would be willing to accept in exchange for relinquishing various spectrum usage rights. The second was a multiple round procedure—a descending clock auction—in which the bid collection process would take place in a series of bidding rounds. In each round, a bidder would have a set period of time to indicate whether it would be willing to accept a specific payment amount in exchange for relinquishing rights. The payment amounts generally would decline with each round, or

[1289] MetroPCS Comments at 8.

[1290] *See NPRM*, 27 FCC Rcd at 12372–77, paras. 35–53. Appendix C describes in more detail than the *NPRM* how some of the auction design options could be implemented. *Id.* at 12563–65, 12568–74.

[1291] The incentive auction may include multiple stages, with reverse and forward auction bidding in each stage. *See* § IV.A. (Overview and Integration of the Reverse and Forward Auctions).

[1292] *NPRM*, 27 FCC Rcd at 12373, paras. 38–40; *see also id.* at 12450, para. 272.

each "tick" of the descending clock.[1293] The *NPRM* also discussed an additional bid collection procedure—"intra-round bidding"—that would enable bidders to indicate a specific price, between the opening and closing prices in a round, below which a bid option would not be acceptable.[1294]

449. *Discussion.* The reverse auction will collect bids using a descending clock auction format, and bidders will have the option of making intra-round bids.[1295] We adopt this format because of its advantages for participating bidders. In each round, bidders will be faced with relatively simple choices of determining whether or not they are still willing to accept the current prices for bid options. Observing the sequence of prices over multiple rounds will give bidders an indication of relative values for the different bid options, which will help them refine and feel more confident in their bidding decisions. This process of price discovery will be particularly helpful in the context of this first-time-ever incentive auction, in which there will be no historical results to guide bidder expectations. In contrast, a single round sealed-bid format would require bidders to make price commitments in advance of any information revealed through the auction process. Commenters generally agree with this choice.[1296] Moreover, some commenters favor the multiple round approach because the bidder may never have to reveal its lowest acceptable price, unlike in a single round auction in which a bidder would indicate, at one time, the lowest prices at which it would accept various bid options.[1297]

450. Under the descending clock format, in each round a participating broadcaster will be presented a price for a bid option and will indicate whether it is willing to accept the option at that price.[1298] As explained below, each station will see a price that takes into account objective factors, such as location and potential for interference with other stations, that affect the availability of channels in the repacking process and, therefore, the value of a station's bid to voluntarily relinquish spectrum usage rights.[1299] Thus, a station with a high potential for interference will be offered a price that is higher than a station with less potential for interference to other stations. Setting prices in this manner will encourage stations with more interference potential to remain active in the reverse auction bidding longer, increasing

[1293] Appendix C describes in more detail a descending clock auction in which prices for bidding options—for example, to relinquish all spectrum usage rights or to move to a lower band—would start high and decline during subsequent rounds. *See id.* at 12568.

[1294] *See NPRM*, 27 FCC Rcd at 12572 (Appendix C); *see also id.* at 12378, para. 60 (discussing intra-round bidding in the context of the forward auction).

[1295] As discussed above, the rules we adopt provide the necessary flexibility to vary aspects of the reverse auction bidding process, including the format we now adopt, if circumstances or the record developed in the pre-auction process reflect the need to do so. Again, however, we fully intend to implement the choices we make in this Order.

[1296] *See* Anon. Broadcaster 2 Comments at 5; CEA Comments at 30; EOBC Comments at 6; EOBC Reply at 9; Local Media Reply at 5; Mobile Future Comments at 9–10; TIA Comments at 13–14; Verizon Comments at 28; Vision Comments at 2; *see also* T-Mobile Comments at 39–41 (advocating for a multiple round reverse auction with sealed bidding for each phase). *But see* MetroPCS Comments at 6–7 (suggesting an ascending clock reverse auction where broadcasters choose a reserve price at which they are willing to relinquish spectrum); NRB Comments at 14–15 (recommending that broadcasters submit confidential non-binding bids to supply the Commission with the information necessary to engage in a separate rulemaking once the amount of available spectrum in known). Examination of the record adequately rebuts proposed alternatives to a descending clock auction. *See* EOBC Reply at 8 (explaining that the multi-round ascending reverse auction proposed by MetroPCS would not offer a high initial starting price to attract broadcasters, would make it difficult for broadcasters to determine the price at which to enter the auction, and would not be conducive to meeting the goal of repurposing the maximum amount of spectrum); *see id.* (stating that NRB's suggestion that broadcasters submit confidential, non-binding bids before the repacking process would delay the auction unnecessarily and decrease broadcaster participation).

[1297] *See, e.g.*, EOBC Reply at 9.

[1298] A bidder may see a price for more than one option. *See* § IV.B.1.b (Reverse Auction Bid Options). Whether a bidder can accept a price for more than one option at a time will be determined in the *Procedures PN*.

[1299] *See* § IV.B.2.b (Reverse Auction Bid Assignment Procedures).

the efficiency of the repacking process by reducing the likelihood that such stations will have to be assigned channels, thereby blocking other stations with less interference potential. This, in turn, will reduce the overall cost of clearing spectrum and increase the likelihood of a successful auction.[1300]

451. We will determine the factors to be used in setting prices in the *Procedures PN* based on additional, more focused public input.[1301] We will also determine in the *Procedures PN* the mechanism for applying such factors.[1302] We emphasize that we do not intend to set prices to reflect the potential market or enterprise value of stations, as opposed to their impact on the repacking process. Possible factors include the number of stations that a station would interfere with and block from being assigned channels, the population the station covers,[1303] or a combination of such factors.[1304]

452. We disagree with arguments that using such factors is unnecessary to account for the value of a station's voluntary relinquishment of rights in the reverse auction.[1305] For the reasons explained above, we conclude that such factors will significantly improve the likelihood of a successful auction.[1306] We also disagree with suggestions that using such factors will overly complicate the reverse auction process.[1307] This approach will not be difficult to implement from an auction design perspective, nor will it alter the bidding experience. In each round, each reverse auction bidder will be presented with a price offer that takes into account these factors. As described below, a bidder will be able to indicate whether it is still willing to accept a bid option at the current price. In addition, we are not persuaded that

[1300] For example, suppose station A with an interference potential or "volume" of 10 would relinquish rights for a price of 15, and station B with a volume of 20 would relinquish rights for a price of 20. Without considering volume, station B would drop out first (to assure it receives at least 20), even though assigning a channel to station B would foreclose more channels for other stations than assigning a channel to station A, or impair more spectrum in the wireless band. With the use of volume as a factor, however, when the price per unit of volume drops below 1.50, station A would drop out since it would not accept an incentive payment of less than 15, while station B would remain active until the price per unit of volume falls below 1.00, to assure that it receives an incentive payment of at least 20.

[1301] *See* Select Spectrum Comments at 5–6 (encouraging the Commission to develop any scoring mechanism with a high degree of transparency and some form of dialogue). *See also* CCA Reply at 16; LIN Comments at 2.

[1302] In making this determination we will consider, among other things, whether to utilize optimization techniques.

[1303] We must make all reasonable efforts to preserve the population served of protected stations that will remain on the air, making population served one of the major constraints on the availability of channels in the repacking process. *See* Spectrum Act § 6403(b)(2); § III.B.2 (Implementing the Statutory Preservation Mandate).

[1304] We recognize that some commenters strongly oppose using population served as a factor in setting prices. *See, e.g.* EOBC Comments at 19; Vision Comments at 3; Letter from Ari Meltzer, Counsel for EOBC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Scoring in Reverse Auction Attachment at 2, 19 (filed Dec. 6, 2013) (EOBC Dec. 6, 2013 Cramton Slides) (suggesting that if a scoring mechanism is used, that it should be based on a station's preclusive effect on repacking other stations rather than population coverage or other measures of enterprise value).

[1305] *See* Vision Comments at 3–4; EOBC Dec. 6, 2013 Cramton Slides. *See also* Joint Letter from Julie Kearney, CEA, & Preston Padden, EOBC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Maximizing the Success of the Incentive Auction Attachment at 12 (filed Nov. 6, 2013) (CEA-EOBC Nov. 6, 2013 Maximizing Success Slides). *But see* Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Exhibit dated Dec. 13, 2013 at 10 (filed Dec. 17, 2013) (T-Mobile Dec. 17, 2013 *Ex Parte* Exhibit) (arguing that using such factors will increase the amount of repurposed spectrum, accelerate the bidding process, raise more revenue, and help broadcasters by better distributing funds in the reverse auction).

[1306] *See, e.g.*, T-Mobile Dec. 17, 2013 *Ex Parte* Exhibit; Select Spectrum Comments at 5–6.

[1307] *See* EOBC Comments at 18–19; EOBC Reply at 18; Vision Comments at 3.

using such factors will deter broadcasters from participating in the reverse auction.[1308] No station will be compensated less than the total price that it indicates it is willing to accept.[1309]

453. Generally, the prices for bid options will start high and descend for each station, as long as the station's acceptance of a chosen bid option is not needed to meet the current spectrum clearing target.[1310] Each round will last for a pre-set period of time. The *Procedures PN* will address the timing of rounds and how price decrements will be determined after an opportunity for comment.

454. To illustrate the bidding process under the descending clock auction format we adopt today, consider a participating broadcaster that is willing to relinquish all of its licensed spectrum usage rights if it will receive a sufficiently high incentive payment. In each round in which the offered price is above what the broadcaster considers high enough, the broadcaster will indicate that it is still willing to accept the license relinquishment option at the current price. Once the price becomes too low, the broadcaster will indicate that it is no longer willing to accept the offer and that, at that price, it wishes to drop out of the reverse auction bidding and be assigned a channel in the repacking process. For example, if the bidder's price ticks down from ten to eight between one round and the next, and the bidder is willing to accept a price of ten but not eight, it will indicate that at the new price of eight, it wishes to drop out of the auction and continue broadcasting.

455. We will also provide participating broadcasters with the optional flexibility of "intra-round bidding." Several commenters support this choice.[1311] With intra-round bidding, a bidder will be able to indicate the lowest price at which it is willing to accept an option. Continuing the example from the preceding paragraph, if the price of going off the air ticks down from ten to eight between one round and the next, and the bidder is willing to accept a price of nine but not eight, it can make an intra-round bid of nine, indicating that at a price below nine, it wishes to drop out of the bidding. In addition to giving bidders more control over the bidding process, intra-round bidding will speed the pace of the reverse auction, consistent with our auction design goals, by allowing relatively large round-to-round reductions in prices, but also allowing bidders to identify the precise points at which they want to change bid options or drop out of the auction.

b. Bid Assignment Procedures: Determining Which Bids Are Accepted

456. *Background*. Bid assignment procedures determine which stations receive payments in exchange for relinquishing rights. In addition to considering price information, the bid assignment procedures in the reverse auction must ensure that the stations that drop out of the bidding can feasibly be assigned channels in the repacking process. The *NPRM* identified two general approaches to bid assignment. The first approach would consider all the relevant information at once and try to find the

[1308] *See, e.g.*, CEA-EOBC Nov. 6, 2013 Maximizing Success Slides at 18–19; Vision Comments at 4. *See also* Letter from Peter Tannenwald, Counsel for WatchTV, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 6 (filed Oct. 29, 2013) (agreeing that scoring can act as a disincentive to broadcaster participation); Letter from Leora Hochstein, Counsel for Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed Feb. 26, 2014) (Verizon Feb. 26, 2014 *Ex Parte* Letter).

[1309] For this reason, we also reject any suggestion that using such factors in setting price offers is contrary to the Spectrum Act. *See* CEA-EOBC Nov. 6, 2013 Maximizing Success Slides at 10. As required by statute, the reverse auction will "determine the amount of compensation that each broadcast television licensee would accept in return for voluntarily relinquishing some or all of its broadcast television spectrum usage rights[.]" Spectrum Act § 6403(a)(1).

[1310] *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions).

[1311] *See, e.g.*, CEA Reply at 6; EOBC Comments at 7 (noting that through intra-round bidding the Commission will be able to offer high initial prices, but will be able to decrease the number of rounds efficiently because it will have access to not only the rejected price, but also a price that the broadcaster would accept); *see also* T-Mobile Comments at 43 (noting that, in the context of the forward auction, intra-round bidding may be a way to balance the simplicity and efficiency of a static auction with the price discovery benefits of a dynamic auction).

optimal solution.[1312] Rather than considering all aspects of the problem at one time, the second option would use an iterative or "sequential" approach.[1313] Under the latter approach, when a station decides the price offered for a given bid option is too low and it wishes to drop out of the bidding for that option, the auction system would evaluate the impact of that station's decision, and would determine how assigning that station a channel in a band it considers acceptable would affect the feasibility of assigning channels to the stations that remain active in the bidding at the current prices. Based on that evaluation, determinations would be made as to which bids to accept provisionally at the current prices.

457. *Discussion.* The bid assignment procedures we adopt will evaluate the feasibility of assigning television channels to stations generally using a sequential approach. We adopt the sequential approach because it comports well with the descending clock auction format.[1314] The descending clock auction format, because it has multiple rounds, requires that bid assignment procedures be run in every round, and run quickly, so as not to unduly prolong the auction. Timeliness is especially important in the incentive auction context, where there may be multiple stages, with reverse and forward bidding run in each stage. The sequential approach using a feasibility checker in each round can be run very quickly.[1315] The *Procedures PN* may incorporate some optimization methods into the sequential process after additional public comment, if doing so would improve performance of the feasibility checker and not unduly slow the reverse auction bidding process.[1316]

458. Under the sequential approach, at each point in the bidding process at which a station drops out and must be assigned a channel in its home band, the repacking methodology will determine whether doing so precludes assigning a channel to any of the stations that remain active in the bidding.[1317] If so, the station for which no channel is available will be provisionally selected to receive a payment in exchange for relinquishing rights. Only stations that can still feasibly be assigned a channel in their home

[1312] *NPRM*, 27 FCC Rcd at 12374–75, para. 45 (referring to this concept as "integer programing").

[1313] *Id.* at 12375, para. 46.

[1314] The limited comments directly addressing the choice between the integer programming and sequential approaches dwell on the characteristics of the different approaches without advocating a clear choice between them. For example, NRB states its opposition to the use of integer programming, arguing that this approach lacks transparency, but reserves its opinion with respect to the sequential approach on the grounds that too many uncertainties remain about its implementation. NRB Comments at 9–11. Verizon comments that on balance, the sequential approach may be preferable because it would provide more certainty to broadcasters, but suggests running both methods in parallel, or utilizing different methods during different auction stages, to try to find an optimal solution within a reasonable amount of time. Verizon Comments at 30–31; *see also* AT&T Comments at 68–70 (emphasizing importance of optimizing efficiency of the repacking process and questioning whether a sequential approach could avoid substantial losses in efficiency). As Verizon suggests, we will optimize television channel assignments during a different portion of the incentive auction process. Verizon Comments at 30–31.

[1315] Feasibility checking can produce accurate results in a short amount of time. *See Incentive Auction Task Force Releases Information Related to Repacking; Announces Workshop/Webinar to Provide Additional Detail,* Public Notice, 29 FCC Rcd 47, 47, para. 2 (2013); *see also* FCC, LEARN Workshop on Feasibility Checking During Repacking Process, Feb. 21, 2014, http://www.fcc.gov/events/learn-workshop-feasibility-checking-during-repacking-process (last visited Apr. 10, 2014).

[1316] As discussed above, the repacking methodology will use an integer programming optimization process at various other points in the auction process. *See* § III.B.1 (Repacking Process Overview).

[1317] The methodology for checking the feasibility of assigning channels to television stations during the bidding process is also addressed in § III.B.1 (Repacking Process Overview). When considering channel assignment, the repacking methodology will take into account that a station that drops out of bidding for one relinquishment option may still be bidding to accept another option.

bands will remain active in the bidding as prices decline.[1318] The bidding rounds will continue until every station has dropped out of the bidding and been provisionally assigned a channel in its home band or has been selected to receive a payment to relinquish its rights because no feasible channel could be found for it in the reorganized band.[1319]

c. Procedures to Determine Payments

459. *Background.* The *NPRM* addressed ways of determining the payments that broadcasters would receive in exchange for relinquishing rights under various bid options, including a methodology that the *NPRM* referred to as "threshold" pricing,[1320] which would determine the payment to a winning bidder based on the price at the point the repacking methodology determined that it could no longer find a feasible channel for the bidder's station in its home band because another station had dropped out of the bidding and had to be assigned a channel. By analogy to a simple auction with two bidders in which the winning bidder's price is set when the other bidder drops out, this pricing approach would set the payment for the winning bidder based on the price when the other bidder's decision to drop out leads to the winning bidder's selection.

460. *Discussion.* We will determine payments in the descending clock auction using a threshold pricing approach. Under this pricing approach, a bidder's payment for a relinquishment option generally will be based on the price for the option when another bidder—whose exit from the auction triggers acceptance of the winning bidder's bid, as described above—drops out of the bidding. This payment will be at least as high as the last price the winning bidder agreed to accept for the relinquishment option.

461. We adopt this threshold pricing approach because it will simplify bidding strategy, facilitating broadcaster participation. Under this approach, payments are based on the actions of competing bidders, discouraging bidders from strategically distorting their own bids in an effort to increase their payments. Instead, it encourages a straightforward bidding strategy, in which a bidder indicates that it is willing to accept a price as long as the price is at least as great as the value the bidder ascribes to the bid option. If the bidder drops out before the price reaches its value, the bidder may pass up an opportunity to relinquish rights at a profitable price. If the bidder continues to bid after the price passes its value, it may be selected as a winning bidder, but receive a payment below its value. Since a bidder's drop-out price determines the point at which it exits the auction, but not its payment amount if it wins, the bidder cannot gain by strategically distorting its drop-out price in order to affect its winning payment, as it might with a pay-as-bid approach. The general principle of basing payments on the drop-out behavior of competing bidders is frequently used in auctions because of the strong incentives the approach gives bidders to bid straightforwardly.[1321] Commenters generally support this choice.[1322]

[1318] The statutory mandate to "make all reasonable efforts to preserve . . . the coverage area and population served of each broadcast television licensee" will be incorporated into this feasibility analysis. *See* § III.B.2 (Implementing the Statutory Preservation Mandate); Spectrum Act § 6403(b)(2).

[1319] All assignments will be provisional until the final stage of the auction, when the final stage rule is satisfied. *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions). At that point, final channel assignments will be established through the use of optimization techniques. *See* § III.B.1 (Repacking Process Overview).

[1320] *NPRM*, 27 FCC Rcd at 12376, paras. 51–52; *see also id.* at 12450, para. 272.

[1321] This pricing approach is a variation of a well-known principle known generally as "second-pricing" in auction theory, and first described by William Vickery. *See* William Vickrey, *Counterspeculation, Auctions, and Competitive Sealed Tenders*, 16 J. OF FIN. 8 (1961).

[1322] Commenters addressing the issue support threshold pricing rather than pay-as-bid pricing. AT&T Reply, Che & Haile Reply Attachment at 13 (opposing pay-as-bid approach); EOBC Comments at 10; Local Media Reply at 6; Select Spectrum Comments at 6; T-Mobile Comments at 44; US Cellular Reply at 13; Vision Comments at 2.

d. Additional Bidding Procedures

462. In addition to bid collection, bid assignment, and bid payment procedures, we adopt rules proposed in the *NPRM* for additional reverse auction bidding procedures.[1323] The *Procedures PN* will announce final decisions on the reverse auction bidding procedures, following further consideration of the record, including public input received in response to an additional opportunity for comment. Accordingly, we do not address debates within the record to date regarding decisions that will be made in the *Procedures PN*.

463. Among the rules we adopt is a rule that provides for opening or reserve prices.[1324] Before any party applies to participate in the auction, the *Comment PN* will seek comment on the methodology for determining opening prices—the maximum amounts that will be offered to each potentially eligible broadcast licensee for each bidding option in the reverse auction—and the *Procedures PN* will announce this methodology. We also could adopt a dynamic version of reserve prices, a variation on reserve prices that would set dynamic maximum prices based on bidding in the auction.[1325] Under this rule, the amounts offered will be calculated for each licensee based on specific factors that affect the value of its voluntary relinquishment of spectrum usage rights as discussed above.[1326] Thereafter, a licensee interested in potentially exercising any of the bid options will file a pre-auction application to participate in the reverse auction.[1327] Qualified applicants for the reverse auction will then indicate, in the initialization step, the relinquishment options they would be willing to accept at the opening prices.[1328] The record supports adoption of these rules. Parties addressing opening and reserve prices generally express concern that prices be high enough to attract broadcaster participation, and these rules will facilitate the Commission's ability to do so.[1329] In particular, using dynamic reserve prices could address the risk that setting the opening prices too high will prevent the auction from repurposing spectrum by establishing a mechanism that will allow price offers to be reduced in non-competitive areas based on bids in other areas.

464. We also adopt a rule expressly providing that a bid in the reverse auction is an unconditional, irrevocable offer by the bidder to fulfill the terms of the bid. That is, a bidder that indicates it is willing to accept a price for a bid option is obligated to relinquish those rights at that price, if the bid is selected by the auction system as a winning bid. As several commenters note, such a provision is fundamental to the incentive auction process in order to ensure that broadcasters will bid truthfully in the reverse auction and to provide certainty to forward auction bidders.[1330] We decline to adopt opposing proposals that would allow reverse auction bidders to revoke bids after making them.[1331] Accordingly, a bidder will have a binding obligation to fulfill the terms of a winning bid.

[1323] *See NPRM*, 27 FCC Rcd at 12450, para. 272.

[1324] *NPRM*, 27 FCC Rcd at 12377, para. 53.

[1325] *See NPRM*, 27 FCC Rcd at 12574 (Appendix C). *See also* § IV.A (Overview and Integration of the Reverse and Forward Auctions).

[1326] *See* § IV.B.2.a (Reverse Auction Bid Collection Procedures); *see also* § IV.B.2.b (Reverse Auction Bid Assignment Procedures).

[1327] *See* § IV.B.1 (Reverse Auction Pre-Auction Process).

[1328] *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions)

[1329] *See, e.g.*, Verizon Comments at 28; US Cellular Comments at 9; T-Mobile Comments at 46.

[1330] T-Mobile Reply at 84–85; CTIA Reply at 53; *see also* Verizon Comments at 68 (supporting the Commission's proposal that all reverse auction bids be deemed irrevocable, binding offers).

[1331] *See, e.g.*, Tribune Comments at 8.

C. Forward Auction

465. The forward auction portion of the incentive auction will identify the prices that potential users of repurposed broadcast television spectrum would pay for new licenses to use the spectrum. This information and the information from the reverse auction will determine the winning bidders for new flexible use licenses and the prices those bidders will pay for the spectrum licenses, provided the requirements of the final stage rule are met. In the first two Sections below, we describe the pre-auction and bidding processes for the forward auction. In a subsequent Section, we address the deletion of a prior, now outdated, auction rule, section 1.2102(c).

1. Pre-Auction Process

466. In this Section, we address a number of issues related to the pre-auction process, some of which we face for the first time in preparing for the forward auction portion of the incentive auction. In particular, we describe how, in this context, we interpret the Commission's authority to conduct competitive bidding in the forward auction of 600 MHz licenses. In addition, we adopt small business size standards consistent with those applicable for 700 MHz licenses and apply the associated size-based bidding credits in our Part 1 competitive bidding rules, which may be utilized by eligible applicants in bidding for 600 MHz licenses. We also adopt modifications to the existing Part 1 competitive bidding rules discussed below to facilitate the forward auction, such as a modification of the prohibition of certain communications among forward auction applicants so that it will also apply to communications by forward auction applicants with potential reverse auction applicants. Finally, we modify the recently adopted national security certification designed to ensure compliance with section 6004 of the Spectrum Act. In all other respects, we will utilize our existing Part 1 rules to govern the pre-auction and post-auction application and payment requirements and processes of the forward auction.[1332]

a. Competitive Bidding Authority

467. *Background*. The Spectrum Act mandates that the Commission shall conduct a forward auction to assign licenses to authorize the use of repurposed spectrum as part of an incentive auction of broadcast television spectrum.[1333] The Spectrum Act did not revise section 309(j)(1) of the Communications Act, which requires the Commission to use competitive bidding to assign licenses when "mutually exclusive applications are accepted for any initial license," subject to the Commission's obligation in the public interest to avoid mutual exclusivity in application and licensing proceedings and subject to specified exemptions not applicable here.[1334]

468. When interpreting section 309(j)(1), the Commission has found—and courts have affirmed—that the Commission has authority to conduct competitive bidding when all applicants to participate in bidding on particular licenses cannot be granted the subject licenses because the applicants seek the same license or different licenses that would interfere with each other,[1335] or when the requests for interchangeable channels exceed the available supply.[1336] The Commission has such authority

[1332] *See* 47 C.F.R. §§ 1.2101–1.2114.

[1333] Spectrum Act § 6403(c)(1); *see also Channel Sharing Report and Order*, 27 FCC Rcd at 4620, para. 8 (noting that the Spectrum Act requires the Commission to conduct an incentive auction to recover a portion of the broadcast television spectrum while preserving that service as a healthy, viable medium).

[1334] 47 U.S.C. §§ 309(j)(1)–(2), (j)(6)(E). These sections and their requirements are distinct from the requirement that at least two competing licensees participate in the reverse auction. *See* § IV.B.1.d. (Two Competing Participants Requirement).

[1335] *Benkelman Tel. Co. v. FCC*, 220 F.3d 601, 603 n.2 (D.C. Cir. 2000).

[1336] *DIRECTV v. FCC*, 110 F.3d 816, 822 (D.C. Cir. 1997).

irrespective of whether each of the parties applying to bid for a license subsequently bids for the subject license.[1337]

469. In the *NPRM*, the Commission sought comment on how to apply the section 309(j)(1) requirement of mutual exclusivity in the context of the broadcast television spectrum forward auction.[1338] Inherent in the forward auction are a number of features that distinguish it from past spectrum license auctions. First, the Spectrum Act expressly ties the success of the reverse auction to generation of specified "minimum proceeds" from the forward auction.[1339] As a result, forward auction bids cannot be used to assign flexible-use wireless licenses unless the sum of all forward auction bids is sufficient to meet the costs and expenses identified by the Spectrum Act, as determined in part by the reverse auction. Second, at the outset of the reverse and forward auctions, there is a conflict between the current use of UHF band spectrum by reverse auction bidders (existing broadcast television licensees) and the future use of any portion of the spectrum by forward auction bidders (new flexible-use licensees), which only the conduct of both the reverse and the forward auctions can resolve. These interdependencies make it unclear at the outset of the forward auction exactly how many (if any) blocks of repurposed spectrum will ultimately be made available in any given market.[1340]

470. *Discussion.* We interpret our competitive bidding authority under section 309(j)(1) in light of these features of the broadcast television spectrum incentive auction mandated by the Spectrum Act, and in a manner that is consistent with, and that will give full effect to, that mandate.[1341] Accordingly, we conclude that the Commission has authority in the section 6403 forward auction to conduct competitive bidding if it accepts any application(s) seeking to bid on initial 600 MHz flexible-use licenses, and any application(s) seeking to bid in the reverse auction.[1342] We reject the suggestion that more than one forward auction bidder must make a bid on specific available reallocated spectrum to satisfy section 309(j)(1).[1343] We conclude that our interpretation best accords with canons of statutory construction requiring that statutes be read in light of their purpose,[1344] and that "normally the specific governs the general."[1345]

[1337] *See Benkelman Tel. Co.*, 220 F.3d at 605–06 (upholding the Commission's finding of mutual exclusivity where applicants merely reserved the option to bid on all available licenses, where "necessary to effectively implement the new [license by auction] scheme"); *see also DIRECTV*, 110 F.3d at 827–28. If only one party applies to bid for a particular license offered in competitive bidding, and that application is not mutually exclusive with any other application, that license is removed from the competitive bidding process and the Commission considers that party's non-mutually exclusive application for the license through a process separate from the competitive bidding. 47 C.F.R. § 1.2102(a); *see Competitive Bidding Second R&O*, 9 FCC Rcd at 2376, para. 165.

[1338] *NPRM*, 27 FCC Rcd at 12454, para. 292; 47 U.S.C. § 309(j)(1).

[1339] Spectrum Act § 6403(c)(2).

[1340] *See* Verizon Comments at 48. Further, the Spectrum Act permits the conduct of reverse and forward auctions "on a contemporaneous basis." Spectrum Act § 6403(f)(1). Pursuant to that authority, the Commission has integrated these two auctions in a series of stages, further illustrating the interdependencies between the forward and reverse auctions.

[1341] *Cf.* Verizon Comments at 48. Our determination does not preclude finding other bases for our competitive bidding authority under § 309(j)(1).

[1342] The Spectrum Act requires that "at least two competing licensees participate in the reverse auction." Spectrum Act § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(ii)). As we discuss above in § IV.B.1.d (Two Competing Participants Requirement), we find that this additional requirement will be satisfied if more than one broadcast television licensee's pre-auction application is found to be complete and in compliance with the application rules, and if at least two such licensees are not commonly controlled.

[1343] *See* Anon. Citizen Comments at 2.

[1344] *See, e.g., Zuni Pub. Sch. Dist. No. 89 v. Dep't of Educ.*, 550 U.S. 81, 93 (2007); *Pub. Citizen v. U.S. Dep't of Justice*, 491 U.S. 440, 454–55 (1989) ("[S]tatutes always have some purpose or object to accomplish, whose

(continued….)

471. In section 6403, Congress directed in plain language that the Commission "shall conduct a forward auction" for spectrum reallocated from broadcast use.[1346] With respect to other frequency bands specifically subject to auction pursuant to the Spectrum Act, Congress referred more generally to the use of "a system of competitive bidding under section 309(j)."[1347] We need not address here how to apply section 309(j)(1) in those or other contexts, but the intention of Congress in section 6403 is clear. We also construe that mandate as reflecting a recognition of the features of the incentive auction described above. These include the interdependence of the reverse and forward auctions and our resulting inability to make determinations at the outset about whether and in what markets requests for interchangeable channels exceed supply, due to the mutually exclusive uses of the spectrum presented by existing licensees and any parties licensed based on the forward auction; and the contingency of the success of the reverse auction on the proceeds to be derived from permitting the forward auction to proceed, making our acceptance of forward auction bids dependent on the sum of all forward auction bids. We thus also conclude that our interpretation of the statutory scheme is "necessary to effectively implement" the incentive auction mandate established by Congress.[1348]

b. Bidding Credits

472. *Background*. Section 309(j)(4) of the Communications Act requires that when the Commission prescribes regulations to establish a methodology for the grant of licenses through the use of competitive bidding, it must "ensure that small businesses, rural telephone companies, and businesses owned by members of minority groups and women are given the opportunity to participate in the provision of spectrum-based services, and, for such purposes, consider the use of . . . bidding preferences."[1349] In addition, section 309(j)(3)(B) provides that in establishing eligibility criteria and bidding methodologies, the Commission shall promote "economic opportunity and competition . . . by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women."[1350] One of the principal means by which the Commission fulfills this mandate is through "bidding preferences" in the form of bidding credits to small businesses. The Commission defines eligibility requirements for small businesses on a service-specific basis, taking into account the capital requirements and other characteristics of each particular service in establishing the appropriate threshold.[1351]

473. The Commission proposed in the *NPRM* to adopt the same small business size standards for the forward auction component of the incentive auction as it adopted for the adjacent 700 MHz Band.[1352] The Commission specifically sought comment on whether these small business provisions are

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sympathetic and imaginative discovery is the surest guide to their meaning.") (quoting *Cabell v. Markham*, 148 F.2d 737, 739 (2d Cir. 1945) (Hand, J.), *aff'd*, 326 U.S. 404 (1945)).

[1345] *See, e.g, Long Island Care at Home, Ltd. v. Coke*, 551 U.S. 158, 170 (2007).

[1346] Spectrum Act § 6403(c)(1).

[1347] *Id.* § 6103(a)(2). *See also id.* § 6401(b)(1)(B) ("a system of competitive bidding under such section").

[1348] *See Benkelman Tel. Co.*, 220 F.3d at 605–06.

[1349] 47 U.S.C. § 309(j)(4)(D); *see NPRM*, 27 FCC Rcd at 12454, para. 293.

[1350] 47 U.S.C. § 309(j)(3)(B); *see NPRM*, 27 FCC Rcd at 12454, para. 293.

[1351] *Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, PP Docket No. 93-253, Second Memorandum Opinion and Order, 9 FCC Rcd 7245, 7269, para. 145 (1994); 47 C.F.R. § 1.2110(c)(1). *See Part I Third Report and Order*, 13 FCC Rcd at 388, para. 18 (continuing a service-by-service approach to defining the eligibility requirements for small businesses).

[1352] *NPRM*, 27 FCC Rcd at 12455, para. 295. Specifically, the Commission proposed to define a small business as an entity with average annual gross revenues for the preceding three years not exceeding $40 million, and a very
(continued….)

sufficient to promote participation by businesses owned by minorities and women, as well as rural telephone companies.[1353] The Commission also proposed to extend any rules and policies adopted in the spectrum over Tribal lands proceeding, including those related to Tribal land bidding credits, to any licenses that may be issued through competitive bidding in the forward auction.[1354]

474. *Discussion*. Certain commenters requested that we modify our existing rules regarding bidding credits specifically for the incentive auction.[1355] As our designated entity rules include generally applicable provisions regarding size-based eligibility and corresponding bidding preference, we decline to adopt modifications specific to the incentive auction. Instead, we will initiate a separate proceeding to examine our designated entity ("DE") program generally. Our goal is to resolve that DE proceeding early enough to allow all parties to account for any changes to the DE rules while planning for the incentive auction.

475. Pending the outcome of the DE proceeding, which will allow the Commission to develop a more complete record, we today adopt the same business size standards and associated bidding credits for small businesses as the Commission did for the 700 MHz Band. In the DE proceeding, we will revisit and consider changing these business size standards and bidding credits. Specifically, for the purpose of the forward auction, we will define a small business as an entity with average annual gross revenues for the preceding three years not exceeding $40 million, and a very small business as an entity with average annual gross revenues for the preceding three years not exceeding $15 million. For the 600 MHz Band, small businesses will be provided with a bidding credit of 15 percent and very small businesses with a bidding credit of 25 percent, consistent with the standardized schedule in Part 1 of our rules. We adopt these size standards and associated bidding credits in light of the similarities with wireless licenses already assigned in the 700 MHz Band, based on the record established to date and our existing designated entity rules. Due to their proximity, these bands have similar propagation characteristics. In addition, the technical rules we adopt for the 600 MHz Band are based on the rules for 700 MHz spectrum, with specific additions or modifications designed to protect certain incumbent licensees and unlicensed users.[1356] In light of these similarities, licensees utilizing the 600 MHz Band may face issues and costs similar to licensees utilizing the 700 MHz Band, including issues and costs related to

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small business as an entity with average annual gross revenues for the preceding three years not exceeding $15 million. The Commission also proposed to provide small businesses with a bidding credit of 15 percent and very small businesses with a bidding credit of 25 percent, consistent with the standardized schedule in Part 1 of our rules. *Id.*

[1353] *NPRM*, 27 FCC Rcd at 12456, para. 296. The Commission instructed that to the extent commenters propose additional provisions to ensure participation by minority-owned or women-owned businesses, they should address how such provisions should be crafted to meet the relevant standards of judicial review. *Id. See also Adarand Constructors, Inc. v. Peña,* 515 U.S. 200 (1995) (requiring a strict scrutiny standard of review for Congressionally mandated race-conscious measures); *United States v. Virginia*, 518 U.S. 515 (1996) (applying an intermediate standard of review to a state program based on gender classification).

[1354] *NPRM*, 27 FCC Rcd at 12456, para. 297.

[1355] *See, e.g.*, RTG Comments at 8 ("Though RTG generally supports the adoption of bidding credits as it has in prior spectrum auctions, RTG urges the Commission to promote participation by rural telephone companies in the Incentive Auction by adopting revised and additional bidding credits."); McBride *Band Plan PN* Reply at 6 (advocating to "[m]aximize the number of small carriers that take part in the [incentive] auction by arming them with generous bidding credits as much as 50 [percent]"). *See also* IAA Comments at 6–7 (noting that "this spectrum incentive auction may be the last opportunity for new entrants in communications to secure spectrum and provide competition to incumbent providers" and arguing that to ensure DEs are able to fully participate in the incentive auction the "Commission should consider a DE plan that restores bidding credits to the 40 [percent] levels used in pre-2006 auctions").

[1356] *See* § VI.B (600 MHz Band Technical and Service Rules).

developing markets, technologies, and services.[1357] Accordingly, at this time it is appropriate to adopt the same size standards and associated bidding credits for the 600 MHz Band as the Commission adopted for the 700 MHz Band.

476. Based on the Commission's prior experience with the use of bidding credits in spectrum license auctions, the use of bidding credits is an effective tool in achieving the statutory objective of offering opportunities for participation by designated entities in the provision of spectrum-based services.[1358] In the absence of small business size standards and bidding credits, designated entities might have less opportunity to obtain spectrum in the 600 MHz Band. Continuing to extend such benefits to forward auction participants would be consistent with the statutory mandate. Moreover, use of the small business size standards and credits set forth in the Part 1 schedule provides consistency and predictability for small businesses.[1359] Commenters, including wireless carriers and trade groups, generally support implementing a system of bidding credits and recognize the related pro-competitive benefits for smaller carriers.[1360]

477. We decline to adopt at this time additional tiers or larger bidding credits than those proposed in the *NPRM*. Several commenters propose adopting additional tiers or increasing the size of bidding credits available to participants in the forward auction.[1361] Commenters in this proceeding have not presented specific and data supported grounds to warrant adopting for the 600 MHz Band additional tiers or larger bidding credits than those adopted for the 700 MHz Band.[1362] As with licenses offered recently in AWS and the 700 MHz Band, a significant number of licenses offered in the forward auction will be for small geographic areas and will provide small businesses with ample opportunities to win

[1357] *Cf. H Block Report and Order*, 28 FCC Rcd at 9579, 9581, paras. 258, 262 (indicating that similar expectations regarding services to be offered in a band support offering similar bidding credits).

[1358] *See, e.g., AWS-1 R&O*, 18 FCC Rcd at 25219–20, para. 148.

[1359] *See* 47 C.F.R. §1.2110(f)(2).

[1360] *See, e.g.*, CCA Comments at 12; CCA Reply at 8; C Spire Comments at 5 n.11; Leadership Conference Comments at 1, 5–6; Leap Comments at 6; Leap Reply at 3; RTG Comments at 8; Verizon Reply at 27. *But see* NHMC Comments at 8–9 (noting that while bidding credits could increase participation of small competitors and increase competition in the market, it is less clear whether they will lead to increased ownership opportunities for women and people of color).

[1361] For example, KSW and WISPA argue that the Commission should reinstate the 35 percent bidding credit previously available to applicants with average gross revenues of $3 million or less for the last three years. *See, e.g.*, KSW Reply at 7; WISPA Comments at 32–33. Similarly, IAA, MMTC, and Council Tree recommend that the Commission increase bidding credits to 40 percent. *See* IAA Comments at 7; S. Jenell Trigg & Jeneba Jalloh Ghatt for MMTC, *Digital Déjà Vu: A Road Map for Promoting Minority Ownership in the Wireless Industry*, GN Docket No. 12-268 at 32 (filed Feb. 27, 2014) (*Digital Déjà Vu*); Council Tree Comments at 3; *but see* Letter from S. Jenell Trigg, Counsel to Council Tree, to Marlene Dortch, Secretary, FCC, WT Docket No. 13-135, GN Docket No. 12-268 at 1 (filed July 29, 2013) (Trigg July 29, 2013 *Ex Parte* Letter) (advocating for a 45 percent designated entity bidding credit for all future auctions); Council Tree Comments, WT Docket No. 13-135, GN Docket No. 12-268 at 14 (filed July 27, 2013) (advocating for a 25 percent bidding credit to businesses with average annual gross revenues not exceeding $40 million, a 35 percent bidding credit to businesses with average annual gross revenues not exceeding $25 million, and a 45 percent bidding credit to businesses with average annual gross revenues not exceeding $15 million). *See also* RTG Comments at 8 (supporting a 10 percent bidding credit for businesses with average gross revenues not exceeding $75 million for the preceding three years); McBride Comments at 2; McBride *Band Plan PN* Reply at 20–21 (supporting a 50 percent bidding credit for "nano businesses" and a 25 percent bidding credit for "micro businesses"); Leadership Conference at 6 (urging the Commission to consider increasing the bidding credit for small and very small businesses).

[1362] *See, e.g.*, WISPA *PEAs PN* Comments at 6–8 (arguing that the Commission should adopt a third tier of bidding credits as it did for portions of the Lower 700 MHz Band in spectrum license auctions in 2003 and 2005).

licenses with the two bidding credits (i.e., 15 percent and 25 percent) we adopt in this Order.[1363] Due to the similar physical characteristics and similar regulatory treatment of the 600 MHz and 700 MHz Bands, we expect the capital requirements for services in the 600 MHz Band to be very similar to those for 700 MHz services. Accordingly, at this time, we set the revenue threshold (i.e., bidding credit eligibility) at $40 million for small businesses and $15 million for very small businesses.

478. We also decline to adopt at this time proposals to adopt a scale of bidding credits for the 600 MHz Band based on an entity's spectrum holdings in a particular geographic area in lieu of credits based on small business size.[1364] DISH similarly proposes that eligibility for bidding credits in the forward auction could be determined based on either a modified spectrum screen, giving greater weight to spectrum below 1 GHz, or through a standalone spectrum limit applicable below 1 GHz.[1365] These proposals fundamentally involve issues of spectrum aggregation policy because the commenters advocate them to achieve the same purposes as the Commission traditionally has sought to achieve through spectrum aggregation policies. Spectrum aggregation issues are addressed in the separate *MSH Report and Order*.[1366]

479. We also decline to adopt at this time new rural bidding credits for the 600 MHz Band as proposed by RTG and Blooston Rural.[1367] The Commission has previously considered and declined like proposals,[1368] observing that proponents of this type of credit had been unable "to demonstrate a historical lack of access to capital that was the basis for according bidding credits to small businesses, minorities and women,"[1369] and that "large rural telcos have failed to demonstrate any barriers to capital formation

[1363] *See, e.g., Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No. 02-353, Order on Reconsideration, 20 FCC Rcd 14058, 14075–77, paras. 32–36 (2005); *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150, *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, *Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones*, WT Docket No. 01-309, *Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, WT Docket 03-264, *Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission's Rules*, WT Docket No. 06-169, *Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band*, PS Docket No. 06-229, *Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010*, WT Docket No. 96-86, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8064, 8088–90, paras. 59–65 (2007).

[1364] *See, e.g.*, Leap Comments at 6; CCA Comments at 12 n.28; MetroPCS Comments at 26–27. AT&T and Verizon call on the Commission to reject these alternative bidding credit plans. *See* AT&T Reply at 50–52, Katz et al. Reply Declaration at paras. 43–52; Verizon Reply at 27–28.

[1365] DISH Reply at 3, 12–13. DISH suggests that spectrum screen bidding credits could be smaller than those available to other designated entities (i.e., five percent). *Id.* at 13.

[1366] *See MSH Report and Order*. *See also* Leap Reply at 2 (noting that the Commission should move forward with its parallel spectrum aggregation proceeding so it can apply more accurate and more functional eligibility criteria to the auction process).

[1367] RTG Comments at 8 (urging the Commission to adopt additional rural service bidding credits for carriers that currently provide mobile wireless service to rural areas, have a history of offering telecommunications services to rural markets, or are now seeking to serve unserved areas); Blooston Rural *PEAs PN* Comments at 9 (urging the Commission to adopt small business and rural bidding credits for any auction of 600 MHz spectrum).

[1368] *See, e.g., Lower 700 MHz R&O*, 17 FCC Rcd at 1089–91, paras. 175–76 (declining to "adopt a bidding credit or other auction incentive for rural telephone companies, irrespective of how large or well-financed these entities may be"). *See also H Block Report and Order*, 28 FCC Rcd at 9580–81, para. 260; *AWS-3 Report and Order* at 70, para. 187.

[1369] *See Lower 700 MHz R&O*, 17 FCC Rcd at 1090–91, para. 176 (citing *Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, PP Docket No. 93-253, Fifth Memorandum Opinion and Order, 10 FCC Rcd 403, 457–58, para. 100 (1994)).

similar to those faced by other designated entities."[1370] The record in this proceeding does not provide a sufficient basis to revisit these prior determinations. Further, the record does not support at this time adopting new bidding credits based on past service to rural areas, as proposed by RTG,[1371] which has not demonstrated how such bidding credits would directly serve the forward-looking goals of bidding preferences, or help to avoid excessive concentration of licenses by disseminating licenses among a wide variety of applicants.[1372] Accordingly, we decline at this time to adopt a rural bidding credit in addition to the small business bidding credits for the 600 MHz Band.

480. Further, we decline IAA's request to issue a Further NPRM in this proceeding regarding an Overcoming Disadvantages Preference.[1373] On October 14, 2010, the Advisory Committee on Diversity for Communications in the Digital Age formally recommended that the Commission undertake a notice of proposed rulemaking to consider how to "design, adopt, and implement an additional new preference program in its competitive bidding process."[1374] Under the proposed preference, persons or entities who have overcome substantial disadvantage would be eligible for a bidding credit.[1375] The Media and Wireless Telecommunications Bureaus subsequently issued a Public Notice seeking information to assist the Commission in considering whether to launch a proceeding to further examine the components of the recommended preference.[1376] As acknowledged by the Advisory Committee,[1377] there are "a number of issues concerning the design and implementation of its proposal [that] need to be refined and resolved."[1378] As the proceeding initiated by the Bureaus' Public Notice has not yet resulted in an implementable proposal, we expect that the Commission may consider a new preference for

[1370] *See Lower 700 MHz R&O*, 17 FCC Rcd at 1091–92, para. 176 (citing *Amendment of Part 1 of the Commission's Rules – Competitive Bidding Procedures*, WT Docket No. 97-82, Order on Reconsideration of the Third Report and Order, Fifth Report and Order, and Fourth Further Notice of Proposed Rule Making, 15 FCC Rcd 15293, 15320–21, para. 52 (2000)); *Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems*, WT Docket No. 96-18, *Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, PR Docket No. 93-253, Memorandum Opinion and Order on Reconsideration and Third Report and Order, 14 FCC Rcd 10030, 10091–92, para. 114 (1999); *Amendment of the Commission's Rules to Establish New Personal Communications Services, Narrowband PCS*, GN Docket No. 90-314, ET Docket No. 92-100, *Implementation of Section 309(j) of the Communications Act – Competitive Bidding, Narrowband PCS*, PP Docket No. 93-253, Second Report and Order and Second Further Notice of Proposed Rule Making, 15 FCC Rcd 10456, 10476–77, para. 41 (2000); *Amendment to Parts 1, 2, 87 and 101 of the Commission's Rules to License Fixed Services at 24 GHz*, WT Docket No. 99-327, Report and Order, 15 FCC Rcd 16934, 16968–69, para. 81 (2000). The Commission pointed out that, due to certain financing programs, "rural telephone companies may have greater ability than other designated entities to attract capital." *Lower 700 MHz R&O*, 17 FCC Rcd at 1090-91, para. 176.

[1371] RTG Comments at 8.

[1372] *See* 47 U.S.C. § 309(j)(3)(B). We note that, like other applicants, rural telephone companies may qualify for bidding credits based upon their business size.

[1373] *See* IAA Comments at 8.

[1374] *Media and Wireless Telecommunications Bureaus Seek Comment on Recommendation of the Advisory Committee on Diversity for Communications in the Digital Age for a New Auction Preference for Overcoming Disadvantage*, GN Docket No. 10-244, Public Notice, 25 FCC Rcd 16854 (2010) (*Overcoming Disadvantage Preference PN*). *See also* Advisory Committee on Diversity for Communications in the Digital Age, *Recommendations to Federal Communications Commission: Preference for Overcoming Disadvantage*, Oct. 14, 2010, http://www fcc.gov/DiversityFAC/meeting101410.html (*Recommendation*).

[1375] *See Overcoming Disadvantage Preference PN*, 25 FCC Rcd at 16854.

[1376] *See id*.

[1377] *See Recommendation* at 7 ("An FCC rulemaking should flesh out similarities and differences and would refine and resolve some of the issues identified below.").

[1378] *See Overcoming Disadvantage Preference PN*, 25 FCC Rcd at 16854.

overcoming disadvantages in the DE proceeding.[1379] As part of that proceeding, the Commission will consider whether any revisions made to the designated entity rules, including any preference for overcoming disadvantages, should apply to auctions, including the broadcast television spectrum incentive auction.

481. We will implement the bidding credit preference we adopt in accordance with Part 1 of our rules and decline at this time to modify other aspects of the Commission's bidding credit program as suggested by T-Mobile.[1380] Based on examination of the current record in this proceeding, we are not persuaded at this time that the additional measures T-Mobile advocates are needed in order to successfully implement the adopted bidding preference for the 600 MHz Band, or that the existing bidding credit rules are insufficient.

482. At this time, we decline to grant the proposals by MMTC,[1381] Council Tree,[1382] and Grain Management to act in this proceeding to modify or eliminate the attributable material relationship ("AMR") rule, in this Order.[1383] The Wireless Telecommunications Bureau recently released a Public Notice seeking comment on Grain Management's request for clarification or waiver of the Commission's AMR rule.[1384] We intend to act on that request in the near term. As discussed above, we expect to

[1379] For the same reason, we disagree with MMTC's assertion that the *NPRM* is deficient because it failed to solicit comment and provide adequate notice of the Diversity Committee's proposal regarding an Overcoming Disadvantage Preference. *See, e.g.*, Letter from David Honig, President and Executive Director, MMTC, to Marlene Dortch, Secretary, FCC, MB Docket Nos. 09-182, 07-294, IB Docket No. 11-133, GN Docket No. 12-268 at 1–2 (filed Jan. 10, 2013); Letter from David Honig, President, MMTC, to Marlene Dortch, Secretary, FCC, MB Docket Nos. 09-182, 07-294, IB Docket No. 11-133, GN Docket No. 12-268 at 4 (filed Dec. 5, 2012).

[1380] Specifically, T-Mobile argues that if the Commission adopts bidding credits for the 600 MHz Band, it must also adopt detailed eligibility requirements, exhaustive limitations on license transfers, and robust compliance audits, and must swiftly apply meaningful sanctions in the event of non-compliance. T-Mobile Reply at 67.

[1381] *See, e.g., Digital Déjà Vu* at 32 (advocating that the Commission eliminate the attributable material relationship rule because wholesaling and leasing arrangements have become standard and important industry practices).

[1382] In its initial comments, Council Tree proposes to modify the "25 [percent] Wholesale Rule," which prescribes when the revenues of an entity which leases spectrum from an auction applicant are attributed to the applicant in implementing the Part 1 small business bidding credits. Council Tree Comments at 4–5 (arguing that the rule should only apply to "wholesaling transactions" by an applicant "with the top two US [w]ireless carriers" (i.e., AT&T and Verizon)). *See also* 47 C.F.R. § 1.2110(b)(3)(iv)(A). In subsequent *Ex Partes*, Council Tree proposes to waive or eliminate the attributable material relationship rule. *See, e.g.*, Trigg July 29, 2013 *Ex Parte* Letter at 1.

[1383] Letter from Patrick S. Campbell, Counsel for Grain Management, to Marlene Dortch, Secretary, FCC, WT Docket No. 05-211, GN Docket Nos. 12-268, 13-185 at 3–4 (filed March 13, 2014) (arguing that, as written, the attributable material relationship rule is overly broad and advocating that the Commission clarify that the rule does not apply to leasing transactions between designated entities and non-designated entities where "(1) the licenses involved in the transaction were not acquired through the use of [designated entity] benefits and, instead, such licenses were acquired on the secondary market; and (2) the transaction does not involve a structure permitting a non-[designated entity] to exercise undue influence over a [designated entity's] activities or decision making"). *See also Implementation of the Commercial Spectrum Enhancement Act and Modernization of the Commission's Competitive Bidding Rules and Procedures*, WT Docket No. 05-211, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, *Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, GN Docket No. 13-185, Grain Management, LLC's Request for Clarification or Waiver of the Commission's "Attributable Material Relationship" Rule (filed Mar. 4, 2014). *But see* T-Mobile Reply at 67 (arguing that the spectrum acquired using bidding credits should be fully attributed to the party who actually uses it whether that spectrum or spectrum capacity is acquired through lease, option, joint venture or any other form of ownership or collaboration).

[1384] *Wireless Telecommunications Bureau Seeks Comment on Request for Clarification or Waiver of the Commission's "Attributable Material Relationship" Rule*, WT Docket No. 05-211, GN Docket Nos. 12-268, 13-

(continued….)

generally re-examine the AMR rule, as well as other potential changes to the designated entity program, as part of the DE proceeding. In light of that proceeding, and limited record support applicable solely to the 600 MHz Band, we therefore decline to modify the AMR rule at this time.[1385] In the DE proceeding we will seek comment on how any revisions to the designated entity rules should apply to the incentive auction.

483. Finally, we adopt the *NPRM*'s proposal to extend any rules and policies adopted in the spectrum over Tribal lands proceeding, including those related to Tribal land bidding credits, to any licenses that may be issued through competitive bidding in the forward auction.[1386] Thus, we defer the application of any rules and policies for facilitating access to spectrum and the provision of service to Tribal lands to the Tribal lands proceeding.[1387] Because that proceeding is specifically focused on promoting greater use of spectrum over Tribal lands, it is better suited than the instant proceeding to reach conclusions on that issue.

c. Prohibition of Certain Communications

484. *Background*. The Commission's existing rules governing spectrum license auctions include a prohibition of certain communications, which is intended to supplement other competitive safeguards incorporated into auction procedures in order to enhance the competitiveness of the auction process.[1388] This is a precautionary measure designed to reinforce existing antitrust laws, facilitate detection of collusive conduct, and deter anticompetitive behavior, without being so strict as to discourage pro-competitive arrangements among auction participants.[1389]

485. In the *NPRM*, the Commission sought comment on how to determine which parties are "competing" in the forward auction for the purposes of enforcing the existing communications prohibition, particularly if the spectrum licenses offered are generic blocks.[1390] The Commission also sought comment on whether to prohibit reverse auction applicants from communicating with forward auction applicants regarding the substance of their bids or bidding strategies, and, given the statutory requirement to protect the confidentiality of the identities of reverse auction participants, whether the prohibition should apply to communications with all broadcast television licensees as opposed to only those licensees that submit applications to participate in the reverse auction.[1391]

(Continued from previous page)
185, Public Notice, 29 FCC Rcd 3179 (2014) (seeking comment on Grain Management's request for clarification or waiver of the Commission's "attributable material relationship" rule, 47 C.F.R § 1.2110(b)(3)(iv)(A)).

[1385] We also reject proposals by MMTC and IAA to conduct designated entity-only closed auctions. *See* IAA Comments at 7 (asking the Commission to examine the desirability of requesting from Congress authority to conduct closed designated entity auctions, if necessary to restore diversity in spectrum ownership); *Digital Déjà Vu* at 33 (stating that the Commission should reinstitute select designated entity-only closed spectrum auctions). *But see* Letter from Jonathan Spalter, Chair, Mobile Future, to Marlene Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269 at Att. at 4 (filed Nov. 13, 2013) (stating that auction rules, such as set-asides, have caused missed opportunities for innovation and economic growth). These proposals involve policy considerations outside the scope of this proceeding.

[1386] *See NPRM*, 27 FCC Rcd at 12456, para. 297. The Commission received no comments on its proposal to extend any rules and policies adopted in the spectrum over Tribal lands proceeding to any licenses that may be issued through competitive bidding in the forward auction.

[1387] *See Improving Communications Services for Native Nations by Promoting Greater Utilization of Spectrum Over Tribal Lands*, WT Docket No. 11-40, Notice of Proposed Rulemaking, 26 FCC Rcd 2623 (2011).

[1388] *See* 47 C.F.R. § 1.2105(c); *Competitive Bidding Second R&O*, 9 FCC Rcd at 2387, para. 225.

[1389] *Competitive Bidding Second R&O*, 9 FCC Rcd at 2386–88, paras. 221, 225.

[1390] *NPRM*, 27 FCC Rcd at 12458, para. 304.

[1391] *Id.* at 12449–50, 12458, paras. 269–70, 304 n.456.

486. *Discussion*. We will apply to forward auction applicants the Commission's existing Part 1 rule prohibiting certain communications. Under this rule, after the short-form application filing deadline, all applicants for licenses in any of the same geographic license areas are prohibited from cooperating or collaborating with respect to, discussing with each other, or disclosing to each other in any manner the substance of their own, or each other's, or any other competing applicants' bids or bidding strategies until after the down payment deadline, unless such applicants are members of a bidding consortium or other joint bidding arrangement identified on the bidder's short-form application, subject to certain specified exceptions.[1392] Two forward auction applicants are "competing" for the purposes of this prohibition if they apply for licenses in any of the same geographic license areas, regardless of whether the licenses are for specific frequencies or generic blocks.[1393] Thus, this prohibition applies only to forward auction applicants that apply for licenses in the same geographic license area, and not to those that apply only in different geographic license areas. The plain text of the rule makes clear that business discussions and negotiations that are *unrelated* to bids and bidding strategies or to post-auction market structure are not prohibited by the rule.[1394] The rule's prohibition has always been aimed at the specific content of an applicant's communication to a competing applicant regardless of the context or situation in which such content is communicated. Conversely, if the content of an applicant's communication does not fall within the prohibition, the particular situation in which the communication occurs will not alone make it a violation.

487. In addition, beginning on the short-form application filing deadline for the forward auction and until the results of the incentive auction have been announced by public notice,[1395] all forward auction applicants are prohibited from communicating directly or indirectly any incentive auction applicant's bids or bidding strategies to any covered television licensee.[1396] Applying the prohibition across the reverse and forward auctions will promote a fair and competitive auction.[1397] This restriction will inhibit the ability of forward auction applicants and covered television licensees to form side agreements, which could have anticompetitive effects and could alter the outcome of the incentive auction.[1398]

[1392] 47 C.F.R. § 1.2105(c).

[1393] As the Commission has determined previously, where bidders have not applied for licenses in any of the same geographic license areas, there is little risk of anticompetitive conduct with respect to any of the licenses for which they applied. *Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, PP Docket No. 93-253, Fourth Memorandum Opinion and Order, 9 FCC Rcd 6858, 6868, para. 55 (1994); *Implementation of Section 309(j) of the Communications Act – Competitive Bidding Narrowband PCS*, PP Docket No. 93-253, Third Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 10 FCC Rcd 175, 190, para. 31 (1994).

[1394] *Cf.* Verizon Comments at 51 (suggesting that there is "uncertainty as to whether discussions not related to bids or bidding strategies or post-auction market structure could violate the rule").

[1395] *See* § V.A (Auction Completion and Effective Date of the Repacking Process).

[1396] As described in § IV.B.1.c.ii (Reverse Auction Prohibition of Certain Communications), all broadcast television licensees that are or could become eligible to participate in the reverse auction, *see* § IV.B.1.a (Eligibility), and all channel sharers are "covered television licensees."

[1397] *See* § IV.B.1.c.ii (Reverse Auction Prohibition of Certain Communications).

[1398] *See* Sprint Comments at 5–6 n.11 ("Given the tremendous *ex ante* uncertainty of forward auction participants about the amount of spectrum and specific frequencies likely to be made available in each market, any information that reache[s] forward auction participants could create dangerous and anti-competitive informational asymmetries among bidders."); T-Mobile Apr. 23, 2013 *Ex Parte* Letter at 1 ("[A]llowing unfettered communications between forward and reverse auction participants could generate opportunities for inequitable gaming of the auction framework."). *But see* Verizon Comments at 54 (asserting that there is "no reason why discussions between reverse and forward auction applicants could make either auction less competitive"); Verizon Reply at 29.

488. Under this restriction, forward auction applicants are prohibited from communicating with all covered television licensees regarding incentive auction applicants' bids and bidding strategies, not just those broadcast television licensees that actually apply to participate in the reverse auction. Given the Commission's statutory obligation to protect the identities of reverse auction participants, it is not practicable to limit the prohibition to communications with reverse auction applicants because doing so would require disclosing the identities of those reverse auction applicants to the forward auction applicants.[1399] This prohibition restricting communications across the reverse and forward auctions is not limited by geographic area. Given that the results of the reverse auction for one participant may have effects across multiple geographic areas,[1400] it is appropriate to prohibit forward auction applicants from communicating prohibited information to any covered television licensee, regardless of the broadcast television licensee's geographic location.

489. We adopt one exception to the rule prohibiting forward auction applicants from communicating with any covered television licensee regarding incentive auction applicants' bids or bidding strategies. In recognition of the practical realities of business ownership and management and to allow strategic coordination within a single enterprise during the incentive auction, if a controlling interest, director, officer, or holder of any 10 percent or greater ownership interest in a forward auction applicant is also a controlling interest, director, officer, or governing board member of a covered television licensee,[1401] the forward auction applicant and the covered television licensee may communicate with each other regarding incentive auction applicants' bids and bidding strategies without violating the prohibition.[1402] As with respect to the reverse auction,[1403] this exception for overlapping interests only applies to controlling interests, directors, officers, and governing board members of a covered television licensee as of the deadline for submitting applications to participate in the reverse auction, and it only applies to controlling interests, directors, officers, and holders of any 10 percent or greater ownership interest in a forward auction applicant as of the deadline for submitting short-form

[1399] Spectrum Act § 6403(a)(3); *see* § IV.B.1.c.ii (Reverse Auction Prohibition of Certain Communications).

[1400] *See* § IV.B.1.d (Two Competing Participants Requirement).

[1401] As we noted in § IV.B.1.c.ii (Reverse Auction Prohibition of Certain Communications), controlling interests include individuals or entities with positive or negative *de jure* or *de facto* control of the licensee. *De jure* control includes holding 50 percent or more of the voting stock of a corporation or holding a general partnership interest in a partnership. Ownership interests that are held indirectly by any party through one or more intervening corporations may be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, except that if the ownership percentage for an interest in any link in the chain meets or exceeds 50 percent or represents actual control, it may be treated as if it were a 100 percent interest. *De facto* control is determined on a case-by-case basis. Examples of *de facto* control include constituting or appointing 50 percent or more of the board of directors or management committee; having authority to appoint, promote, demote, and fire senior executives that control the day-to-day activities of the licensee; or playing an integral role in management decisions.

[1402] This exception would allow communications between a forward auction applicant and a covered television licensee that are commonly owned by the same controlling interest. *Cf.* Tribune Comments at 2, 4–6 (indicating that as a broadcaster interested in flexible spectrum use, it does not know whether it will be a buyer, a seller, or a bystander in the incentive auction).

[1403] *See* § IV.B.1.c.ii (Reverse Auction – Prohibition of Certain Communications).

applications to participate in the forward auction.[1404] We emphasize that this exception applies only to a forward auction applicant's discussions with a covered television licensee.[1405]

490. We decline to adopt a general exception allowing forward auction applicants to communicate with covered television licensees regarding incentive auction applicants' bids and bidding strategies so long as agreements between the relevant parties are disclosed to the Commission.[1406] Such an exception is not warranted here because no party has advanced any pro-competitive reason why forward auction applicants should be allowed to communicate with covered television licensees regarding bids and bidding strategies during the incentive auction.[1407]

491. For the purposes of the new rule that we adopt here, we will apply the same definition of forward auction "applicant" that applies to the rule for spectrum license auctions generally, and that will apply to communications between forward auction applicants.[1408] That definition provides that the term "applicant" includes all controlling interests in the entity submitting the short-form application, as well as all holders of partnership and other ownership interests and any stock interest amounting to 10 percent or more of the entity, or outstanding stock, or outstanding voting stock of the entity, and all officers and directors of the entity.[1409] We decline to amend the definition of "applicant" so that the prohibition would apply only to controlling equity interest holders, as opposed to 10 percent interest holders. Verizon argues that a non-controlling interest holder is "highly unlikely" to have knowledge regarding the filing entity's bids or bidding strategies.[1410] However, 10 percent interest holders may easily become conduits of information, and as a result, we will continue to apply the prophylactic prohibition of certain communications to such interest holders in order to prevent anticompetitive communications.[1411]

492. Consistent with the approach we have taken in spectrum license auctions generally, forward auction applicants may continue to communicate with covered television licensees and

[1404] The prohibition across the reverse and forward auctions applies to controlling interests, directors, officers, and holders of any 10 percent or greater ownership interest in the forward auction applicant as of the deadline for submitting short-form applications to participate in the forward auction, and any additional such parties at any subsequent point prior to when the prohibition ends. Thus, if, for example, a forward auction applicant appoints a new officer after the short-form application deadline, that new officer would be subject to the prohibition, but would not be included within this exception.

[1405] This exception does not apply to a forward auction applicant's discussions with a competing forward auction applicant. *See* 47 C.F.R. § 1.2105(c)(1).

[1406] *See, e.g.*, PTV Comments at 33 (arguing that the baseline position should be that participants may communicate as long as there is disclosure); Public TV Licensees Reply at 7 (agreeing with PTV). We note, however, that such a general exception will apply to discussions between competing forward auction applicants. *See* 47 C.F.R. § 1.2105(c)(1).

[1407] *See, e.g.*, Verizon Comments at 54 (arguing in favor of allowing such discussions without providing any pro-competitive reasons for such discussions).

[1408] 47 C.F.R. § 1.2105(c)(7)(i); *cf.* § IV.B.1.c.ii (Reverse Auction Prohibition of Certain Communications) (concluding that with respect to covered television licensees, the prohibition includes all controlling interests in the licensee, and all directors, officers, and governing board members of the licensee).

[1409] 47 C.F.R. § 1.2105(c)(7)(i).

[1410] Verizon Comments at 53; *see also* Verizon Reply at 28.

[1411] *Cf. Review of Foreign Ownership Policies for Common Carrier and Aeronautical Radio Licensees under Section 310(b)(4) of the Communications Act of 1934, as Amended*, IB Docket No. 11-133, Second Report and Order, 28 FCC Rcd 5741, 5768, 5772, paras. 48, 55–56 (2013) (*Foreign Ownership Second R&O*) (adopting a 10 percent threshold for rebuttable presumption that a non-controlling foreign interest in a U.S. parent or licensee is exempt from specific approval requirements in certain circumstances).

competing forward auction applicants regarding matters wholly unrelated to the incentive auction.[1412] Verizon's suggestion that the prohibition should only apply to discussions that "directly" or "expressly" convey information regarding bids or bidding strategies is unnecessarily narrow.[1413] Rather, we rely on existing precedent regarding the types of communications that rise to the level of prohibited communications under the rules.[1414] We emphasize that the rules prohibiting certain communications are limited in scope and only prohibit disclosure of information that affects, or has the potential to affect, bids and bidding strategies. Further, we agree with Verizon that forward auction applicants may structure their auction participation as needed to avoid violating the rules, such as by instituting internal controls with respect to information about bids and bidding strategies.[1415] For instance, although it would not outweigh specific evidence of prohibited communications, a forward auction applicant could reduce the possibility of a violation by preventing employees with information about bids and bidding strategies from communicating such information to other employees who are engaging in unrelated negotiations with competing forward auction applicants or with covered television licensees.[1416]

493. The rules prohibiting certain communications that we adopt in this Order and the existing Part 1 rule all apply during a limited period of time, which we expect will be a matter of months at most. The new rules prohibiting certain communications across the reverse and forward auctions apply until the results of the incentive auction have been announced by public notice. Allowing communications between forward auction applicants and covered television licensees after the announcement of auction results will facilitate the UHF band transition. The existing Part 1 rule prohibiting certain communications between competing forward auction applicants applies until after the down payment

[1412] *See, e.g., Application of Todd Stuart Noordyk for a New FM Station on Channel 260A at Manistique, Michigan*, Memorandum Opinion and Order, 16 FCC Rcd 18113, 18116–17, para. 12 (2001) ("Our rules do not require the suspension of all relations among auction participants while an auction is pending."). *See NPRM*, 27 FCC Rcd at 12448, para. 264 n.405; *see also* Verizon Comments at 54–55 (arguing that in no event should the Commission prohibit business discussions between broadcaster and mobile broadband providers unrelated to an auction applicant's bids or bidding strategies, or the post-auction market structure).

[1413] Verizon Comments at 51–52 (requesting clarification that routine business discussions including those regarding management, resale, roaming, interconnection, and partitioning and disaggregation agreements are not prohibited, unless the participants "expressly" convey information regarding their bids or bidding strategies or post-auction market structure); *see also* Verizon Reply at 28; MetroPCS Comments at 15–16.

[1414] *See, e.g., Part I Third Report and Order*, 13 FCC Rcd at 467–68, para. 163 (explaining that as a general matter, the anti-collusion rule does not prohibit non-auction-related business negotiations, but cautioning applicants that "discussions concerning, but not limited to, issues such as management, resale, roaming, interconnection, partitioning and disaggregation may all raise impermissible subject matter for discussion because they may convey pricing information and bidding strategy"); *see also Wireless Telecommunications Bureau Provides Guidance on the Anti-Collusion Rule for D, E and F Block Bidders*, Public Notice, 11 FCC Rcd 10134 (1996); *Wireless Telecommunications Bureau Responds to Questions About the Local Multipoint Distribution Service Auction*, Public Notice, 13 FCC Rcd 341, 347 (1998); *Auction of H Block Licenses in the 1915-1920 MHz and 1995-2000 MHz Bands Scheduled for January 14, 2014; Notice and Filing Requirements, Reserve Price, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auction 96*, AU Docket No. 13-178, Public Notice, 28 FCC Rcd 13019, 13026–27, paras. 15–18 (2013); *AWS-3 Report and Order* at 67, para. 179 (noting that although competing applicants must affirmatively avoid all communications with each other that affect, or have the potential to affect, their bids or bidding strategy, this does not mean that all business negotiations between such applicants are prohibited).

[1415] Verizon Comments at 52–53.

[1416] *See Nevada Wireless MO&O*, 13 FCC Rcd at 11977–78, paras. 11–13 (strongly recommending that where competing applicants' authorized bidders are different individuals employed by the same organization—e.g., the same law firm—those applicants each certify in their applications what measures have been taken to prevent communications between authorized bidders, but cautioning that merely filing a certifying statement as part of an application will not outweigh specific evidence that collusive behavior has occurred nor will it preclude the initiation of an investigation when warranted).

deadline.[1417] We decline to shorten the period during which the prohibition applies to communications between forward auction applicants, as Verizon suggests.[1418] We disagree with Verizon's contention that "[o]nce the bidding closes, communications between auction applications [sic] cannot, by definition, affect participants' bids or bidding strategies, and cannot disadvantage other bidders."[1419] Rather, the expectation of potential side deals that could occur between the close of bidding and the down payment deadline could spur a forward auction applicant to place bids during the auction that do not reflect that bidder's value assessment and resources, absent such speculation, and could thus alter the auction outcome. Discussions among applicants after the close of bidding and prior to the down payment deadline could also convince some winning bidders to default when they otherwise would not have, disrupting the outcome of the bidding process.[1420] Applying the prohibition to communications between forward auction applicants for the limited additional time period from the effective date until after the down payment deadline will protect the outcome of the auction and will impose only a minimum additional burden on forward auction applicants.

494. Any party that makes or receives a prohibited communication regarding bids or bidding strategies shall report such communication in writing to the Commission immediately, and in no case later than five business days after the communication occurs.[1421] A failure to make a timely report constitutes a continuing violation.[1422] Parties must adhere to any applicable antitrust laws, including any additional communications restrictions. Where specific instances of collusion in the competitive bidding process are alleged, the Commission may conduct an investigation or refer such complaints to DOJ for investigation.[1423] Parties who are found to have violated the antitrust laws or the Commission's rules in connection with participation in the auction process may be subject to forfeiture of their upfront payment, down payment, or full bid amount and revocation of their license(s), and may be prohibited from participating in future auctions.[1424]

495. Additional information regarding the rule prohibiting certain communications will be provided during the pre-auction process, including in the *Incentive Auction Procedures PN*. As with the reverse auction, we anticipate offering an interactive auction tutorial for the forward auction that guides potential auction applicants through the auction process from beginning to end and gives potential applicants an opportunity to become familiar with the auction application prior to the application deadline.

[1417] 47 C.F.R. § 1.2105(c)(1).

[1418] Verizon Comments at 53–54; *see also* Verizon Reply at 28; MetroPCS Comments at 15 (suggesting that the Commission shorten the period of time that applicants are subject to the rule prohibiting certain communications "by holding to a minimum the time between the filing of the short form application and the auction commencement date").

[1419] Verizon Comments at 53–54.

[1420] Although, as Verizon points out, the Commission may assess default penalties if winning bidders default on their final payments, *see* Verizon Comments at 54, the prohibition is intended in part to prevent bidders from changing their course of action based solely on information gained from other bidders.

[1421] *See* 47 C.F.R. § 1.2105(c)(6).

[1422] *See id.*; *see also Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150, Second Report and Order, 22 FCC Rcd 15289, 15403–04, paras. 285–86 (2007).

[1423] *See Competitive Bidding Second R&O*, 9 FCC Rcd at 2388, para. 226; *see also* Press Release, DOJ, *Justice Department Sues Three Firms Over FCC Auction Practices: Coded Bids Used to Signal Competitors* (Nov. 10, 1998), *available at* http://www.justice.gov/opa/pr/1998/November/536at.htm (announcing lawsuits against bidders that allegedly agreed not to bid against each other and used coded bids to communicate during the auction).

[1424] 47 C.F.R. § 1.2109(d); *see also Competitive Bidding Second R&O*, 9 FCC Rcd at 2388, para. 226.

d. National Security Certification

496. *Background.* To implement the national security restriction set forth in section 6004 of the Spectrum Act, the Commission proposed that on the short-form application for the forward auction, the applicant must certify, under penalty of perjury, that it and all of the related individuals and entities required to be disclosed on the short-form application are not "person[s] who [have] been, for reasons of national security, barred by any agency of the Federal Government from bidding on a contract, participating in an auction, or receiving a grant."[1425] The Commission proposed to add the new certification to the various other certifications that a party must make in any application to participate in competitive bidding as required under our existing Part 1 rules.[1426] The Commission noted that any changes made to its general competitive bidding rules in other Commission proceedings would apply to the forward auction for new licenses made available through the incentive auction, including changes to applicants' certification requirements.[1427] In a recent proceeding, the Commission adopted a national security certification applicable to subsequent auctions similar to the one proposed in the *NPRM* in this proceeding,[1428] thereby amending the certification requirements under the existing Part 1 rules.[1429]

497. *Discussion*. In accordance with the *NPRM,* we revise the recently adopted national security certification to comprehensively include all of the auctions within the scope of section 6004 of the Spectrum Act.[1430] As the Commission will conduct the forward auction under its general competitive bidding rules and the forward auction is subject to the national security restriction in section 6004 of the Spectrum Act,[1431] forward auction applicants must certify as to their compliance with the national security restriction in 47 C.F.R. § 1.2105(a), as amended. As with other required certifications, a forward auction applicant's failure to include the required certification by the applicable filing deadline would render its short-form application unacceptable for filing, and its application would be dismissed with prejudice.[1432]

2. Bidding Process

498. Below, we address the forward auction bidding process. We will conduct the forward auction using an ascending clock auction, with bidding for licenses in categories of generic licenses during the clock bidding rounds, followed by an assignment process to resolve preferences for frequency-

[1425] *NPRM*, 27 FCC Rcd at 12458, para. 305. *See also* Spectrum Act § 6004.

[1426] *NPRM*, 27 FCC Rcd at 12458, para. 305. *See also* 47 C.F.R. § 1.2105(a).

[1427] *NPRM*, 27 FCC Rcd at 12453, para. 289.

[1428] The certification adopted in the H Block proceeding applies to auctions required to be conducted under Title VI of the Middle Class Tax Relief and Job Creation Act of 2012. 47 C.F.R. § 1.2105(a)(2)(xii). *See* Spectrum Act § 6004(b)(1).

[1429] *See H Block Report and Order*, 28 FCC Rcd at 9578, para. 254. *See also AWS-3 Report and Order* at 68, para. 182 (requiring AWS-3-auction applicants to certify as to their compliance with the national security restriction in 47 C.F.R. § 1.2105(a)(2)(xii)).

[1430] We amend the certification to extend its applicability to auctions "in which any spectrum usage rights for which licenses are being assigned were made available under [47 U.S.C. § 309(j)(8)(G)(i)]." *See* Spectrum Act § 6004(b)(2).

[1431] The national security restriction in § 6004 of the Spectrum Act applies to the broadcast television spectrum reverse and forward auctions since Title VI requires the Commission to conduct both auctions. *See* Spectrum Act §§ 6004(b)(1), 6403(a), (c). The forward auction is also subject to the national security restriction because the spectrum usage rights offered in the auction will be made available under 47 U.S.C. § 309(j)(8)(G)(i). *See* Spectrum Act § 6004(b)(2).

[1432] *See* 47 C.F.R. § 1.2105(b)(1).

specific licenses.[1433] An ascending clock auction is simple for bidders to understand and participate in confidently. Bidding for categories of generic licenses will facilitate a speedier auction than if bidding were conducted for multiple, substitutable, frequency-specific licenses.

499. The Part 1 rules regarding competitive bidding for spectrum licenses will apply to the auction of new flexible-use 600 MHz licenses. We modify those rules to provide a framework for the forward auction that is consistent with our approach to auction design generally, in the reverse and forward portions of an incentive auction as well as in conventional spectrum license auctions.[1434]

500. Below, we discuss the forward auction design in terms of three high level auction design elements: (i) bid collection procedures that will determine how bids for generic licenses are gathered in the ascending clock auction, (ii) assignment procedures to select winning bids and determine specific license assignments, and (iii) pricing procedures to determine final license prices. As with the reverse auction bidding process, we generally address the forward auction bidding process in a single stage.[1435]

a. Bid Collection Procedures: Auction Format, Generic License Categories, Etc.

501. *Background*. Bid collection procedures determine how participants will bid for licenses during the auction. Unlike previous spectrum license auctions the Commission has conducted, the *NPRM* noted that where multiple blocks of spectrum are available in a geographic area, as is expected to be the case in the forward auction, the Commission could collect bids for generic licenses in one or more categories in a geographic area.[1436] A subsequent assignment mechanism would resolve bidder preferences for specific frequencies within the categories of such generic licenses.[1437]

502. The *NPRM* also proposed to collect bids using one of two multiple round auction format options: a simultaneous multiple round ("SMR") ascending auction, which typically has been used for spectrum license auctions, or an ascending clock auction.[1438] Under the clock auction format, the auction system would announce a price for the licenses in each category within a geographic area and a bidder would indicate the number of licenses it was interested in at that price in that category. In a clock auction, the Commission proposed to permit intra-round bidding, in which a bidder could indicate a specific price

[1433] In referring to "generic licenses" we are not referring to the actual licenses that will be assigned to winning bidders, but to standardized blocks of spectrum that will be used to represent quantities of licenses for a time during the bidding process.

[1434] The rules we adopt today provide the flexibility to vary aspects of the forward auction, including the format we now adopt, if the record developed in the pre-auction process reflects the need to do so, but we fully intend to implement the choices that we make today. We also note that the Wireless Bureau has delegated authority with respect to the administration of spectrum license auctions, including both the reverse auction component of incentive auctions under the new Part 1 rules adopted in this Order and the forward auction component of incentive auctions pursuant to the Part 1 rules as modified by this Order. As noted above, in the unique context of the broadcast television spectrum incentive auction we will establish certain final auction procedures at the Commission level. *See* § I (Introduction). The Commission's determination of final auction procedures in this context does not diminish the authority generally delegated to the Wireless Bureau.

[1435] Each stage of the incentive auction will incorporate both forward auction bidding and reverse auction bidding. *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions). Prior to the beginning of bidding in any stage, forward auction bidders will be informed of the licensing band plan (the quantity of generic licenses in each category and the frequencies they will cover for each geographic area) corresponding to the stage's spectrum clearing target.

[1436] *NPRM*, 27 FCC Rcd at 12377, para. 56. For example, rather than bidding for a specific frequency block in an area, bidders would indicate their interest in one or more paired 5+5 megahertz blocks. *Id.*

[1437] *Id.* at 12378, para. 64; *see also id.* at 12565, 12575 (Appendix C).

[1438] *Id.* at 12377, paras. 57–58.

at which its demand for licenses in a category would change, instead of simply accepting or rejecting the clock price.[1439] The Commission also asked about providing for package bidding, which would allow bidders to bid on all-or-nothing packages of licenses.[1440] The *NPRM* noted that extended bidding could be implemented if proceeds were insufficient to meet the requirements to close the auction.[1441]

503. Noting that auction design has evolved since the existing Part 1 rules for competitive bidding with respect to spectrum licenses were adopted, the Commission also proposed to revise the rules, in part to provide explicitly for auction procedures directly addressing bid collection.[1442]

504. *Discussion*. For the forward auction, we adopt an ascending clock auction to collect bids for categories of generic licenses, to be followed by a separate assignment mechanism to assign frequency-specific licenses.[1443] We also adopt the proposal for extended round bidding under certain circumstances. In addition, we adopt the proposed Part 1 rule revision with respect to bid collection procedures to update our rules and create a consistent framework for addressing these procedures in reverse and forward auctions.[1444]

505. Most commenters agree that the ascending clock mechanism offers many potential benefits, including simplicity and efficiency, and that the multiple round approach will facilitate price discovery.[1445] Speed is of particular concern in the incentive auction.[1446] Because the components of the auction are interrelated, a more expeditious forward auction benefits reverse auction bidders as well as forward auction bidders, and lowers participation costs for all. Conducting bidding for generic licenses has the potential to significantly speed up the clock rounds of the forward auction bidding process, since bidders will not need to bid iteratively across rounds on several substitutable license blocks, as they would if they were bidding for frequency-specific licenses. The clock auction format we adopt easily incorporates bidding for categories of generic licenses, and because it has multiple rounds, will allow bidders to observe changes in relative prices for different types of licenses and across different geographic areas, and to adjust their bidding strategies accordingly.

506. Although commenters generally support bidding for generic licenses,[1447] some caution that the blocks of spectrum within a license category must be truly fungible, or at least sufficiently

[1439] *Id.* at 12378, para. 60; *see also id.* at 12565 (Appendix C).

[1440] *Id.* at 12378, para. 62.

[1441] *See id.* at 12567 (Appendix C).

[1442] *NPRM*, 27 FCC Rcd at 12456, para. 299.

[1443] Bids also may be collected in subsequent assignment rounds, as part of the process of assigning licenses for specific frequencies. *See* § IV.C.2.b. (Forward Auction Bid Assignment Procedures).

[1444] The bid collection procedures we adopt for the forward auction are not inconsistent with the Commission's existing competitive bidding rules. We find, however, that the revised rules provide greater clarity with respect to the options likely to be used. For example, as revised in this proceeding, § 1.2103(b)(1)(ii) expressly provides for procedures allowing for, among other things, bids for a number of generic items in one or more categories of items. *See* Appendix A. We make a corresponding revision expressly providing that an application may identify categories of licenses on which the applicant wishes to bid.

[1445] *See, e.g.*, AT&T Comments at 6, 40–41; CEA Comments at 32 & n.78; T-Mobile Comments at iv; Verizon Comments at 44; Verizon Reply at 40. *Contra* Metro PCS Comments at 14 (supporting the use of the SMR auction format used during Auction 66 to allow carriers to engage in price discovery and more effectively select their bids). We note that the clock auction format we adopt is also a multiple round mechanism that will permit price discovery.

[1446] *See* §§ I (Introduction), III.B (Repacking the Broadcast Television Bands).

[1447] *See, e.g.*, AT&T Comments at 6, 40–41; CEA Comments at 20; Mobile Future Reply at 5; T-Mobile Reply at 4 n.5; Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, The 600 MHz Incentive Auction Attachment (filed Feb. 1, 2013) (T-Mobile Feb. 1, 2013 *Ex Parte* Letter, Attachment) (suggesting that bidding for generic licenses will accelerate the auction and reduce its complexity,

(continued….)

similar.[1448] While we agree that it is important for licenses in a category to be similar, they need not be entirely interchangeable, as the assignment round will take into account specific bidder preferences for licenses within a category. We recognize that we may need to consider a number of factors, such as proximity to television stations or guard bands, in order to define whether particular licenses are "similar enough" to be included in a single bidding category.[1449] During the pre-auction process, in response to the *Comment PN*, potential bidders will be able to provide input on specific standards for categories of generic licenses.

507. Like the SMR auction format the Commission typically has used, the ascending clock auction format will proceed in a series of rounds, with bidding being conducted simultaneously for all licenses available in the auction.[1450] The initial price for generic licenses in a category and geographic area will be the minimum opening bid. Hence, in the initial round, a bidder will indicate how many generic licenses in a category in an area it demands at the minimum opening bid price. Bidding rounds will be open for predetermined periods of time, during which bidders will indicate their demands for licenses at the clock prices associated with the current round. As in SMR auctions, bidders will be subject to activity and eligibility rules that govern the pace at which they participate in the auction.[1451]

508. In each geographic area, the clock price for a license category will increase from round to round if bidders indicate total demand that exceeds the number of licenses available in the category. The clock rounds will continue until, for all categories of licenses in all geographic areas, the number of licenses demanded does not exceed the supply of available licenses. At that point, those bidders indicating demand for a license in a category at the final clock price will be deemed winning bidders, contingent upon the incentive auction process closing after the current stage of the forward auction.[1452]

509. We will incorporate intra-round bidding into the ascending clock auction. Intra-round bidding will allow a bidder not willing to accept the next round's clock price to indicate a point between

(Continued from previous page)
which in turn will encourage diverse participation and reduce the time and therefore the cost of participation); Verizon Comments at 44. We disagree with US Cellular that offering generic licenses would add undue complexity. *See* US Cellular Comments at 20.

[1448] *See, e.g.*, AT&T Comments at 41 (stating that the Commission must ensure that categories of generic licenses are "genuinely interchangeable spectrum assets of comparable value"); AT&T Reply at 54; CTIA Comments at 15–16 (stating Commission must carefully study this issue to make sure that generic licenses are truly fungible); Qualcomm Comments at 2; Verizon Comments at 44. *Cf.* US Cellular Reply at 24 (stating it does not support use of generic licenses, but stipulating if they are used the Commission must ensure they are fungible).

[1449] We are mindful that the nature and extent of inter-service interference may differ substantially across spectrum blocks in an area. *See* § III.A.2.d (Market Variation). Some commenters express concern that interference from guard band operations could affect fungibility. *See, e.g.*, Intel Reply at 21–22; Qualcomm Comments at 2; Qualcomm Reply at 3–4 (stating that the Commission must "ensure that the spectrum blocks that are adjacent to the duplex gap and guard bands are protected to the same level as the non-adjacent spectrum blocks"). *See also* Joint Letter from Kevin Krufky, Joan Marsh, Mark Racek, Peter Pitsch, Risk Kaplan, Dean Brenner, & Charla Rath, for Alcatel-Lucent, AT&T, Ericsson, Intel, NAB, Qualcomm & Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 1 (filed May 3, 2013) (Alcatel-Lucent et al. May 3, 2013 *Ex Parte* Letter) (stating that if the Commission offers generic licenses at auction, utilizing a sufficient duplex gap to avoid interference to adjacent spectrum blocks is essential to ensure the generic spectrum blocks are essentially fungible).

[1450] Section 1.2103(b)(1)(i), as revised in this proceeding, provides for collecting bids in a single round or in multiple rounds. *See* Appendix A.

[1451] Activity and eligibility rules, as with other detailed procedures and mechanisms, will be established in the *Procedures PN*.

[1452] In the context of the forward auction, we use the term "provisional winner" to indicate that winning bid status depends upon the final stage rule of the incentive auction being satisfied. The clock auction will not assign explicit provisionally winning bid status, as in an SMR auction, to indicate a standing high bid.

the previous round's price and the next clock price at which its demand for licenses in the category changes.[1453] Intra-round bidding will allow the auction to proceed more quickly, by making it possible to use relatively large clock price increments without running the risk that a large jump in price will overshoot bidders' demands for licenses in a category. Commenters agree that this approach will help to speed up the auction and offer bidders flexibility to express their bids more precisely.[1454]

510. We do not intend to incorporate package bidding procedures into the forward auction because of the additional complexity that package bidding would introduce into the auction.[1455] The forward auction will offer multiple blocks of licenses in multiple categories in many hundreds of geographic areas. To permit bidders to bid on combinations of those licenses would considerably complicate the bidding process and the procedures to determine clock prices and winning bids. Commenters are split on the issue of package bidding, with the larger carriers generally supporting package bidding[1456] and the smaller carriers generally opposing it.[1457] Opponents argue that package bidding will hinder participation by smaller carriers and new entrants;[1458] supporters argue that it will increase participation.[1459] Likewise, opponents contend that package bidding will decrease revenues,[1460]

[1453] For example, a bidder can indicate that it will bid five percent more than the previous clock price for a license, even if it is not willing to bid at a ten percent clock increment.

[1454] *See, e.g.*, T-Mobile Comments at 43–44 (asserting that intra-round bidding offers bidders greater flexibility to respond to price changes, would allow the Commission to use larger bid increments, and would reduce the number of bidding rounds, which would decrease the time required by a traditional SMR auction without placing additional burdens on bidders); CEA Comments at 32 n.78 (agreeing that intra-round bidding could greatly speed up the auction process, which is important given the interdependence of the reverse and forward auctions).

[1455] Package bidding procedures would permit bidding on all-or-nothing groups of licenses as well as on individual items within those groups.

[1456] A number of commenters, particularly larger carriers, support package bidding, or at least the use of limited package bidding, in part to address "exposure risk." *See, e.g.*, CEA Comments at 19; Mobile Future Comments at 5; AT&T Comments at 7, 51; Letter from Joan Marsh, Vice President Regulatory Affairs for AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Apr. 2, 2014) (AT&T Apr. 2, 2014 *Ex Parte* Letter); T-Mobile Reply at 62; Verizon Comments at 49–50; Letter from Tamara Preiss, Vice President Regulatory Affairs for Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 3–4 (filed Mar. 20, 2014) (Verizon Mar. 20, 2014 *Ex Parte* Letter). The exposure problem exists when a bidder may win less than the number of licenses needed to support the aggregate bid. *But see* T-Mobile Reply at 64–65; T-Mobile Apr. 23, 2013 *Ex Parte* Letter at 2 (proposing limited bid withdrawals as an alternative to offering package bidding to address the risk of geographic exposure).

[1457] *See, e.g.*, C Spire Reply at 4–5; CCA Comments at 18; Letter from Jonathan Foxman, President of Cellular One, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 1 (filed Oct. 17, 2013) (Cellular One Oct. 17, 2013 *Ex Parte* Letter); KSW Reply at 6–7; Leap Comments at 2, 9; MetroPCS at 10; RTG Comments at 9; US Cellular Reply at 38–40.

[1458] *See* C Spire Reply at 4–5; CCA Comments 18; KSW Reply at 6–7; Leap Comments at 9; MetroPCS Comments at 10, 14; US Cellular Reply at 39–40.

[1459] *See, e.g.*, T-Mobile Reply at 63. *But see* Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Promoting Competition, Curtailing Excessive Market Power Attachment at 12 (filed Jan. 24, 2014) (T-Mobile Jan. 24, 2014 *Ex Parte* Letter, Attachment) (stating that package bidding raises complex questions and creates problems like creating excess supply).

[1460] *See, e.g.*, CCA Reply at 10 ("[C]ombinatorial bidding can enable larger carriers to acquire a particular license at sub-optimal valuation by packaging it with other licenses, which not only would generate lower auction proceeds, but also would risk excluding smaller carriers that would place a higher valuation on the license."); US Cellular Reply at 41 ("It is a well-settled economic principle that decreased participation leads to lower auction revenues . . . [and] package bidding would in fact decrease the odds of meeting the closing conditions.").

and supporters argue the opposite.[1461] We agree with small carriers that package bidding could bring unnecessary complexity into an already complex auction.[1462]

511. An alternative to package bidding on which the *Comment PN* will seek input may strike a compromise between the larger carriers' interests in ensuring a minimum scale of operations in urban areas and smaller bidders' interests in smaller markets.[1463] Under this alternative, the Commission would create an aggregation of the largest PEA licenses.[1464] A bidder could indicate interest in the aggregated PEAs or in individual PEAs not included in the aggregation. Unlike package bidding formats that would give a bidder the option of placing an all-or-nothing package bid on a group of licenses or bidding separately on the licenses comprising the package, bids would not be accepted for the individual PEAs included in the aggregation of PEAs.

512. We may conduct an extended round of bidding after the clock bidding rounds to increase the likelihood that the auction will conclude at the end of the current stage, thereby avoiding the need to move to another stage in which less spectrum would be available for licensing in the forward auction.[1465] If, at the end of the clock bidding rounds, the proceeds raised are insufficient to satisfy the final stage rule, but are within some range of the required amount, an extended bidding round would allow the provisionally winning bidders to indicate willingness to accept higher prices to close the gap.[1466] The current record supports the use of extended rounds to close a proceeds gap, but commenters disagree as to when and how to implement such rounds.[1467] We will determine those implementation details in the *Procedures PN* based on additional public input, including the particular circumstances under which extended rounds would be implemented during the forward auction.

[1461] *See, e.g.*, AT&T Comments at 7; AT&T Reply at 56 ("Because of the exposure problem, the absence of a package-bidding mechanism would reduce forward-auction revenues and increase the risk of auction failure.").

[1462] *See* CCA Reply at 10; KSW Reply at 6–7; Leap Comments at 2; MetroPCS Comments at 13; US Cellular Comments at 51–52. *Contra* AT&T Reply at 58; Verizon Reply at 45.

[1463] RWA and NTCA support a proposal by NERA that suggests conducting forward auction bidding in two phases, with bidding in the first phase for licenses in urban areas and bidding in the second phase for licenses in non-urban, smaller geographic areas. *See* NERA *PEAs PN* Comments at 32; RWA/NTCA *PEAs PN* Comments at 10–13. Several small carriers support NERA's two-phase proposal, *see, e.g.*, Pioneer *PEAs PN* Reply at 6; Copper Valley *PEAs PN* Reply at 5, which is primarily directed at facilitating a geographic licensing scheme with areas smaller than EAs, and as such, is addressed above, where we determine that we will use a scheme based on smaller PEAs. *See* § III.A.2.c (Geographic Area Licensing). Hence, we do not here address the merits of the two-phased bidding proposals, but note that we agree with other commenters that they would add significant complexity to the forward auction bidding process. *See* AT&T *PEAs PN* Comments at 9; CCA *PEAs PN* Comments at 2–3; C Spire *PEAs PN* Comments at 4–5; T-Mobile *PEAs PN* Reply at 12–13.

[1464] PEAs are discussed in § III.A.2.c (Geographic Area Licensing).

[1465] Section 1.2103(b)(1)(v), as revised in this proceeding, provides for collecting bids in any needed additional stage or stages following an initial single or multiple round auction, such as an extended bidding round or an assignment stage for generic items. *See* Appendix A.

[1466] *See NPRM* 27 FCC Rcd at 12567 (Appendix C). The specific circumstances, including the range of proceeds, that will trigger an extended bidding round will be discussed in more detail and established in the pre-auction process. Any such subsequent bidding will not by itself change the set of provisional license winners.

[1467] Verizon generally supports the use of extended rounds in the forward auction to help meet revenue requirements, whereas AT&T proposes extended bidding rounds in both the forward and reverse auctions once excess supply and demand are eliminated. *See* Letter from Leora Hochstein, Counsel for Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 1 (filed July 2, 2013) (Verizon July 2, 2013 *Ex Parte* Letter); AT&T Comments at 11–12, 71. T-Mobile argues that the use of extended rounds may best be combined with its proposed "last-call" approach to address any revenue shortfall in the forward auction. T-Mobile Reply at 80. Under this proposal, the Commission would offer wireless carriers an opportunity to cover a shortfall before any extended rounds. *See* T-Mobile Reply at 82–83.

b. Bid Assignment Procedures: Determining Winning Bidders and Assigning Frequency-Specific Licenses

513. *Background*. The bid assignment procedures for the forward auction will determine which bidders win which new licenses. As discussed above, under the ascending clock format, winning bidders for generic licenses in the categories offered would be determined during the clock bidding rounds, contingent on the incentive auction closing at that stage. An assignment mechanism then would assign corresponding frequency-specific licenses, and could take into account the need for bidders winning multiple licenses to obtain frequency or geographically contiguous blocks, as well as any bidding contingencies such as a package bidding alternative. The Commission proposed in the *NPRM* to revise its existing rules, in part, to provide explicitly for auction procedures directly addressing bid assignment procedures.[1468]

514. Commenters suggest several approaches to assigning specific frequencies to winners of generic licenses, including competitive bidding procedures[1469] and administrative or non-competitive procedures.[1470] Several commenters advocate assignment procedures that will ensure contiguous frequency blocks to bidders that win multiple blocks of spectrum in the same category within an area.[1471] On the other hand, some commenters warn that facilitating contiguity will exacerbate interoperability concerns.[1472]

515. *Discussion*. We adopt a two-step assignment procedure for the forward auction: the clock rounds will first determine that a bidder will win one or more generic licenses in a category, and an assignment mechanism subsequently will determine specific frequency assignments. This two-step process will give bidders the benefits of price discovery in the clock rounds, permitting them to shift bidding strategies as the relative prices of different categories of licenses change, while still realizing the speed advantages of bidding for generic licenses. Knowing that the assignment mechanism will enable them to express preferences for frequency-specific licenses, bidders will be able to bid more confidently for generic licenses in the clock rounds. We also revise the Part 1 rule concerning bid assignment

[1468] *NPRM*, 27 FCC Rcd at 12456, para. 299.

[1469] *See*, *e.g.*, AT&T Comments at 8–9 ("To the extent the rules do not specify complete assignment outcomes, the Commission should allow for supplemental bids during a subsequent 'assignment phase.'").

[1470] *See, e.g.*, US Cellular Reply at 25 (advocating completely random assignment and opposing subsequent bidding); T-Mobile Comments at 21–22; CCA Reply at 9; Verizon Comments at 46 (supporting administrative assignment with market correction); WSA Comments at 26–27 (recommending a type of administrative scheme under which winning bidders would not receive a specific frequency allocation until deployment, at which time frequency allocations would be implemented dynamically based on "actual use and deployment in a given geographic area").

[1471] Commenters supporting this type of contiguity sometimes refer to it as "vertical" contiguity. *See, e.g.*, Mobile Future Reply at 5; Sprint Comments at 10; Verizon July 2, 2013 *Ex Parte* Letter at 1; RIM Comments at 6–7; Qualcomm Comments at 21–22; Alcatel-Lucent Comments at 25; AT&T Comments at 8, 59–61. Many commenters also support horizontal contiguity across geographic areas. For instance, AT&T notes that bidders' valuation of spectrum will increase to the extent assignment rules yield as much horizontal contiguity as possible. AT&T Comments at 59. Verizon argues that "[n]o parties dispute the merits of contiguous and consistent blocks across EAs." Verizon Reply at 49. *But cf.* T-Mobile Reply at 51 (supporting a quasi-random assignment structure that would facilitate vertical contiguity for winning bidders with more than one block within a Metropolitan Economic Area (MEA), and horizontal contiguity for winning bidders with licenses throughout an MEA, but opposing horizontal contiguity across multiple MEAs).

[1472] *See, e.g.*, US Cellular *Band Plan PN* Comments at 13 n.51 (recommending an entirely random assignment process that would not prioritize contiguity); T-Mobile Reply at 51 (arguing that the Commission should limit the amount of contiguous spectrum it assigns across EAs in light of interoperability concerns). *See* § VI.B.1.e (Interoperability Rule).

procedures to create a consistent framework for addressing these procedures in the reverse and forward auctions.[1473]

516. The first step of the assignment procedure, which takes place in the clock rounds, is discussed in the preceding Section. The clock rounds will end in a stage with bidders winning generic licenses in each category of licenses in each geographic area, contingent on the final stage rule being satisfied. If the final stage rule is satisfied, the second step of the assignment procedure will assign specific frequencies to the winning bidders through the special assignment mechanism. If the rule is not satisfied in a stage of the forward auction, then the special assignment mechanism will not be run in that stage.

517. The assignment mechanism will consist of a single bidding round, or a series of separate bidding rounds, in which bidders will bid for priority in selecting bands or for a preferred frequency within a geographic area.[1474] The frequency preferences of the bidders willing to pay the highest premiums will be honored, to the extent technically possible. The payment rule for the assignment round will be determined in the *Procedures PN*.

518. There is support in the record for our choice of assignment mechanism.[1475] The use of a competitive bidding round will give bidders an opportunity to indicate their preferences for specific frequencies, facilitating the assignment of specific frequencies to the highest-valuing users.[1476] An administrative, random, or quasi-random assignment process would not have this advantage of taking users' particular preferences into account and thus may undermine the efficiency of the ultimate license assignments. To the extent that some commenters would prefer an administrative assignment mechanism in order to facilitate interoperability, we note that we will require interoperability throughout the 600 MHz Band, which ensures interoperability regardless of how many band classes are created for the 600 MHz Band.[1477] We choose to address interoperability concerns directly through this requirement rather than indirectly through auction design.

c. Procedures to Determine Payments

519. *Background*. In addition to an assignment round to determine which frequencies are assigned to winning bidders, the Commission proposed an additional bidding opportunity—an extended round—beyond the clock phase of the forward auction to permit bidders to increase their bids if necessary

[1473] The assignment procedures likely to be used in the forward auction are consistent with the Commission's existing competitive bidding rule. We find, however, that the revised rule provides greater clarity with respect to the options likely to be used. For example, as revised in this proceeding, § 1.2103(b)(2) expressly authorizes an auction in which the assignment of winning bids is based on a variety of factors in addition to the submitted bid amount, including but not limited to bids submitted in a separate competitive bidding process, such as an auction to establish incentive payments for the relinquishment of spectrum usage rights—i.e., the reverse auction. *See* Appendix A.

[1474] The winning clock price could include a payment determined in an extended round of bidding. *See* § IV.C.2.c (Forward Auction Procedures to Determine Payments).

[1475] *See* AT&T Comments at 8–9, 42, 62 (stating that supplemental assignment-round bidding "may indeed be an efficient and appropriate means of assigning actual licenses"); Verizon Comments at 46 (noting it is not categorically opposed to competitive bidding to assign forward auction licenses); *see also* NERA *PEAs PN* Comments at 32 (describing a bifurcated forward auction and noting that "[t]he assignment round for award of specific frequencies to winning bidders from the Forward Auction could take place as planned after completion of the two bidding phases"). Some commenters, however, contend that bidding in an assignment phase will give bidders an incentive to make lower bids in the clock auction phase. *See, e.g.*, T-Mobile Comments at 21; T-Mobile Reply at 50.

[1476] *See* Verizon Comments at 46 (arguing that the assignment phase "must be transparent, predictable, and reflect bidder preferences to the extent possible").

[1477] *See, e.g.*, T-Mobile Reply at 51. *See also* § VI.B.1.e (Interoperability Rule).

to meet final stage rule, thereby avoiding the need for a new stage with less spectrum available.[1478] The Commission proposed to revise the existing Part 1 competitive bidding rules to provide explicitly for procedures to determine payments through the extended and assignment rounds.[1479]

520. *Discussion*. We determine that the final prices winning bidders in the forward auction will pay for spectrum licenses will be based on the final clock prices for generic licenses, modified by any additional payments determined in an extended round aimed at satisfying the final stage rule and in the assignment round to assign frequency-specific licenses.[1480] As discussed above, the assignment round will serve important auction goals by allowing bidding on generic licenses during the clock rounds, thereby expediting the forward auction bidding process. Likewise, the extended bidding round may help to expedite the incentive auction by giving forward auction bidders the opportunity to satisfy the final stage rule and thereby avoid the need to run another stage of the auction.

521. We also revise the Commission's Part 1 rules governing payment determination procedures. Although the procedures in the forward auction will be consistent with the existing competitive bidding rule, the revised rule provides greater clarity with respect to the tools available to the Commission.[1481]

d. Additional Bidding Procedures

522. *Background.* As noted in the *NPRM*, the Commission's existing Part 1 competitive bidding rules include, in addition to provisions regarding bid collection, bid assignment, and bid payment procedures, additional competitive bidding mechanisms for sequencing or grouping licenses offered; reserve prices, minimum opening bids and minimum or maximum bid increments; stopping or activity rules; and payments in the event of bid withdrawal, default, or disqualification.[1482] Noting that the rules did not exhaustively list all potential bidding mechanisms, the Commission proposed in the *NPRM* to revise the list of options set forth in section 1.2103.[1483] It further proposed to revise its rules for stopping an auction to permit it to terminate multiple round auctions within a reasonable time and in accordance with the goals, statutory requirements, and rules for the incentive auction, including the reserve price or prices.[1484]

523. *Discussion.* We adopt the proposal to revise the Commission's competitive bidding rules with respect to auction design options and competitive bidding mechanisms.[1485] These revisions are

[1478] *NPRM*, 27 FCC Rcd at 12379, para. 65.

[1479] *Id.* at 12456, para. 299.

[1480] We received no comments directly addressing how to determine final license prices in response to the *NPRM*, but commenters will be able to provide input on final, specific auction procedures in the pre-auction process.

[1481] Section 1.2103(b)(3), as revised in this proceeding, highlights the need for auction design to address payment rules and does so in terms that can be used consistently across Commission competitive bidding, including the forward auction component of incentive auctions and standard spectrum license auctions. *See* Appendix A.

[1482] *See NPRM*, 27 FCC Rcd at 12457, para. 300 (citing applicable rule sections).

[1483] *Id.* at 12456, para. 299. The Commission also noted that the procedures established to implement these broad auction design elements should take into account sound economic principles and practices and the needs of the Commission and the bidders. *Id.*

[1484] *Id.* at 12457, para. 301.

[1485] We make clarifying edits to the text of the proposed rules set forth in the *NPRM* without changing their substance. As discussed elsewhere, we also change the rule regarding the contents of applications to participate in the forward auction regarding the identification of categories of licenses on which the applicant wishes to bid and with respect to certifications the application must include. *See* §§ IV.C.1.d (Forward Auction – National Security Certification); IV.C.2.a (Forward Auction Bid Collection Procedures). Likewise, we modify the language of the rule regarding upfront payments so that it can be applied to circumstances in which an applicant identifies categories of licenses on which it wishes to bid rather than particular licenses, we move language regarding bid apportionment

(continued….)

essential to assuring consistency in the framework for the reverse and forward auctions. Many of the auction procedures and mechanisms addressed in the revised rules will be the subject of more fully informed discussion during the upcoming pre-auction process.[1486]

3. Deletion of Outdated 1.2102(c)

524. In the *NPRM*, the Commission proposed deleting section 1.2102(c), a list specifically exempting from competitive bidding identified services, such as UHF Television.[1487] This rule was adopted prior to the Balanced Budget Act of 1997, which mandated the use of competitive bidding in circumstances where it was previously discretionary, while also adopting specified exemptions from that mandate.[1488] The Commission codified the statute's current categorical exemption in section 1.2102(b).[1489] Anon. Part 90 contends that the proposed deletion would subject Part 90 Private Land Mobile services to competitive bidding notwithstanding the exemption from competitive bidding provided by the Communications Act, specifically section 309(j)(2).[1490] However, that argument overlooks the fact that section 1.2102(b) separately codifies the protections afforded under section 309(j)(2) of the Communications Act. Thus, the proposed deletion would not change the extent to which the Part 90 licensees are subject to competitive bidding. Instead, it simply brings the Commission's rules into accord with the statute.[1491] Accordingly, we delete section 1.2102(c).

V. THE POST-INCENTIVE AUCTION TRANSITION

525. In this Section, we address the post-auction transition in the reorganized UHF band for each of the services and operations that currently operate in the band, as well as post-auction broadcast regulatory issues and 600 MHz Band technical and service rules. Following completion of the reverse and forward auctions, the Media and Wireless Bureaus will announce the results of the incentive auction and the repacking process in the *Channel Reassignment PN*. The Public Notice will establish a 39-month transition period, and identify new channel assignments for full power and Class A television stations that have been reassigned to different channels. These stations will have three months to file their initial construction applications relating to their channel reassignments. Following the close of this three-month period, there will be a period of no more than three years during which time all full power and Class A television stations that are relocating, and all successful reverse auction bidders that have agreed to

(Continued from previous page)
previously contained in 1.2103 to 1.2104, and we update cross-references contained in other sections as needed. *See also* §§ IV.C.1.c (Forward Auction), IV.C.3 (Deletion of Outdated 1.2102(c)).

[1486] The Commission's rules provide for the applicable procedures to be finalized in the pre-auction process, including procedures for bid withdrawal. *See* Appendix A revising §§ 1.2103(b)(vi) (procedures for modifying bids during the auction), 1.2104(g) (potential liabilities for bid withdrawal); *see also* MetroPCS Comments at 16 (arguing that the Commission's bid withdrawal rules must guard against a circumstance where a legitimate, but stranded, bidder is forced to pay a penalty for what was a bona fide bid when entered).

[1487] *NPRM*, 27 FCC Rcd at 12454, para. 291 n.423. Footnote 423 should have read "propose to delete," rather than "delete" given the procedural context. *See id.* at 12498 (Appendix A) (proposed change to § 1.2102). Further, given the statutory limitations on competitive bidding, the footnote should have noted that "the services" listed in § 1.2102(c) "are subject to competitive bidding" *and exceptions therefrom* "under current law."

[1488] *Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended*, WT Docket No. 99-87, Report and Order, 15 FCC Rcd 22709 (2000).

[1489] *See* 47 C.F.R. § 1.2102(b).

[1490] 47 U.S.C. § 309(j)(2). *See* Anon. Part 90 Comments at 5–7.

[1491] B. Kobb expresses concern about the effect on the exemption from competitive bidding of Personal Radio Services under Part 95 if § 1.2102(c)(8) is deleted. B. Kobb Reply at 1. As detailed above, § 1.2102(c) has been superseded by revisions to §§ 309(j)(1) and (2) of the Communications Act, codified in 47 C.F.R. §§ 1.2102(a), (b). The deletion of § 1.2102(c) therefore will not change the extent to which services, including Part 95 Personal Radio Services, are subject to competitive bidding under the current statute, contrary to B. Kobb's concern. *Id.*

voluntarily relinquish some or all of their spectrum usage rights, must cease operations in those portions of the current broadcast UHF television bands that are being repurposed. During this transition period, 600 MHz licensees will be able to commence operations.

526. Below, we first address when the reverse and forward auctions will be "complete," and when the repacking process will be "effective," within the meaning of the Spectrum Act. We next address the processing of bid payments. We then turn to transition procedures for full power and Class A television stations, as well as reimbursement procedures for full power and Class A stations and MVPDs. We next describe transition procedures concerning the various secondary services and unlicensed operations—LPTV and TV translator stations, BAS, LPAS and unlicensed wireless microphones operations, and TVWS device and other unlicensed operations—in the UHF band. The Commission has overseen complex transitions before, including the transition from analog to digital television completed in 2009 ("DTV transition"). The Commission's experience in overseeing the DTV transition informs our implementation of the channel reorganization necessitated by the Spectrum Act. Based on this experience as well as the extensive record in this proceeding, we believe that we have created a framework for completing the post-auction transition as smoothly and efficiently as possible.

A. Auction Completion and Effective Date of the Repacking Process

527. *Background*. The Spectrum Act directs that no reassignments or reallocations may become effective until the completion of the reverse auction and the forward auction.[1492] After the reverse and forward auctions are "complet[e],"[1493] the "effective" date of any spectrum reassignments and reallocations signals the end of the statutory confidentiality requirement for reverse auction participants,[1494] as well as the beginning of the Commission's authority to borrow up to $1 billion from the U.S. Treasury to accelerate relocation payments to broadcasters and MVPDs for repacking expenses.[1495] In addition, the FCC must make any relocation reimbursements from the TV Broadcaster Relocation Fund ("Reimbursement Fund") within three years of the completion of the forward auction.[1496]

528. The Commission proposed in the *NPRM* to interpret completion of the reverse and forward auctions to mean when the Commission publicly announces that each auction has ended. In addition, the Commission proposed to interpret the effective date for reassignments and reallocations to mean when the Commission publicly announces the results of the reverse auction, the forward auction, and the repacking process.[1497] The Commission noted that these announcements could be released sequentially or simultaneously. The Commission sought comment on these proposals and on any alternatives.[1498]

529. *Discussion*. We adopt the proposal that the reverse and forward auctions will each be "complete" within the meaning of the Spectrum Act when a public notice announces that each auction, respectively, has ended.[1499] In addition, the reassignments and reallocations will be "effective" for purposes of the statute when the Media and Wireless Bureaus release the *Channel Reassignment PN*

[1492] Spectrum Act § 6403(f)(2). In addition, no reassignments or reallocations of broadcast television spectrum may become effective unless the proceeds of the forward auction exceed the sum specified in § 6403(c)(2).

[1493] *Id.* § 6403(f)(2).

[1494] *Id.* § 6403(a)(3).

[1495] *Id.* § 6403(d)(3).

[1496] *Id.* §§ 6403(b)(4)(D), (d)(4).

[1497] The Spectrum Act provides that to the extent practicable, all reassignments and reallocations shall become effective simultaneously. Spectrum Act § 6403(f)(2).

[1498] *NPRM*, 27 FCC Rcd at 12447, para. 260.

[1499] *Id.*

specifying the new channel assignments and technical parameters of any stations that are assigned new channels in the repacking process or that become winning bidders in the reverse auction to change channels.[1500] This approach is consistent with the common meaning of the terms complete and effective, with the typical practice of issuing a public notice announcing the results of each auction as soon as the results have been finalized, and with the practical requirements of the UHF band transition. We anticipate that the public announcements regarding completion of the reverse auction, completion of the forward auction, and the effective date of the reassignments and reallocations will occur simultaneously and may be combined in one public notice, if practicable.

530. We decline to adopt broadcasters' suggestion to delay the completion of the forward auction until after broadcast stations reassigned to new channels in the repacking process file applications for construction permits to change channels and forward auction licenses have been issued.[1501] Broadcasters assert that this approach would allow them more time to finish relocating before the end of the three-year deadline for collecting relocation reimbursements from the Reimbursement Fund. Although we recognize that the three-year deadline for reimbursements will be challenging,[1502] the rules that we adopt today for administration of the Reimbursement Fund, which provide for payments to broadcasters and MVPDs based on their estimated costs,[1503] will help to ameliorate concerns about that deadline.[1504] Moreover, we conclude that the term "completion," used in section 6403(b)(4)(D) in the context of conducting the *forward* auction, cannot reasonably be interpreted to refer to when repacked broadcasters file construction permit applications.[1505]

531. The approach suggested by broadcasters also would have a number of negative consequences for the UHF band transition. The Spectrum Act directs that no reassignments or reallocations may become effective until the completion of the reverse auction and the forward auction,[1506] so we would have to require broadcasters to file applications for construction permits to change channels before the reassignments and reallocations become effective, injecting uncertainty into the UHF band transition. In addition, delaying the effective date would delay the Commission's ability to borrow $1 billion from the U.S. Treasury to expedite the reimbursement process.[1507] We do not believe

[1500] *See* § V.C.1.a (Construction Permit Application Filing Requirements).

[1501] Affiliates Associations Comments at 48; Affiliates Associations Reply at 15; NAB Comments at 49–51; State Broadcaster Associations Comments at 15. Similarly, Harris Broadcast argues that the Commission should declare the forward and reverse auctions complete and all reassignments and reallocations effective as of the date when it initiates the distribution of initial payments from the Reimbursement Fund. Harris Broadcast Comments at 21–22.

[1502] *See, e.g.*, NAB Comments at 50 (noting that completing the construction of relocated stations within three years may be challenging, particularly for stations in certain metropolitan areas and border areas).

[1503] *See* § V.C.5.b (Reimbursement Process).

[1504] We also note that, whether the three-year deadline reflects Congress's funding priorities or, as Harris Broadcast maintains, its wish to ensure prompt payment to broadcasters, it is a statutory deadline with which we must comply. *See* Spectrum Act §§ 6403(b)(4)(D), (d)(4); *see* Harris Broadcast Comments at 22 (arguing that Congress added the three-year deadline to the Spectrum Act not to penalize broadcasters or to reduce the likelihood that they would be compensated, but to ensure that broadcasters receive their payments in a timely manner).

[1505] *See* CTIA Reply at 51–53 (arguing that forward auction licensing should not have to await any final broadcast licensing matters); Verizon Reply at 29–30.

[1506] Spectrum Act § 6403(f)(2).

[1507] *Id.* § 6403(d)(3). Broadcast industry associations argue that the $1 billion Treasury loan is not necessary because the Reimbursement Fund could be funded by the down payments provided by winning bidders in the forward auction. *See* Affiliates Associations Reply at 16 n.36; NAB Comments at 49–50 n.72. But as we discuss below, *see* § V.B (Processing of Bid Payments), down payments provided by applicants for new licenses are not disbursed until the associated licenses are granted. Although we expect the licensing process to move forward quickly, the $1 billion Treasury loan may expedite payments to broadcasters and MVPDs.

that Congress intended to delay the Commission's access to the $1 billion loan because the very purpose of the loan is to expedite the availability of relocation funds. Further, delaying the effective date would prolong the statutory requirement that the Commission protect the confidentiality of the identities of reverse auction participants,[1508] thereby delaying the Commission's ability to release publicly the identities of the winning reverse auction bidders—a necessary prerequisite to the release of the channel reassignment information that broadcasters will need in order to file their applications for construction permits.

B. Processing of Bid Payments

532. *Background*. In accordance with section 309(j)(8)(G)(i) of the Communications Act, the Commission will share with successful bidders that voluntarily relinquish licensed spectrum usage rights a portion of the forward auction proceeds "based on the value of [their] relinquished rights as determined in [a] reverse auction."[1509] Section 6403(c) of the Spectrum Act provides that the amount of the proceeds that the Commission will share with a broadcast television licensee will not be less than the amount of the licensee's winning bid in the reverse auction.[1510] The Commission proposed to incorporate these statutory requirements into the competitive bidding rules for the reverse auction and sought comment on this proposal.[1511] The *NPRM* sought comment on timing and procedures for auction proceeds disbursements.[1512]

533. The Commission must disburse winning bid payments by forward auction participants in compliance with statutory requirements. As discussed in connection with the integration of the reverse and forward auctions, we will determine whether the final stage rule for the incentive auction is satisfied and reallocations and reassignments may proceed based on the winning bids in the forward auction.[1513] Payments that bidders then make to honor those bids must be distributed, specifically to fund: (1) payments to broadcasters relinquishing spectrum usage rights; (2) specified FCC administrative costs; (3) relocation costs to be funded through the Reimbursement Fund; and (4) the Public Safety Trust Fund ("PSTF").[1514] The Spectrum Act does not specify a timetable for the distribution of auction proceeds, though it specifies some deadlines before which particular distributions must occur.[1515]

[1508] Spectrum Act § 6403(a)(3).

[1509] *Id.* § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(i)).

[1510] *Id*. § 6403(c)(1)(B).

[1511] *NPRM*, 27 FCC Rcd at 12452, para. 285.

[1512] *Id.* at 12452–53, paras. 283–84, 286–88. *See also* 47 C.F.R. §§ 1.1910(b)(2), 1.2105(a)(2)(x), (b)(1). In part, the Commission sought comment on whether to modify its red light procedures, which require that action on an application be withheld until full payment is made on any non-delinquent debt owed to the Commission, in connection with the incentive auction. *NPRM*, 27 FCC Rcd at 12453, para. 288. We received no comments directly addressing this issue. As a result, we are not modifying those procedures at this time.

[1513] *See* § IV.A (Overview and Integration of Reverse and Forward Auctions).

[1514] *See* Spectrum Act §§ 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(iii)(II)), 6403(c)(2). One of the conditions of the final stage rule is that sufficient proceeds are recovered to meet statutory minimum requirements plus any amount necessary to fund the PSTF for FirstNet. *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions). We note that auction proceeds are comprised only of the payments of winning bids for spectrum licenses by participants in the forward auction. Upfront or pre-auction deposits or payments are applied toward liabilities incurred in the auction, returned to unsuccessful bidders, or applied toward the amount of winning bids and, therefore, do not provide a separate component of auction proceeds. *See* 47 U.S.C. § 309(j)(8)(C); 47 C.F.R. §§ 1.2106(d), (e). *Cf.* Spectrum Act § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(iii) ("the proceeds (including deposits and upfront payments from successful bidders) from any auction")).

[1515] *See generally* Spectrum Act § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(iii)). Deadlines are provided for the transfer of unused funds in the Reimbursement Fund three years after the completion of the forward auction, *see*

(continued….)

534. *Discussion*. Addressing first the issue that attracted the most attention from commenters,[1516] we will share auction proceeds with broadcasters relinquishing spectrum usage rights as soon as practicable following the successful conclusion of the incentive auction, as suggested by several wireless carriers and trade groups.[1517] We will not adopt a rigid deadline for disbursing those proceeds.[1518] In all spectrum license auctions, the Commission disburses auction proceeds only after spectrum licenses associated with winning bids have been granted, absent express statutory direction to do otherwise. That is, only after the Commission grants a spectrum license to a winning bidder does the Commission disburse any payments made in connection with the license to the FCC's administrative account or to the Treasury.[1519] Furthermore, the Commission has granted spectrum licenses post-auction on a rolling basis, as license applications filed by winning bidders are ready to be granted.[1520] Thus, amounts become available for distribution on a rolling basis over time and at intervals tied to the licensing process. Given these facts, a specific deadline for sharing proceeds is not feasible.

535. The Spectrum Act does not permit us to make reimbursement payments to relocated broadcasters before completion of the forward auction using funds collected as down payments from bidders in the forward auction, as suggested by NAB.[1521] Section 6403(b)(4)(A) of the Spectrum Act directs the Commission to reimburse broadcasters "from amounts made available under [section 6403(d)(2)]," which includes two categories of "amounts": (1) "[a]ny amounts borrowed under [section 6403(d)(3)(A)]," and (2) "any amounts in the [Reimbursement Fund] that are not necessary for reimbursement of the general fund of the Treasury for such borrowed amounts."[1522] Neither source of funding will be available to the Commission until the forward auction is complete. With regard to the first category, under section 6403(d)(3)(A), the Commission has no borrowing authority until "the date when any reassignments or reallocations under [section 6403(b)(1)(B)] become effective, as provided in [section 6403(f)(2)]." Section 6403(f)(2) in turn provides that "no reassignments or reallocations under [section 6403(b)(1)(B)] shall become effective until the completion of the reverse auction . . . and the forward auction."[1523] Thus, the statute prohibits reimbursements from the first category prior to the

(Continued from previous page)
Spectrum Act § 6403(d)(4), and for making deposits of remaining incentive auction proceeds before the end of fiscal year 2022 into the PSTF and after the end of fiscal year 2022 into the Treasury general fund, *see* Spectrum Act § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(iii)(II)). Neither of these deadlines requires distributions of specific amounts by any particular date.

[1516] Virtually all of the comments submitted with respect to post-auction payments address the timing of payments only.

[1517] *See, e.g.*, EOBC Comments at 23; EOBC Reply at 11–12; Mobile Future Comments at 20; TIA Comments at 16; Tribune Comments at 9; US Cellular Reply at 14; Vision Comments at 11. In contrast, some commenters suggest that the Commission should adopt certain milestones that broadcasters must meet prior to receiving incentive payments and Reimbursement Fund payments. *See, e.g.*, T-Mobile Reply at 94; Sprint Comments at 13.

[1518] Several commenters support establishing a fixed deadline for the Commission to make incentive payments. *See, e.g.*, EOBC Comments at 23 (supporting payments within 45 days after completion); Mobile Future Comments at 20; Vision Comments at 11 (supporting payments within 30 days after the broadcaster surrenders its license).

[1519] The Commission does not disburse the upfront or down payments from winning bidders who default on their post-auction obligations prior to the issuance of their licenses. *See* Tribune Comments at 11 n.19 (arguing that if an auction winner defaults prior to making its final payment, either before or after down payments are due, any monies deposited for the auction should be included in the distribution to reverse auction participants).

[1520] Any single application may cover up to all of the licenses won by the applicant and the associated winning bids may be in any amount, i.e., there is no fixed correlation between the number of applications and the number of licenses granted or the amount of related payments.

[1521] *See* NAB Comments at 49–50 n.72.

[1522] Spectrum Act §§ 6403(b)(4)(A), (d)(2).

[1523] *Id.* § 6403(f)(2).

completion of the forward auction. With regard to the second category, there will be no auction proceeds to be deposited in the Reimbursement Fund prior to completion of the forward auction. The Spectrum Act provides that deposits and upfront payments from "successful bidders" constitute auction proceeds,[1524] but such "successful bidders" will not exist prior to the completion of the forward auction.[1525] Therefore, we do not have authority under the Spectrum Act to issue reimbursement payments to relocated broadcasters prior to the completion of the forward auction.

536. We are committed to disbursing auction proceeds as promptly as possible while meeting all of our statutory responsibilities. We do not interpret the Spectrum Act to require or prohibit prioritizing any particular initial distributions of auction proceeds over others.[1526]

537. With respect to relevant procedural matters, we also adopt the Commission's proposed rule incorporating the statutory requirements in section 309(j)(8)(G)(i) of the Communications Act and section 6403(c) of the Spectrum Act concerning incentive payments into our competitive bidding rules.[1527] In addition, we adopt the Commission's proposal to require successful bidders in the reverse auction to submit additional information to facilitate incentive payments.[1528] As mentioned in the *NPRM*, we envision that the information would be submitted on standardized incentive payment forms similar to the Automated Clearing House ("ACH") forms unsuccessful bidders in typical spectrum license auctions use to request refunds of their deposits and upfront payments.[1529] This information collection is necessary to facilitate incentive payments and should not be burdensome to successful bidders. Specifically, without further instruction and bank account information from successful bidders, the Commission would not know where to send the incentive payments.

[1524] *Id.* § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(iii)).

[1525] *Cf.* 47 U.S.C. § 309(j)(8)(C)(ii) (generally requiring return of deposits to unsuccessful bidders following the conclusion of competitive bidding).

[1526] *See* Spectrum Act § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(iii)) (no express prioritization). We note, however, that payments deposited in the Reimbursement Fund must repay any Treasury loan before funding additional relocation reimbursements. *See* Spectrum Act § 6403(d)(2) (reimbursement of relocation to be made from funds borrowed from Treasury or from the Reimbursement Fund); *id*. § 6403(d)(3)(B) (Treasury reimbursement "as funds are deposited" into the Reimbursement Fund). We expect that payments to broadcasters relinquishing spectrum usage rights will be among the first disbursements once amounts become available for distribution. This approach addresses Tribune's contention that broadcasters should not bear financial risks stemming from any forward auction licensing delays or forward auction bidder defaults. *See* Tribune Comments at 9–10; *but see* CTIA Reply at 54 (arguing that the additional financial protections that Tribune seeks for broadcasters participating in the reverse auction are unnecessary and would "unduly complicate the auction process and undermine the auction's efficiency and success"). *Cf.* Spectrum Act § 6413(b) ("As amounts are deposited in the [PSTF], such amounts shall be used to make the following deposits or payments in the following order of priority . . . .").

[1527] *See NPRM*, 27 FCC Rcd at 12452, para. 285.

[1528] *See id.* at 12452, para. 283. We note that the Commission's existing Part 1 competitive bidding rules will govern the post-forward auction process, including the submission of bid payments and long-form applications. *See* 47 C.F.R. § 1.2107. Specific details concerning forward auction bid payments and long-form filing requirements, including related deadlines, will be set forth in a public notice. *See* Tribune Comments at 9 (suggesting that the Commission require full payment from forward auction winners within a short time after the forward auction closes).

[1529] *See* 27 FCC Rcd at 12452, para. 283. We received no comments directly commenting on this proposal. The Commission intends to follow winning reverse auction bidders' payment instructions as set forth on their respective standardized incentive payment forms to the extent permitted by applicable law. *See* CIT Comments at 4 ("The Commission can also honor its payees' instructions specifying how, and to what accounts, payments are to be directed.").

538. We will disburse payments to the licensee that is the reverse auction applicant when sharing proceeds from the auction.[1530] This approach will ensure that the person who legally holds the license receives forward auction proceeds in return for relinquishing spectrum usage rights. We received no comments from broadcast television licensees suggesting an alternative approach.[1531] Further, our decision is consistent with the Spectrum Act, which repeatedly refers to sharing forward auction proceeds with licensees.[1532]

C. Transition Procedures for Television Stations and Reimbursement Procedures for Television Stations and MVPDs

539. As the Commission recognized in the *NPRM*, implementing the results of the incentive auction will be a complex and challenging undertaking for broadcasters.[1533] After the auction concludes and the results of the repacking process are announced, stations changing channels must be able to transition to their new channels in a manner that will minimize disruption to their viewers as well as other stations, wireless operators, and multichannel video programming distributors ("MVPDs").[1534] With this overarching goal in mind, we adopt rules and procedures with respect to: (1) the method by which station licensees will submit, and the Commission will process, applications for construction permits for newly assigned channels; (2) the opportunity stations will have to request alternate channels or expanded facilities on their newly assigned channels; (3) the schedule for stations to transition to new channels and the deadline by which stations must clear their pre-auction channels; (4) stations' consumer education requirements; and (5) stations' obligations to notify MVPDs.

540. We also address in this Section the process for reimbursing eligible broadcasters and MVPDs for reasonably incurred costs from the Reimbursement Fund. The Spectrum Act specifies that reimbursements from the Fund must occur within three years of the completion of the forward auction,[1535] and this finite period necessitates a prompt and efficient reimbursement process. Moreover, to provide the greatest possible assurance that broadcasters and MVPDs will receive reimbursement for all eligible expenses, the transition and reimbursement schedules must work in concert.

541. The Commission has overseen complex transitions before, including the transition from analog to digital television completed in 2009. The Commission's experience in overseeing the DTV

[1530] *See NPRM*, 27 FCC Rcd at 12452, para. 286.

[1531] This question was addressed by CIT, a middle-market lender that regularly obtains and perfects liens on proceeds of its borrowers' FCC-issued licenses. *See* CIT Comments at 4 (recommending that the "Commission adopt payment procedures that could obviate the need for secured creditors to seek judicial remedies"). We decline to intervene between licensees and their creditors. We likewise decline CIT's request to characterize the nature of incentive payments. *See* CIT Comments at 4 ("[T]he Commission should unequivocally acknowledge that its payments to winning reverse auction bidders will be functional equivalents of proceeds derived from transactions among private parties."). Without taking issue with CIT's position, we find that characterizing the nature of incentive payments is a fact-specific determination that should be conducted on a case-by-case basis. *See also* Tribune Comments at 12–13; T-Mobile Reply at 97–98 (discussing the categorization of payments to broadcasters for tax purposes).

[1532] *See, e.g.*, Spectrum Act § 6402 (allowing the Commission to "encourage a *licensee* to relinquish voluntarily some or all of its licensed spectrum usage rights . . . by sharing with such *licensee* a portion . . . of the proceeds") (emphasis added); *id.* § 6403(a)(1) (requiring the Commission to "conduct a reverse auction to determine the amount of compensation that each *broadcast television licensee* would accept in return for voluntarily relinquishing some or all of its broadcast television spectrum usage rights") (emphasis added).

[1533] *See NPRM*, 27 FCC Rcd at 12458, para. 308.

[1534] No broadcaster will be required to change the location of its transmission facility, but operation on a new channel will require modifications to existing facilities, ranging from relatively minor adjustments to more substantial changes depending on various factors.

[1535] *See* Spectrum Act § 6403(b)(4)(D).

transition informs our implementation of the transition necessitated by the Spectrum Act. Based on this experience as well as the extensive record in this proceeding, we believe that we have created a practical and efficient framework for completing the post-auction transition.

1. License Modification Procedures

a. Construction Permit Application Filing Requirements

542. *Background*. Section 316 of the Communications Act authorizes the Commission to modify any broadcast television license in order to promote the public interest, convenience, and necessity.[1536] In addition, section 6403(h) of the Spectrum Act provides that the right that a broadcast television licensee ordinarily has to protest a modification to its license pursuant to section 316 does not apply in the case of a modification made in connection with the incentive auction.[1537] The Commission proposed in the *NPRM* to modify the licenses of stations that are assigned new channels in the reverse auction or repacking process based on the authority provided in these statutory provisions.[1538]

543. Channel allotments for full power television stations currently are codified in the Table of Allotments.[1539] Under the Commission's existing rules, a station must engage in a two-step process, including a rulemaking proceeding and a subsequent application process, to change the channel allotted to it in the Table of Allotments.[1540] In order to enable broadcasters to transition efficiently to their post-auction channels, the Commission proposed in the *NPRM* not to use the Table of Allotments and to use a simple minor change application process instead of the ordinary two-step process to change stations' channels.[1541] Specifically, the Commission proposed that, once the reverse and forward auctions are complete and the results of the repacking process are announced, stations that are assigned new channels would be required to file minor change applications for construction permits.[1542] The Commission sought comment on an appropriate construction permit application filing deadline.[1543] In order to encourage stations to file applications as promptly as possible, the Commission also proposed expedited processing for applications that are timely filed and comply with certain technical requirements.[1544]

544. *Discussion*. We adopt the proposal in the *NPRM* to modify the licenses of stations assigned new channels in the reverse auction or repacking process pursuant to section 316 of the Communications Act and section 6403(h) of the Spectrum Act. We will not use a codified Table of Allotments or rulemaking procedures to implement post-auction channel changes, and we will classify construction permit applications for post-auction channels as minor changes.[1545] We delegate authority to

[1536] 47 U.S.C. § 316; *see NPRM*, 27 FCC Rcd at 12461, para. 314.

[1537] *See* Spectrum Act § 6403(h).

[1538] *See NPRM*, 27 FCC Rcd at 12461, para. 314.

[1539] *See id.* at 12459, para. 309; *see also* 47 C.F.R. § 73.622(i).

[1540] *See NPRM*, 27 FCC Rcd at 12459, para. 309.

[1541] *See id.* at 12461-62, paras. 314-315.

[1542] Unlike major change applications, minor change applications are not subject to local public notice requirements or a 30-day petition to deny filing window. 47 C.F.R. §§ 73.3580, 73.3584.

[1543] *See NPRM*, 27 FCC Rcd at 12462, para. 316.

[1544] *See id.* at 12462-63, para. 317.

[1545] After the Commission completes the repacking and channel substitution process, the Media Bureau will resume using the current rulemaking process to make new channel allotments and intends to initiate a proceeding to amend § 73.622 of the rules to reflect all new full power channel assignments in a revised Table of Allotments. 47 C.F.R. § 73.622; *see also* 47 C.F.R. § 0.283(a) (delegating rulemaking authority to the Media Bureau regarding allotment of television channels). The revised Table of Allotments will reflect shared channel status and continue to reflect NCE status.

the Media and Wireless Telecommunications Bureaus to release the *Channel Reassignment PN* upon the conclusion of the auction specifying the new channel assignments and technical parameters of any stations that are assigned new channels in the repacking process or that submit winning bids to change channels in the reverse auction.[1546] Stations that are reassigned in the repacking process or that submit winning UHF-to-VHF or high-VHF-to-low-VHF bids will be required to file minor change applications for construction permits using FCC Form 301, 301-CA, or 340.[1547]

545. No commenters urge us to use rulemaking or major change application procedures in this context. We note that issues that would be considered through the use of those procedures, such as preservation of service to existing viewers and compliance with our interference and other technical rules, will be addressed through the repacking methodology we will use to generate new channel assignments. Use of a rulemaking process also would be burdensome, cause delays, and would be inconsistent with the goal of expeditiously implementing the results of the auction and repacking process. In addition, the use of minor change applications will help facilitate an expeditious post-auction transition because they can be processed more quickly than major changes.[1548]

546. We will require stations to file their minor change applications during a three-month filing window that will begin upon the release of the *Channel Reassignment PN*.[1549] This period will provide stations with significantly more time to prepare their applications than the 45-day deadline that typically follows the conclusion of a channel change rulemaking proceeding.[1550] A longer filing period is

[1546] The *Channel Reassignment PN* also will specify winning channel sharing bids. Channel sharing stations are required to file license applications as discussed in § V.B.1.c. (Channel Sharing Stations). Any application for a construction permit or license filed in accordance with the requirements discussed in § V.C.1 (License Modification Procedures) will not trigger the filing of competing applications. Consideration of competing applications would not serve the public interest in the unique context of the broadcast television spectrum incentive auction because it would create uncertainty for potential bidders, thereby chilling auction participation, and would delay the post-auction transition and the introduction of new services on repurposed spectrum. As discussed below, however, applications for expanded facilities or alternate channels filed during an applicable window may be mutually exclusive with one another.

[1547] These initial minor change applications for construction permits, including applications that propose permissible contour extensions, will be exempt from filing fees because affected stations will be filing to modify their existing authorizations solely in order to effectuate new channel assignments resulting from the repacking process. *See* paras. 553–555; 47 C.F.R. § 1.1116(a). We note, however, that an applicant requesting any additional modification will be subject to the appropriate fee.

[1548] This approach is consistent with our implementation of channel assignments during the DTV transition. *See Third DTV Periodic Review*, 23 FCC Rcd at 3059, para. 135 n.405.

[1549] This filing deadline will apply to all stations that are reassigned to a new channel in the repacking process or via a winning UHF-to-VHF or high-VHF-to-low-VHF bid, even if they wish to apply for an alternate channel or expanded facilities as discussed below.

[1550] We disagree with Univision that all stations should be given a 180-day period to file their construction permit applications. *See* Univision Comments at 15-16. Univision argues that a lengthy filing period is necessary because "third-party technical consultants . . . will need to load new databases for each client" in order to prepare engineering exhibits for construction permit applications. *Id.* This is not correct. Consistent with the Commission's action in adopting the Table of Allotments, we will load the technical parameters of newly assigned channels into our engineering database when we announce the new channel assignments. This information will be accessible through the Commission's CDBS Public Access Link (http://www.fcc.gov/encyclopedia/media-bureau-filing-systems-and-databases). Because technical consultants will be able to access and use this information, it will not be necessary for them to create individualized databases. We also disagree with Univision's other arguments in favor of a lengthier filing period. Three months should provide adequate time for antenna companies to evaluate the feasibility of achieving specified radiation patterns for most stations. Moreover, because the auction timing will be known well in advance of the commencement of the auction, antenna manufacturers, consultants, and other third parties involved in the application process should have adequate notice regarding the likely beginning of the transition process to make any staffing adjustments necessary to handle the resulting increase in business.

appropriate because, in contrast to situations in which licensees petition the Commission to change channels, stations that are assigned new channels in the repacking process will have no prior input into the choice of channel. While we recognize that stations may need more time to prepare their applications than is typically afforded for voluntary channel changes, a three-month filing period will be adequate because the technical facilities stations must apply for will be specified in the *Channel Reassignment PN* and, consequently, the amount of engineering work stations will need to do before filing their applications will be limited. Stations unable to meet the three-month deadline for submission of their minor change application will have the option to seek a waiver no later than 30 days prior to the deadline.[1551] Because of the finite reimbursement period established in the Spectrum Act and the deadlines under which stations will be required to complete their transitions, however, we strongly encourage all stations to submit their applications by the three-month deadline, if possible.

547. Stations reassigned to different channels within their existing band will have the flexibility to propose transmission facilities in their initial construction permit applications that would slightly extend their coverage contour, as defined by the technical parameters specified in the *Channel Reassignment PN*.[1552] Our repacking methodology will preserve stations' existing antenna azimuth patterns and locations (i.e., their geographic coordinates and antenna height). However, some stations may need to request a slightly different antenna pattern or slightly different location than specified in the *Channel Reassignment PN* that necessarily may result in a slightly larger coverage contour in some directions. Such deviations may be necessary, for example, because the original antenna model is not available on the reassigned channel or because the dimensions of the new antenna necessitate a slightly different mounting location on a tower. Also, some stations reassigned to a different channel within their band may experience some loss in coverage area due to propagation differences between channels.

548. Accordingly, we will allow such stations to propose transmission facilities in their initial construction permit applications that will increase their coverage contour if such facilities: (1) are necessary to achieve the coverage contour specified in the *Channel Reassignment PN* or to address loss of coverage area resulting from their new channel assignment; (2) will not extend a full power station's noise limited contour or a Class A station's protected contour by more than one percent in any direction; and (3) will not cause new interference, other than a rounding tolerance of 0.5 percent, to any other station.[1553] We conclude that a one percent coverage contour increase is *de minimis* and that providing this flexibility will assist broadcasters in engineering their facilities and quickly transitioning to their new channels. Stations reassigned to a channel within the same band that wish to extend their contour area by more than one percent may do so as discussed below.[1554]

[1551] 47 C.F.R. § 1.3 (Rules may be "waived for good cause shown"). Any stations that are granted a waiver of the construction permit application deadline nonetheless will be required to complete their transition pursuant to the process and by the deadlines established in § V.C.2 (Construction Schedule and Deadlines*)*. Moreover, the fact that a station intends to file for an alternate channel or expanded facility as set forth in § V.C.1.b (Alternate Channel and Expanded Facilities Opportunities*)* would not constitute "good cause" for failing to meet the three-month filing deadline, except in those instances where it is impossible for the station to apply for the facility assigned in the repacking process. This could occur, for example, if a station is unable to construct the facility specified in the *Channel Reassignment PN* on the tower on which it is operating at the time the Public Notice is released.

[1552] *See NPRM*, 27 FCC Rcd at 12391, para. 101. Belo supports the proposal to allow broadcasters flexibility in selecting their post-auction facilities. Belo Comments at 8. Affiliates Association proposes that the Commission provide stations with greater flexibility in applying for their newly assigned channels in order to account for propagation differences between a station's current channel and its newly assigned channel, and the likelihood that a station will be unable to specify an antenna with a radiation pattern that precisely matches the antenna characteristics derived by the Commission's repacking software. Affiliates Associations Comments at 29.

[1553] In proposing facilities under this option, we will require stations to use an antenna that has a pattern that closely conforms to the coverage area based on the technical parameters in the *Channel Reassignment PN*.

[1554] *See* § V.C.1.b (Alternate Channel and Expanded Facilities Opportunities).

549. We decline to permit all reassigned stations to file initially for facilities that would extend their coverage areas up to five miles in any direction.[1555] Although the Commission allowed expedited processing of certain expansion applications that satisfied this standard during the DTV transition,[1556] the circumstances are different here.[1557] In addition, such a large extension will not be necessary for stations reassigned to different channels within their existing band to achieve the coverage area defined by the technical parameters specified in the *Channel Reassignment PN*. We also find that adopting this proposal would create a significant potential for mutually exclusive applications, which would result in delays in the processing of initial construction permit applications.

550. We will not, however, impose a one-percent contour increase restriction on winning UHF-to-VHF or high-VHF-to-low-VHF bidders. Due to antenna pattern variations between UHF and VHF antennas and between high VHF and low VHF antennas, it is likely that some stations voluntarily moving from the UHF to the VHF band or from the high VHF to the low VHF band will not be able to obtain an antenna that replicates the coverage contour reflected in the *Channel Reassignment PN*. Accordingly, stations moving to or between the VHF bands may specify an antenna that would result in a larger coverage contour than that resulting from the technical parameters specified in the *Channel Reassignment PN*, as long as the proposed facility will not cause new interference, other than a rounding tolerance of 0.5 percent, to any other station.

551. In order to help transitioning broadcasters begin construction of their new facilities as quickly as possible, we also will provide expedited processing for certain applications.[1558] Specifically, we will provide expedited processing if a station's application meets all three of the following requirements: (1) it does not seek to expand the coverage area, as defined by the technical parameters specified in the *Channel Reassignment PN*, in any direction;[1559] (2) it seeks authorization for facilities that are no more than five percent smaller than those specified in the *Channel Reassignment PN* with respect to predicted population served; and (3) it is filed within the three-month deadline for submission of minor change applications. The Commission adopted the same expedited processing procedure with the same criteria during the DTV transition, which enabled the Media Bureau to quickly process a large percentage of the post-transition digital construction permit applications it received after adopting the post-transition Table of Allotments.[1560] The same approach will have similar benefits here. We anticipate that the Media Bureau generally will be able to process qualified applications within 10 days after filing.

b. Alternate Channel and Expanded Facilities Opportunities

552. *Background*. Anticipating that some stations receiving new channel assignments may wish to change their channels, the Commission proposed in the *NPRM* to announce an opportunity for

[1555] Univision Comments at 16-17.

[1556] Univision's proposal is based on a filing freeze waiver policy the Commission adopted during the DTV transition for stations that were returning to their pre-transition analog channels for post-transition DTV operations. *See Third DTV Periodic Review*, 23 FCC Rcd at 3065-66, paras. 151-52.

[1557] The filing freeze waiver policy used during the DTV transition was meant to address the fact that many stations returning to their analog channels would face the prospect of significant service losses if unable to expand because of the "unbuildable, theoretical pattern" specified in the DTV Table Appendix B, *Third DTV Periodic Review*, 23 FCC Rcd at 3065, para. 151, which required greater application flexibility. In addition, the Commission concluded that the waiver standard served the public interest because it would encourage a station's use of its existing analog channel antenna and therefore "reduc[ed] the demands on equipment supplier and installation crews during a critical time as the transition date nears," a benefit that is not present here. *Id*. at 3065-66, para. 152.

[1558] *See NPRM*, 27 FCC Rcd at 12462–63, para. 317.

[1559] Stations that propose transmission facilities in their initial construction permit applications that extend the coverage contour specified in the *Channel Reassignment PN* will not qualify for expedited processing.

[1560] *Third DTV Periodic Review*, 23 FCC Rcd at 3060, para. 140.

stations to request an alternate, or substitute, channel after the staff substantially completes its processing of initial minor change applications, provided that the station is able to identify an available channel.[1561] The Commission also proposed that, consistent with existing rules, grant of an alternate channel application would not extend the construction deadline in the station's initial construction permit for its reassigned channel.[1562] The Commission asked whether it should treat applications for alternate channels as major change applications.[1563] It also sought comment on which licensees should be eligible for the proposed alternate channel opportunity and under what circumstances a winning reverse auction bidder should be allowed to apply.[1564] Finally, the Commission sought comment on appropriate processing of such applications, including whether to provide "cut-off" protection from subsequently filed applications and means to avoid mutual exclusivity among channel substitution applications.[1565]

553. *Discussion*. We will provide stations assigned to new channels in the repacking process as well as winning UHF-to-VHF and high-VHF-to-low-VHF bidders with an opportunity to seek an alternate channel.[1566] We recognize that, in some cases, a broadcaster may determine that a different channel will be more desirable or will make the transition process simpler and less costly.[1567] As some commenters request,[1568] we also will allow stations assigned to new channels and winning UHF-to-VHF and high-VHF-to-low-VHF bidders to apply for construction permits for "expanded facilities"[1569] on their new channels. These filing opportunities are appropriate for, and will be limited to, stations that will not have input into their post-auction channel assignments. We note that, as a practical matter, stations' ability to identify an available alternate channel or to expand their facilities may be limited as a result of the repacking process.[1570]

[1561] *See NPRM*, 27 FCC Rcd at 12463, para. 318. Belo, Entravision, and LIN support the Commission's proposal to allow stations to seek alternate channels. Belo Comments at 8-9; Entravision Comments at 13-14; LIN Comments at 5.

[1562] 47 C.F.R. § 73.3533(b); *NPRM*, 27 FCC Rcd at 12463, para. 318.

[1563] *See NPRM*, 27 FCC Rcd at 12463, para. 318.

[1564] *Id.* at para. 319.

[1565] *Id.*

[1566] As proposed in the *NPRM*, we conclude that stations moving from a UHF to a VHF channel will not be permitted to request an alternate UHF channel. *See NPRM*, 27 FCC Rcd at 12463, para. 319. Allowing such requests would be directly contrary to the premise of UHF-to-VHF bids—for the station to transition from UHF to VHF service. For the same reason, stations submitting winning UHF-to-VHF bids that specify the high-VHF band or the low-VHF band, and stations submitting winning high-VHF-to-low-VHF bids, will not be permitted to request a channel outside of their assigned band.

[1567] Belo explains that a newly assigned channel may be technically feasible and preserve a station's coverage area and population served as contemplated by the Spectrum Act, yet still be undesirable for a number of reasons, such as because it will require excessively expensive and time-consuming facility modifications. Belo Comments at 9. Belo believes that "broadcasters and their station engineers are in the best position to understand their stations' technical equipment and unique signal propagation characteristics," and "may be able to suggest alternative facility modifications that will make channel changes easier and less disruptive to viewers." Belo Comments at 8-9.

[1568] *See* Tribune Comments at 26 n.53; Univision Comments at 16-17.

[1569] For purposes of this filing opportunity, we define "expanded facilities" as those that propose a change in height above average terrain (HAAT), effective radiated power (ERP), or transmitter location that (i) would be considered a minor change under the Commission's rules (*see* 47 C.F.R. § 73.3572(a)(1)–(3); 47 C.F.R. § 74.787(b)); and (ii) in the case of a station reassigned to another channel within its existing band, would result in a change in such station's contour beyond one percent in any direction from the coverage area defined by the technical parameters specified in the *Channel Reassignment PN*.

[1570] In general, if an application for an alternate channel or expanded facilities is granted, the deadline in the construction permit for the alternate channel or expanded facilities will be the same as the deadline in the station's

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554. In view of the anticipated scarcity of available broadcast spectrum to accommodate proposals for alternate channels and expanded facilities following the repacking process, we will give a filing priority to certain stations. Specifically, we will provide a priority to any station that demonstrates that it is unable to construct facilities that meet the technical parameters specified in the *Channel Reassignment PN*, or the permissible contour coverage variance discussed above, for reasons beyond its control.[1571] In addition, we delegate authority to the Media Bureau to define other categories of stations that may be eligible for a filing priority due to extraordinary circumstances beyond a station's control. Stations qualifying for a priority may request either an alternate channel or expanded facilities on their newly assigned channel.[1572] A second filing opportunity will be offered to all other stations that are assigned new channels in the repacking process or that are winning UHF-to-VHF or high-VHF-to-low-VHF bidders to file for alternate channels or expanded facilities.[1573]

555. A station seeking an alternate channel must submit a construction permit application on FCC Form 301, 301-CA, or 340.[1574] Unlike new channel assignments generated by the Commission in the repacking process, these alternate channel requests will be initiated by licensees without the benefit of our repacking methodology. Thus, applications for alternate channels will be considered major change applications and thus will be subject to local public notice requirements and a 30-day petition to deny filing window.[1575] Applications for expanded facilities on the channel assigned to a station in the *Channel Reassignment PN*, which may be filed at the same time that we accept applications for alternate channels, are limited to minor changes.[1576]

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initial construction permit. However, we will consider granting longer construction periods for alternate channels or expanded facilities in situations where extenuating circumstances justify such an extension.

[1571] We anticipate that such stations would include those that cannot submit a construction permit application for their assigned channel because they are unable to construct at their current tower site due to technical or legal issues. These stations would be required to demonstrate in a request for a waiver of the three-month filing deadline for initial construction permit applications that it was not possible to file an application that was in compliance with the technical parameters in the *Channel Reassignment PN* or with the flexibility to propose alternative transmission facilities discussed above, which require that a station apply for its new channel at its current transmission site.

[1572] As is the case with all major and minor modification applications, we emphasize that stations filing for alternate channels or expanded facilities will be required to demonstrate that their proposals meet all existing technical and interference requirements and would serve the public interest. Moreover, modification applications filed by Class A stations will not be accepted if they fail to comply with the interference protection rules for Class A stations. *See* 47 C.F.R Part 73, Subpart J; *see also* 47 C.F.R. §§ 74.707, 74.792.

[1573] Consistent with the Media Bureau's past practice in lifting filing freezes, applications filed during the first filing opportunity would be treated as cut-off as of the end of that filing period, and would be entitled to interference protection from subsequently filed applications. *See, e.g., Commission Lifts Freeze on Filing of Maximization Applications and Petitions for Digital Channel Substitutions, Effective Immediately*, Public Notice, 23 FCC Rcd 8330 (2008).

[1574] Some priority stations will not have an opportunity to submit an application for a construction permit during the initial three-month filing window. The initial construction permit applications of these stations for alternate channels or expanded facilities will not be subject to filing fees. We note, however, that an applicant requesting any additional modification will be subject to the appropriate fee. Moreover, non-priority stations seeking alternate channels or expanded facilities will be subject to applicable filing fees.

[1575] 47 C.F.R. § 73.3572(a)(1),(2); 47 C.F.R. § 74.787(b). We clarify that stations filing alternate channel requests will not be subject to the current two-step rulemaking process for new channel allotments.

[1576] *See* 47 C.F.R. § 73.3572(a)(1)–(3); 47 C.F.R. § 74.787(b)). As discussed in § V.C.5 (Reimbursement of Relocation Costs), costs reasonably incurred by priority stations that are associated with constructing alternate channels or expanded facilities will be reimbursable from the Reimbursement Fund. For non-priority stations, any additional costs incurred in constructing alternate channels or expanded facilities, beyond those that the station
(continued….)

556. We delegate authority to the Media Bureau to issue public notices announcing filing opportunities for alternate channels and expanded facilities applications and specifying appropriate processing guidelines, including the standards to qualify for priority filing, "cut-off" protections, and means to avoid or resolve mutual exclusivity between applications.[1577] We anticipate that the first filing opportunity to be established by the Media Bureau will open after the staff substantially completes its processing of initial minor change construction permit applications following the release of the *Channel Reassignment PN*. After all stations that are reassigned new channels in the repacking process and winning UHF-to-VHF and high-VHF-to-low-VHF bidders have been given an opportunity to apply for alternate channels or expanded facilities, we anticipate that the Media Bureau will lift certain filing freezes that are now in place,[1578] allowing other stations the opportunity to apply for such facilities.

c. Channel Sharing Stations

557. *Background*. The Commission sought comment in the *NPRM* on the licensing process for stations that enter into channel sharing arrangements as a result of winning reverse auction bids.[1579] Because the implementation of a channel sharing arrangement does not involve construction that will require Commission pre-approval, the Commission suggested that there would be no need for these stations to apply for construction permits and proposed that each channel sharing station (both the "sharer" and any "sharee" stations)[1580] simply be required to file a Form 302 application for a license upon commencement of shared operations. In the event that a "sharer" station is assigned a new channel in the repacking process, the Commission proposed to require all sharing stations to file license applications to share the original, pre-auction channel until the new facility is constructed.[1581]

558. *Discussion*. We will require the licensees of channel sharing stations (i.e., both the sharer station and the sharee station(s)) to submit license applications within three months after the sharee stations receive their auction proceeds.[1582] As discussed below,[1583] sharee stations will be required to

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reasonably would have incurred to construct the facilities assigned in the *Channel Reassignment PN*, will not be reimbursable.

[1577] With the one exception noted in § III.B.3.c.ii (Out-of-Core Class A-Eligible LPTV Stations), we will not protect stations that were eligible for Class A status but did not file an application for a Class A license until after February 22, 2012. If such station obtains a Class A license and is displaced in the repacking process, it may file a displacement application during one of the filing opportunities for alternate channels. Except as indicated here, our existing displacement rules will apply to such applications. *See* 47 C.F.R. §§ 73.3572(a)(4) and 74.787(a)(4). We delegate authority to the Media Bureau to determine whether such stations should be permitted to file for new channels along with priority stations or in the second filing opportunity.

[1578] *See Channel Substitution Freeze*, 26 FCC Rcd 7721 (2011); *Freeze PN*, 28 FCC Rcd 4364 (2013); *Freeze on the Filing of Certain TV and DTV Requests for Allotment or Service Area Changes*, Public Notice, 19 FCC Rcd 14810 (2004).

[1579] *See NPRM*, 27 FCC Rcd at 12463-64, para. 320.

[1580] We use the term "sharee" to refer to a station that relinquishes its frequency to move to the frequency of a "sharer" station. As noted in the *NPRM*, more than two stations may share a channel. Thus, although there would be only one sharer in each channel sharing relationship, there could be multiple sharees. *See NPRM*, 27 FCC Rcd at 12442, para. 245 n.382.

[1581] For example, if a bid proposing that Station A on channel 50 share Station B's channel 30 facility is accepted, and Station B is reassigned channel 20 as part of the repacking process, Station A would be required to vacate channel 50 within the time frame we adopt for implementation of channel sharing agreements and commence sharing channel 30 with Station B. *See id*. at 12464, para. 320 n.494. In addition to filing license modification applications, Stations A and B would be required to file minor change applications for construction permits for channel 20 and separate applications for a license when construction of that facility is completed. *See id*.

[1582] We delegate authority to the Media Bureau to amend FCC Forms 302 and 302-CA prior to the commencement of the auction to add a category for the licensing of shared channels.

terminate operations on their pre-auction channels by this deadline. This is the appropriate deadline for stations in a channel sharing relationship to submit their license applications and to commence shared operations pursuant to program test authority. This same deadline will apply regardless of whether the sharer station is assigned a new channel in the repacking process. While channel sharing stations that are reassigned to a new channel will be afforded a construction period before they must transition to their reassigned channel, we find no basis to delay the commencement of shared operations or the clearing of the sharee's channel.[1584] Upon grant of such license applications, the staff will issue each station in a sharing arrangement a new license indicating "shared" status through the use of an "S," designating the shared channel as the operating frequency for each station, specifying each station's class of service (i.e., commercial full power, NCE, or Class A), and indicating a sharee station's new community of license where appropriate.

2. Construction Schedule and Deadlines

559. The record in this proceeding shows the need for a post-incentive auction transition timetable that is flexible for broadcasters and that minimizes disruption to viewers.[1585] At the same time, the transition schedule must provide certainty to wireless providers and be completed as expeditiously as possible.[1586] With these goals in mind, we adopt a 39-month transition period (the "Post-Auction Transition Period") for broadcasters that are assigned new channels in the repacking process and winning UHF-to-VHF and high-VHF-to-low-VHF bidders. The Post-Auction Transition Period will include (1) the three-month period beginning upon the release of the *Channel Reassignment PN*, during which broadcasters will complete and file their construction permit applications,[1587] followed by (2) a 36-month period consisting of varied construction deadlines (the "Broadcast Construction Period").

560. Post-auction, the Media Bureau, on delegated authority, will establish a set of construction deadlines that will apply during the Broadcast Construction Period. While some stations will be given 36 months to complete construction, other stations will be given shorter deadlines. At the end of the 39-month Post-Auction Transition Period, all stations must cease operating on their pre-auction channels regardless of whether they have completed construction of the facilities for their post-auction channel.

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[1583] *See* § V.C.2 (Construction Schedule and Deadlines).

[1584] In the event the sharer station is assigned a new channel in the repacking process, all sharing stations will be required to jointly file a Form 301 minor change construction permit application consistent with requirements in the Construction Permit Application Filing Requirements Section. *See* § V.C.1.a. We delegate authority to the Media Bureau to amend FCC Forms 301, 301-CA, and 340 prior to the commencement of the auction to add a category for the licensing of shared channels.

[1585] *See*, *e.g.*, State Broadcaster Associations Comments at 15; Affiliates Associations Comments at 49; PTV Comments at 24-25; PTV Reply at 5; Belo Comments at 25; Disney Comments at 35-36; Harris Broadcast Comments at 12-14; KLCS Comments at 2-3; LIN Comments at 7; NAB Comments at 50; R. Mertz Comments at 3; SBBC Comments at 2; Tribune Comments at 25-26; Univision Comments at 17-18.

[1586] *See*, *e.g.*, AT&T Comments at 78-79; AT&T Reply at 67; CEA Comments at 34-35; CTIA Comments at 35; Leap Comments at 10; Mobile Future Comments at 20; Mobile Future Reply at 10; Nokia Comments at 20; Sprint Comments at 12-14; TIA Comments at 8; T-Mobile Reply at 94; Verizon Comments at 67-68; Verizon Reply at 47; US Cellular Comments at 37; US Cellular Reply at 49-50.

[1587] *See* § V.C.1.a (Construction Permit Application Filing Requirements). Stations eligible for reimbursement from the Reimbursement Fund also will be required to file their estimated cost forms by this deadline. *See* § V.C.5.b (Reimbursement Process). We note again that no broadcaster will be required to change the location of its transmission facility as a result of the reverse auction and repacking processes, but operation on a new channel will require modifications to existing facilities. *See* n.1534.

561. We adopt a three-month deadline from the receipt of auction proceeds by winning license relinquishment bidders and channel sharing "sharee" bidders[1588] to terminate operations on their pre-auction channels. We will offer stations the flexibility to seek a single extension of their construction deadlines and to operate temporary facilities during construction. Although we will consider extensions of stations' individual construction deadlines for new post-auction channels, no station with a new channel assignment will be permitted to operate on its pre-auction channel after the end of the Broadcast Construction Period. This approach will provide sufficient flexibility to both broadcasters and the Commission to ensure a successful, expeditious transition, while minimizing disruption to consumers and providing appropriate certainty to the wireless industry.

a. Construction Period for Stations with New Channel Assignments

562. *Background*. In the *NPRM,* the Commission sought comment on reasonable deadlines for stations that must change channels as a result of the repacking process to transition to their new channel assignments.[1589] The Commission asked whether it should adopt a uniform transition period for such stations and, if so, whether an 18-month deadline after the conclusion of the incentive auction would be reasonable for all stations to transition to their new channel assignments.[1590] Alternatively, the Commission invited input on whether it should consider a phased transition timetable in which it would establish deadlines according to region, individual station circumstances, or other factors.[1591]

563. *Discussion.* We adopt a 36-month Broadcast Construction Period that will begin upon the filing deadline for construction permit applications for new channel assignments (i.e., three months after the release of the *Channel Reassignment PN*). We conclude that a phased construction schedule, with the assignment of varying construction deadlines within this 36-month period, is most likely to ensure a successful transition for all broadcasters. Accordingly, we delegate authority to the Media Bureau to establish a set of deadlines within the Broadcast Construction Period to all stations that are reassigned to a new channel in the repacking process and all winning UHF-to-VHF and high-VHF-to-low-VHF bidders.[1592] The deadlines may vary by region, by the complexity of construction tasks, or by other factors the Media Bureau finds appropriate. This tailored approach will ensure that stations have the time they need to complete construction while making spectrum available for new uses as rapidly as possible.

564. Regardless of a station's individual construction schedule, no station will be permitted to continue to operate on its pre-auction channel beyond the end of the Broadcast Construction Period. Any station that has not completed construction by the end of the Broadcast Construction Period must go dark on its pre-auction channel and cease operations until it finishes construction of its new facilities.[1593] In addition, as soon as a station begins operating on its post-auction channel, it must terminate operations on its pre-auction channel.

[1588] A "sharee" station is a full power or Class A television station that agrees to relinquish its channel and share with another station (the "sharer") pursuant to a channel sharing bid in the reverse auction.

[1589] *See NPRM*, 27 FCC Rcd at 12464, para. 321.

[1590] *See id.* at 12464–65, para. 322.

[1591] *See id.* at 12465, para. 323.

[1592] *See* CEA Reply at 20 ("The Commission should take any action necessary, including delegating authority to the Media Bureau, to expedite this process . . . ."). In light of the 36-month Broadcast Construction Period, these deadlines will necessarily be less than the standard three-year construction period in most cases. *See* 47 C.F.R. § 73.3598(a).

[1593] We note that if a station is granted an extension of its construction permit that allows it to continue construction after the end of the Broadcast Construction Period, the station nonetheless must cease operations on its pre-auction channel on or before that deadline.

565. As soon as possible after the filing of construction permit applications, we direct the Media Bureau to announce both the phased construction schedule and stations' construction deadlines in a public notice. We expect that the Media Bureau will work with the Wireless Telecommunications Bureau to coordinate the construction deadlines of stations transitioning to new channels, taking into account the needs of forward auction winners and their construction plans. Stations need not wait until their construction deadlines are formally assigned to take certain necessary steps.[1594] Rather, there are actions stations can begin to take after their new channel assignments are announced and before they receive a construction permit.[1595]

566. The record in this proceeding persuades us that establishing a single deadline by which all stations must complete construction is infeasible. Many commenters maintain that reasonable construction deadlines will depend on a number of factors that will vary among stations and that cannot be fully evaluated before the conclusion of the auction.[1596] For example, commenters point out that, depending on the outcome of the reverse auction and the repacking process, the post-auction transition may exhibit "daisy chains," in which one station may not be able to begin operations on its new channel until another station ceases operation on its pre-auction channel because of interference issues.[1597] Commenters also note that stations on shared tower sites may have to coordinate construction and station downtime in order to complete their transitions.[1598] In addition, a number of commenters argue that there are a limited number of tower crews that will be qualified to construct stations' new facilities and that, in

[1594] Below, we adopt expedited processing procedures for construction permit applications that meet certain requirements. *See* § V.C.1 (License Modification Procedures). We anticipate that a number of applications will be grantable before the Media Bureau has completed the process of establishing these stations' construction deadlines. We believe it important, however, to grant these applications as quickly as possible so that stations can begin constructing their new facilities. *See, e.g., California State University, Sacramento*, Memorandum Opinion and Order, 13 FCC Rcd 17960, para. 16 (1998) (activities constituting construction that require a permit before commencing include installation of an antenna, transmitter, transmission line, and related inside wiring linking these facilities). Any permit issued before the Media Bureau establishes the pertinent construction deadlines will be conditioned on the Media Bureau's subsequent adoption of such deadlines. As soon as a station's deadline is determined, the Media Bureau will reissue the station's authorization with the construction deadline.

[1595] Such steps may include construction planning, installation of a new power line, equipment purchases, and on-site storage of equipment. These types of actions "generally having no intrinsic radio communications use related to a proposed facility" do not constitute construction, thus allowing prospective permittees to take these actions before the grant of a construction permit. *See Wendell & Associates*, Memorandum Opinion and Order, 14 FCC Rcd 1671, 1679-80, para. 24 (1998).

[1596] *See*, *e.g.*, Affiliates Associations Comments at 49; Affiliates Associations Reply at 15; Belo Comments at 6; Disney Comments at 36-38; FMBC Comments at 1-2; Harris Broadcast Comments at 10-11; NYSBA Comments at 19; *Media Bureau Seeks Comment on Widelity Report and Catalog of Potential Expenses and Estimated Costs*, GN Docket No. 12-268, Public Notice, 29 FCC Rcd 2989, 2993–3078 (2014) (*Reassignment Costs Report PN*); Transmit *Reassignment Costs Report PN* Comments at 17.

[1597] For example, the pre-auction UHF channel of a successful UHF-to-VHF bidder may become the post-auction channel of another station, requiring the UHF-to-VHF bidder to vacate its pre-auction UHF channel before the other station can use that channel. As Belo points out, this type of interconnected construction is further complicated by the fact that "broadcasters must continue to provide service to their communities during the transition." Belo Comments at 12. Thus, stations will face "logistical hurdles, such as renting and installing temporary equipment and obtaining FCC authority to operate on an interim channel." *Id*. We also recognize that close cooperation often will be needed between stations in order for reassigned stations to commence post-auction operations. For example, station A may need to begin testing its facility on its post-auction channel in order to be ready to operate by its construction deadline, but station B is currently using the channel. We expect that broadcasters will make all possible accommodations to ensure that all stations will be able to provide service on their post-auction channels by their respective construction deadlines. *See Third DTV Periodic Review*, 23 FCC Rcd at 3012, para. 29.

[1598] *See* NYSBA Comments at 22-23; *see also* DIRECTV/DISH Reply at 12 ("DBS Providers cannot accommodate several hundred broadcast stations implementing changes in a single day without the risk of significant disruption").

order to permit these crews to operate more efficiently, construction schedules should be coordinated on a regional basis, thereby enabling crews to operate in one area at a time.[1599] Similarly, a number of commenters claim that the Commission must consider weather and seasonal issues in establishing a post-auction construction schedule.[1600] We conclude that the flexibility to evaluate and address all of the relevant variables through a phased construction schedule based on the actual outcome of the auction will be critical to the success of the transition. This approach will enable the Media Bureau to take each of the above factors, as well as any others that may be relevant, into account.

567. In light of the complexity of the factors that may be involved in post-auction construction and the varying impact these factors will have on individual broadcasters, we also conclude that the proposal in the *NPRM* to complete the entire post-auction transition within 18 months would not provide sufficient time for all stations to complete the transition process.[1601] We agree with commenters that a universal 18-month transition deadline would not adequately take into account the many factors that will have to be considered when determining station construction deadlines, and we therefore disagree with commenters who assert that an overall 18-month deadline likely would provide broadcasters "more than enough time" to complete construction.[1602] Although we recognize that some stations will be able to transition to new facilities relatively quickly, these commenters underestimate the amount of time that will be necessary for all broadcasters to complete their transitions.[1603] For these reasons, we find that a longer construction period is necessary to ensure a smooth channel transition for all stations.

568. We find that a 36-month Broadcast Construction Period will provide sufficient time to complete a phased transition of all stations assigned to new channels. Many commenters suggest that a construction period of up to 36 months will be sufficient to complete the transition.[1604] In addition, 36

[1599] Harris Broadcast Comments at 10-11; PTV Comments at 27; Belo Comments at 6-7; NYSBA Comments at 19; Univision Comments at 18. Commenters also argue that a similar problem may occur with respect to equipment suppliers and that equipment orders will need to be staggered for the demand to be met. Harris Broadcast Reply at 9; *see also* PTV Comments at 27 (18-month timetable could strain manufacturer or installer resources).

[1600] *See*, *e.g.*, PTV Comments at 26; Belo Comments at 6; NYSBA Comments at 19; Vermont Broadcasters Reply at 7. In addition, we recognize that stations owned by governmental or public entities may need additional time to complete their construction because they are required to follow a mandatory competitive bid process that could delay their ability to purchase equipment or hire a tower crew. *See* KLCS Comments at 2; *see also* SBBC Comments at 2.

[1601] The *Reassignment Costs Report PN* discusses the many steps required to successfully complete the transition. *See, e.g., Reassignment Costs Report PN*, 29 FCC Rcd at 3002–03.

[1602] US Cellular Comments at 57; *see also* Leap Comments at 10; US Cellular Reply at 49-50.

[1603] Although the Commission noted in the *NPRM* that many stations granted construction permits toward the end of the DTV transition completed construction of their facilities within 12 months, we agree with Harris Broadcast that there are important differences between the DTV transition and this transition that would make a similar deadline inappropriate here. *See NPRM*, 27 FCC Rcd at 12464, para 322; Harris Broadcast Comments at 12. For example, some stations that completed their final digital facilities in the period immediately before the final DTV transition deadline did not switch channels, so that their construction tasks were simpler than those of a station reassigned to a new channel. *See* Harris Broadcast Comments at 12. In addition, the number of stations reassigned to new channels in the repacking process could be significantly greater than the number that converted to digital service during the final months of the DTV transition. *Id*. Unlike stations that participated in the DTV transition, stations assigned new channels in the repacking process will not be able to select their channel and "will have had little to no input regarding the technical parameters for their repacked facilities." Disney Comments at 36. Further, the Commission was able to allow a number of stations to transition early during the DTV transition, "thereby alleviating some of the challenges involved with potentially thousands of stations seeking the same equipment and support at once," an option that is not available here. PTV Comments at 25.

[1604] *See* State Broadcaster Associations Comments at 15 (advocating a 30-month construction deadline); Belo Comments at 6 (advocating a 30-month construction deadline); LIN Comments at 7 (advocating a 36-month construction deadline); NAB Comments at 50 (advocating a 30-month construction deadline); PTV Reply at 16

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months is the period afforded under our rules for stations to complete construction of new or modified facilities after the grant of a construction permit, including in situations where construction is complicated or especially challenging. Therefore, we conclude that 36 months is the appropriate maximum time period for stations to complete construction after they request permits for their post-auction facilities.[1605] Moreover, adopting a construction period that closely coincides with the three-year period established in the Spectrum Act to reimburse broadcasters for their repacking expenses will best ensure that stations are successfully reimbursed for their reasonably incurred expenses.[1606]

569. While we recognize that the transition will be complex and time-consuming for a number of stations, we conclude that it is not necessary to afford all reassigned broadcasters 36 months or longer to construct post-auction facilities.[1607] We disagree with commenters who argue that the 36-month Broadcast Construction Period will prove infeasible for a large proportion of stations.[1608] We recognize that some stations will face significant challenges in completing the post-auction transition to their new facilities. The Media Bureau will take such challenges into account when assigning individual construction deadlines. We expect that stations facing more challenging construction tasks will be granted longer construction periods, up to the full 36 months. In addition, although all stations reassigned to new channels will be required to cease operations on their pre-auction channels at the end of the 36-month period, the Commission will work diligently with stations to ensure that service disruptions are minimized to the fullest extent possible through the use of a variety of mechanisms. For example, if a station has not completed construction of its new facilities by the end of the Broadcast Construction Period, it may remain on the air while it completes construction by requesting authority to operate on temporary facilities. Further, as outlined in more detail below, the Media Bureau may to grant extensions of construction permit expiration dates of up to six months to those stations that encounter delays or unexpected challenges, thus providing stations flexibility in the amount of time they are afforded to transition to their new channels.

570. Moreover, we expect that some stations will have to make only modest changes to their facilities in order to transition to new channels. For example, some stations will be able to switch channels simply by re-tuning their existing equipment, a process that can be completed in a short period of time.[1609] Such stations should be able to complete their construction relatively quickly after grant of their construction permits. Thus, not all stations will need or be given the full 36 months to complete construction, and many will be assigned earlier construction deadlines.

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(advocating a three-year construction period); PTV Comments at 24-27 (advocating a construction period of at least three years); *Reassignment Costs Report PN*, 29 FCC Rcd at 2993-3078.

[1605] *See* 47 C.F.R. § 73.3598(a).

[1606] *See* § V.C.5 (Reimbursement of Relocation Costs).

[1607] *See* PTV Comments at 24-27 (advocating construction period of at least three years).

[1608] *See, e.g.*, Sinclair *Reassignment Costs Report PN* Comments at 2; GatesAir *Reassignment Costs Report PN* Comments at 1; APTS *Reassignment Costs Report PN* Reply at 9-10. Some commenters argue that many stations will face a complicated construction process or unanticipated delays and costs, and that such stations will not be able to complete construction in a 36-month timeframe. *See* Sinclair *Reassignment Costs Report PN* Comments at 2-8; NAB *Reassignment Costs Report PN* Comments at 14-25; Block Stations *Reassignment Costs Report PN* Comments at 6; Cohen *Reassignment Costs Report PN* Comments at 3; GatesAir *Reassignment Costs Report PN* Comments at 1, 4, 8-9; Dielectric *Reassignment Costs Report PN* Comments at 1, 6; American Tower *Reassignment Costs Report PN* Comments at 3, 6-7; NATE *Reassignment Costs Report PN* Comments at 2; Transmit Consultancy *Reassignment Costs Report PN* Comments at 5, 17; Stainless *Reassignment Costs Report PN* Comments at 2-3. Commenters further claim that "forc[ing] stations off the air" at the end of the 36-month Broadcast Construction Period for "reasons outside of their control" is contrary to the public interest. GatesAir *Reassignment Costs Report PN* Comments at 8-9.

[1609] *Reassignment Costs Report* at 47-53.

571. A number of commenters also argue that there will be insufficient equipment sources and qualified tower crews to complete the post-auction transition in 36 months.[1610] We recognize that resources needed for the transition process are limited. By structuring a phased transition, our goal is to mitigate the impact of these limitations by eliminating the need for all stations to obtain their equipment or schedule a tower crew at the same time. Further, we expect that the equipment manufacturing and tower installation industries will respond to the greatly increased demand resulting from the post-auction transition and will take advantage of this unique opportunity to provide equipment and construction services.[1611] We also intend to work closely with the industry to help ensure that these resources are allocated efficiently.

572. Finally, adopting a lengthier Post-Auction Transition Period could depress forward-auction participation or the value of investments made by forward auction winners.[1612] As several wireless commenters point out, an unduly long transition period also could delay the launch of innovative services and cause uncertainty both for providers and consumers.[1613] Our tailored approach will help to ensure that each station reassigned to a new channel transitions to its new channel as soon as possible, and that forward auction winners have access to their newly acquired spectrum as quickly as possible, thus ensuring a successful incentive auction.

573. Realizing that we must balance various stakeholder concerns, we again emphasize that the end of the Broadcast Construction Period will mark the latest date on which broadcasters will be permitted to cease operations on their pre-auction channels. Moreover, as discussed below, license relinquishment bidders and sharee stations that are parties to winning channel sharing bids will be required to cease operations within three months of receiving their auction proceeds. Thus, it is likely that many full power and Class A stations will vacate spectrum repurposed for flexible wireless use well before the end of the Broadcast Construction Period. Our approach will ensure that all wireless users will

[1610] *See* Block Stations *Reassignment Costs Report PN* Comments at 6; Dielectric *Reassignment Costs Report PN* Comments at 6; GatesAir *Reassignment Costs Report PN* Comments at 7; NAB *Reassignment Costs Report PN* Comments at 13; NATE *Reassignment Costs Report PN* Comments at 2; Sinclair *Reassignment Costs Report PN* Comments at 4; Stainless *Reassignment Costs Report PN* Comments at 3; Transmit Consultancy *Reassignment Costs Report PN* Comments at 5.

[1611] *But see* Dielectric *Reassignment Costs Report PN* Comments at 3 ("there is simply not enough certainty to allow the broadcast engineering, tower, and manufacturing industries to plan or allocate human capital and equipment to ensure the successful completion of transition in a thirty-six month period").

[1612] *See* AT&T Comments at 78-79 (arguing that "[g]iven the time value of money, therefore, the broadcasters' proposal for the 'maximum possible' delay would depress forward-auction bids and exacerbate the risk of auction failure"); *see also* Leap Comments at 10; Verizon Comments at 67-68; Verizon Reply at 47; AT&T Reply at 67; Sprint Comments at 12.

[1613] For example, AT&T points out that "permitting stations to remain in their existing channels as long as possible . . . would greatly lengthen the interval between the date of the forward auction and the date on which forward-auction winners can make use of the relevant spectrum for the provision of mobile broadband services." AT&T Comments at 78-79; *see also* AT&T Reply Comments at 67. AT&T also warns that "every additional month that goes by, however, is a month that those winners will have tied up billions of dollars of capital in prospective assets that are not yet producing any revenues for them." AT&T Reply at 67. Leap similarly argues that "[i]t is essential that the spectrum be made available for wireless uses as quickly as possible, and in the wireless industry, which is characterized by rapid change and innovation, three years is an eternity." Leap Comments at 10; *see also* Sprint Comments at 10. Verizon echoes those comments arguing that "[r]equiring winning forward auction participants to pay billions of dollars in winning bid amounts immediately after the auction concludes, while holding their license grants in abeyance or prohibiting them from deploying and launching service for years afterward, is not only inequitable but risks regulatory uncertainty to such a degree as to suppress forward auction bids." Verizon Comments at 67-68; *see also* Verizon Reply Comments at 47.

have access to their spectrum no later than 36 months after close of the construction permit filing window.[1614]

b. Winning Bidders for License Relinquishment and Channel Sharing

574. *Background*. The Commission invited comment in the *NPRM* on whether winning license relinquishment and channel sharing bidders should be afforded less time than other stations to cease operations on their pre-auction channels.[1615] The Commission noted that, in contrast to stations assigned new channels, successful license relinquishment bidders will not need to modify technical facilities in order to continue broadcasting. At the same time, the Commission recognized that these stations may be shifting programming to another station or transitioning to cable, satellite, or Internet-based operations and, accordingly, that their transitions "may not be as simple as flipping off a switch."[1616] With respect to winning channel sharing bidders, the Commission similarly noted that these stations may have to make less complicated technical changes than other stations and will have access to auction proceeds to help fund any necessary modifications.[1617]

575. *Discussion*. We require that all winning license relinquishment bidders terminate operations on their pre-auction channels within three months of receipt of their reverse auction proceeds.[1618] We agree with CEA and US Cellular that requiring license relinquishment bidders to quickly terminate their operations "will facilitate and expedite the subsequent changes that will have to be made by both reverse auction winners and repacked stations that remain on the air,"[1619] thus "accelerat[ing] the entire repacking process."[1620] We further agree that it is appropriate to require winning license relinquishment bidders to complete their transition earlier than other stations because the "future plans . . . of these types of winning bidders do not require the construction of new or substantially modified broadcast facilities."[1621]

576. We agree with Vision that we should provide winning license relinquishment bidders with sufficient regulatory flexibility to easily transition their stations off the air.[1622] In particular, we will allow these stations to seek special temporary authority or waiver of our operating rules, including our rules on minimum operating hours, in order to facilitate the final termination of their operations.[1623]

[1614] *See* CEA Comments at 34 (stating that "the Commission should establish a streamlined and efficient post-auction process, with concrete milestones and hard deadlines, and should hold auction participants and new licensees to those milestones and deadlines"); *see also* T-Mobile Reply at 94. We also note that wireless users will not have to wait until spectrum is actually cleared before constructing wireless facilities; construction may begin any time after a forward auction winner files its long-form license application. *See* 47 C.F.R. § 1.2113.

[1615] *See NPRM*, 27 FCC Rcd at 12465, para. 325.

[1616] *Id*.

[1617] *See NPRM*, 27 FCC Rcd at 12465, para. 326.

[1618] Prior to termination, winning license relinquishment bidders must comply with the consumer and MVPD notification requirements set forth below. *See* §§ V.C.3 (Consumer Education), V.C.4 (Notice to MVPDs). In addition, stations must notify the Commission of the termination of operations. *See* 47 C.F.R. § 73.1750.

[1619] CEA Comments at 34.

[1620] US Cellular Comments at 58; US Cellular Reply at 49-50.

[1621] US Cellular Comments at 58-59; US Cellular Reply at 49-50.

[1622] Vision Comments at 11-12.

[1623] The television minimum operating rule requires that stations operate a minimum number of hours per day. 47 C.F.R. §§ 73.1740(a)(2), 73.6001(b). Winning license relinquishment bidders may need the flexibility to vary the number of hours they operate during the three months they are wrapping up the operations of their stations.

577. In addition, we adopt a three-month deadline from receipt of reverse auction proceeds for sharee stations that are party to a winning channel sharing bid to terminate operations on their pre-auction channel and transition to their shared channel.[1624] Because these stations will not have to construct new facilities in order to effectuate their channel change, three months is sufficient for them to cease operations on their pre-auction channels. This deadline will apply regardless of whether or not the sharer station to which the sharee station is transitioning is reassigned to a new channel in the repacking process. If a sharer station is reassigned to a new channel, all broadcasters with shared status will be required to cease operations on the sharer's pre-auction channel and transition to the new channel in accordance with the phased post-auction transition procedures adopted in this Order[1625] and the construction permit issued for the new channel.

578. Although a three-month period for winning license relinquishment and channel sharing bidders to cease operations should provide adequate time, we recognize that some stations may encounter difficulties meeting this deadline.[1626] Therefore, we will permit such stations to submit a waiver request pursuant to section 1.3 of the rules. We will view requests for up to three additional months to terminate operations most favorably, and we anticipate that requests for any additional time will be unlikely to meet our waiver standard.[1627]

c. Additional Flexibility for Stations with New Channel Assignments

579. *Background*. The Commission sought comment on the possibility of providing additional flexibility to broadcasters to complete the transition to their new channel assignments.[1628] The Commission asked whether extensions of construction deadlines should be permitted, whether any extensions should be limited to six months, and what criteria should apply to such extensions.[1629] In addition, it invited comment on whether to allow stations to operate with temporary facilities while they

[1624] Sharee stations must comply with the consumer and MVPD notification requirements set forth in the Consumer Education Section and Notice to MVPDs Section. *See* §§ V.C.3 (Consumer Education); V.C.4 (Notice to MVPDs). In addition, sharee stations will be required to notify the Commission of the termination of operations on their pre-auction channel pursuant to the established procedures. *See* 47 C.F.R. § 73.1750. We expect that the termination of operations of the sharee's pre-auction channel and transition to a shared channel will occur on the same day and thus not result in any gap in service.

[1625] Winning channel sharing bidders whose shared channel is reassigned in the repacking process will be required to share on the sharer's pre-auction channel prior to construction of their newly assigned channel. *See* § V.C.1 (License Modification Procedures).

[1626] For example, license relinquishment bidders may need to shift programming to another station or transition to cable, satellite, or Internet-based operations. Similarly, in addition to programming-related difficulties, it is possible that winning channel sharing bidders will encounter technical issues that may delay the transition to their shared channel.

[1627] Section 1.3 of the rules states that a waiver will be granted if "good cause" is shown. *See* 47 C.F.R. § 1.3. The Commission may exercise its discretion to waive a rule where the particular facts make strict compliance inconsistent with the public interest. *See Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990) (*Northeast Cellular*). In addition, the Commission may take into account considerations of hardship, equity, or more effective implementation of overall policy on an individual basis. *See WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969); *Northeast Cellular*, 897 F.2d at 1166. Waiver of the Commission's rules is appropriate only if both (i) special circumstances warrant a deviation from the general rule, and (ii) such deviation will serve the public interest. *See id*. Such waiver requests must be filed electronically in CDBS as a request for a legal Special Temporary Authority (STA), provide the above-described waiver showing, and include a proposed termination date, not to exceed three additional months. Stations should file such requests as soon as it becomes apparent that they will not be able to meet the three-month termination deadline. In addition, no winning license relinquishment or channel sharing bidder will be granted a waiver beyond the end of the Broadcast Construction Period.

[1628] *See NPRM*, 27 FCC Rcd at 12465-66, para. 327.

[1629] *Id*.

complete construction and, if so, what criteria should be used to evaluate such requests and the maximum amount of time that should be allowed for any such temporary operations.[1630]

580. *Discussion*. Given the complexity of the post-auction transition process and the variety of delays that may occur in completing construction, we recognize that some stations will require additional flexibility in order to transition successfully to new channels.[1631] The Commission granted six-month construction extensions during the DTV transition, and these extensions proved to be a successful method of providing stations additional time, where truly warranted, to complete a successful transition to digital service. Some stations similarly may experience unexpected and uncontrollable delays during the post-auction transition that warrant a brief extension of time. Accordingly, we will permit stations assigned new channels in the repacking process and winning UHF-to-VHF and high-VHF-to-low-VHF bidders to seek a single extension of up to six months of their original construction deadlines. Although a construction deadline may be extended beyond the end of the Broadcast Construction Period, stations may not operate their pre-auction channels after that date.[1632]

581. We will evaluate requests for extensions using procedures similar to those used during the DTV transition, based on criteria tailored to the types of construction stations will need to undertake during the post-auction transition.[1633] Stations anticipating the need for an extension will be required to submit an extension application no less than 90 days before the expiration of their construction permit and demonstrate that, despite all reasonable efforts, they are unable to complete construction of their new facilities on time due to circumstances that were either unforeseeable or beyond their control.[1634] The following circumstances may justify an extension of a station's construction deadline: (1) weather-related delays, including a tower location in a weather-sensitive area;[1635] (2) delays in construction due to the unavailability of equipment or a tower crew;[1636] (3) tower lease disputes;[1637] (4) "unusual technical

[1630] *Id.* at 12466, para. 328.

[1631] *See* R. Mertz Comments at 4 (arguing that deadline extensions should be allowed where "additional time will be needed, and particularly for complications such as zoning issues, construction crew shortages, and problems with equipment availability"); FMBC Comments at 1-2 (arguing that extensions will be needed because "it is impossible to know today what types of construction challenges broadcasters will face in repacking" and that adopting strict construction deadlines without an opportunity for extension could adversely impact construction costs and requests for reimbursement); *Reassignment Costs Report PN*, 29 FCC Rcd at 3010 ("Depending on how the transition is phased, it could be necessary to operate with an interim facility for an extended time due to resource scheduling issues").

[1632] Stations that are still constructing after the end of the Broadcast Construction Period will have to go dark on their pre-auction channels while they complete construction of their new channel facilities. In addition, we note that reimbursements from the Reimbursement Fund will only be available until three years after completion of the forward auction. *See* § V.C.5 (Reimbursement of Relocation Costs).

[1633] *See Review of the Commission's Rules and Policies Affecting the Conversion to Digital Transition,* MB Docket No. 00-39, Memorandum Opinion and Order on Reconsideration, 16 FCC Rcd 20594, 20610-11, para. 46 (2001) (adopting extension criteria including financial hardship); *see also Third DTV Periodic Review*, 23 FCC Rcd at 3030-31, para. 69; 47 C.F.R. § 73.624(d)(3)(ii) (2001), wherein the Commission adopted and subsequently revised the DTV extension criteria. In the *Third DTV Periodic Review*, the Commission revised the criteria for stations seeking an extension during the remaining months of the DTV transition. *See Third DTV Periodic Review*, 23 FCC Rcd at 3030-34, paras. 71-79.

[1634] Extension requests must be filed electronically in CDBS using FCC Form 337. Although that Form has not been used by full power stations since completion of the DTV transition in June 2009, it continues to be used by LPTV, TV translator, and Class A stations seeking extension of their digital construction permits and will be made available for use by full power and Class A stations during the post-incentive auction band transition.

[1635] *See* PTV Comments at 26; Belo Comments at 6; NYSBA Comments at 19; Vermont Broadcasters Reply at 7.

[1636] *See* Harris Broadcast Comments at 10-11; PTV Comments at 27; Belo Comments at 6-7; NYSBA Comments at 19; Univision Comments at 18.

challenges," such as a top-mounted or side-mounted antenna or the need to coordinate channel changes with another station;[1638] or (5) delays faced by broadcast stations that must obtain government approvals, such as land use or zoning approvals, or that are subject to competitive bidding requirements prior to purchasing equipment or services.[1639] We will permit licensees to rely on other circumstances to support an extension only if the licensee is able to show that the circumstance was unforeseeable or beyond its control and that it took all reasonable efforts to resolve the issue.

582. We will permit stations to rely on "financial hardship" as a criterion for seeking an extension of time only in limited circumstances. In the past, the Commission has allowed stations to support an extension request based on a showing that "the cost of meeting the minimum build-out requirements exceeds the station's financial resources."[1640] In this case, because stations will be eligible for an initial allocation of estimated construction costs, stations should not have to rely significantly on self-financing or outside financing for their construction. In addition, a station transitioning to a new channel as a result of a winning UHF-to-VHF or high-VHF-to-low-VHF bid will have access to auction proceeds to fund new construction. Accordingly, we will allow stations that are subject to an active bankruptcy or receivership proceeding to seek an extension based on financial hardship, provided that the station makes an adequate showing that it has filed requests to proceed with construction in the relevant court proceedings. The existence of such proceedings, and the restrictions that may be imposed on the use of funds, justify allowing such stations to seek additional time to complete construction, if necessary. Any other station that seeks an extension of time based on financial hardship must demonstrate that, although it is not subject to an active bankruptcy or receivership proceeding, rare and exceptional financial circumstances nevertheless warrant granting additional time to complete construction of their facilities.

583. While we recognize that extensions may be necessary for a variety of reasons, we agree with US Cellular that we should not permit multiple or prolonged extensions and that we should limit extensions to no longer than six months.[1641] Thus, stations will be allowed, if granted, only a single extension of up to six months beyond their original construction deadline before being subject to our stricter tolling provisions.[1642] This limitation will help ensure that stations continue to dutifully pursue all means to complete construction, transition to their new channel, and terminate operations on their pre-

(Continued from previous page)

[1637] *See* Affiliates Associations Comments at 49; Affiliates Associations Reply at 15; NYSBA Comments at 18-19; R. Mertz Comments at 4.

[1638] *See* Harris Broadcast Comments at 11; NYSBA Comments at 18-19; Belo Comments at 12.

[1639] *See* KLCS Comments at 2; SBBC Comments at 2.

[1640] *Review of the Commission's Rules and Policies Affecting the Conversion to Digital Transition,* 16 FCC Rcd at 20610-11, para. 46; *see also Third DTV Periodic Review*, 23 FCC Rcd at 3030-31, para. 69; 47 C.F.R. § 73.624(d)(3)(ii) (2001). Although the Commission adopted stricter extension criteria in the *Third DTV Periodic Review*, including revising its financial hardship criteria, it continued to allow stations to seek an extension if they were subject to a bankruptcy or receivership proceeding. *See Third DTV Periodic Review*, 23 FCC Rcd at 3031-32, paras. 74-75.

[1641] *See* US Cellular Comments at 38.

[1642] *See* 47 C.F.R. § 73.3598(b), which provides that "[t]he period of construction for an original construction permit shall toll when construction is prevented by the following causes not under the control of the permittee: (i) construction is prevented due to an act of God, defined in terms of natural disasters (e.g., floods, tornados, hurricanes, or earthquakes) or (ii) the grant of the permit is the subject of administrative or judicial review (i.e., petitions for reconsideration and applications for review of the grant of a construction permit pending before the Commission and any judicial appeal of any Commission action thereon), or construction is delayed by any cause of action pending before any court of competent jurisdiction relating to any necessary local, state or federal requirement for the construction or operation of the station, including any zoning or environmental requirement."

auction channel. US Cellular urges us to apply our stricter "tolling" criteria to any extension requests.[1643] We decline to do so. Given the variety of challenges that stations may face in connection with the post-auction transition, stations that are able to demonstrate that they have experienced uncontrollable and unexpected delays in construction should be allowed a single extension of up to six months before being subject to our stricter tolling provisions. To the extent that a legal impediment or an "act of God" prevents a station from meeting its construction deadline even after a six-month extension, we will consider whether any additional time is warranted based on the stricter tolling criteria.[1644]

584. In order to facilitate timely construction of new facilities and to minimize any time broadcasters may be off the air, we also adopt the proposal in the *NPRM* to allow stations to operate with temporary facilities while they complete construction. We agree with commenters that affording this flexibility may make it more feasible for some stations to continue serving viewers throughout the transition and therefore will serve the public interest.[1645] Absent special temporary authority ("STA"), no station will be permitted to operate on its pre-auction channel past the station's individual construction deadline, and the Commission will not grant STAs to operate on pre-auction channels past the end of the Broadcast Construction Period. We will allow stations, on a case-by-case basis, to seek STAs for technical solutions that are similar to those permitted during the DTV transition.[1646] For example, we will consider granting an STA to operate for a short period of time on a channel relinquished by a license relinquishment bidder or from a temporary antenna location.[1647] We will examine all such requests to determine whether they would serve the public interest, and we will require that all temporary authorizations not cause impermissible interference to other broadcast or wireless licensees. All STAs granted in connection with the post-auction transition will be for a maximum of 180 days, the amount of time provided under the Communications Act and the Commission's rules for STA requests.[1648] In addition, the Media Bureau will reserve the right to modify or cancel an STA at any time without prior notice at its sole discretion.[1649]

[1643] *See* US Cellular Comments at 38.

[1644] *See* 47 C.F.R. § 73.3598(b). Stations must notify the Commission as promptly as possible, and in any event within 30 days of any pertinent tolling event, and provide supporting documentation. *See* 47 C.F.R. § 73.3598(c). Whether or not the Media Bureau will toll a station's construction permit will depend on whether additional time to construct is required after the conclusion of the initial six-month extension period discussed above. With respect to tolling based upon administrative or judicial review, stations must notify the Commission promptly when such review is resolved. *See* 47 C.F.R. § 73.3598(d). Tolling resulting from an act of God automatically will cease six months from the date of the notification required by § 73.3598(c), unless the station submits additional notifications at six month intervals detailing how the act of God continues to cause delays in construction, any construction progress, and the steps the station has taken and proposes to take to resolve any remaining impediments.

[1645] *See* Harris Broadcast Comments at 15; PTV Comments at 30; Anon. Broadcaster 1 Comments at 5. We also concur with US Cellular that temporary authority may "allow a station to transition to its newly-assigned channel, and thus clear the 600 MHz band, even though construction of its fully-authorized post-transition facilities may not be complete." US Cellular Comments at 59; *see also* US Cellular Reply at 50. We note that allowing stations to operate with temporary facilities was a key element to successful completion of the DTV transition.

[1646] Stations seeking an STA must satisfy the notice and filing requirements of § 73.1635 of the rules and file an electronic request through CDBS. *See* 47 C.F.R. § 73.1635.

[1647] *See* Harris Broadcast Comments at 15. In evaluating such STA requests, the Media Bureau will take into consideration whether the channel in question has been reallocated for flexible wireless use and, if so, the projected construction timetable for the new wireless facilities.

[1648] *See* 47 U.S.C. § 309(f); 47 C.F.R. § 73.1635(a)(4).

[1649] *See* 47 C.F.R. § 73.1635(b) ("An STA may be modified or cancelled by the FCC without prior notice or right to hearing").

585. Finally, we note that the license of any station that is dark for any consecutive 12-month period expires at the end of that period, except that the Commission can extend or reinstate such license "to promote equity and fairness."[1650] Stations with new channel assignments that remain dark for any consecutive 12-month period may seek an extension or reinstatement of their license and a waiver of the pertinent Commission rules. In considering such requests, we will take into account the extent to which a station has been involuntarily forced to remain dark as a result of the repacking process and whether, in light of the facts presented, equity and fairness dictate a license extension or reinstatement and a waiver.

3. Consumer Education

586. *Background*. The Commission invited comment in the *NPRM* on the types of consumer outreach it should conduct in connection with the post-auction transition.[1651] In particular, the Commission asked whether it should require broadcasters that will cease broadcasting or transition to new channels to air viewer notifications and, if so, the form such notifications should take and when they should be aired.[1652] Noting that stations were required to periodically file reports with the Commission on their consumer education efforts during the DTV transition, the Commission also asked whether such formal reporting requirements would be necessary or advisable during the forthcoming transition.[1653] In addition, the Commission asked to what extent it should use its own resources to inform consumers about the transition, including whether it should expand and update its existing call center to provide consumer assistance and whether and how to provide guidance to consumers through the Commission's website.[1654]

587. *Discussion*. Consumer education will be an important element of an orderly post-auction band transition. Consumers will need to be informed if stations they view will be changing channels, encouraged to rescan their receivers for new channel assignments, and educated on steps to resolve potential reception issues. Thus, we will require stations to take certain actions to adequately notify consumers and minimize any potential disruption.[1655] Specifically, as discussed below, we will require all "Transitioning Stations"[1656] to air viewer notifications for a minimum of 30 days prior to the date that the

[1650] *See* 47 U.S.C. § 312(g). The Commission's rules also provide that the "license of a broadcasting station that fails to transmit broadcast signals for any consecutive 12-month period expires as a matter of law at the end of that period, notwithstanding any provision, term, or condition of the license to the contrary." 47 C.F.R. §§ 73.1020(c). *See also* 73.1615(c)(2), 73.1635(a)(4), 73.1740(c), 73.1750.

[1651] *See NPRM*, 27 FCC Rcd at 12466-67, paras. 330-332.

[1652] *Id.* at 12466-67, para. 332.

[1653] *Id*.

[1654] *Id.* at 12466, para 331.

[1655] We reject as unnecessary NAB's suggestion that the Commission commit to seek funding from Congress for consumer education. *See* Letter from Rick Kaplan, Executive Vice President, Strategic Planning, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 16 (NAB Apr. 23, 2014 *Ex Parte* Letter). We note that stations reassigned to a new channel in the repacking process may submit reasonably incurred costs (other than lost revenues) associated with compliance with consumer education requirements for reimbursement from the Reimbursement Fund. *See* § V.C.5 (Reimbursement of Relocation Costs). Although winning reverse auction bidders are not eligible for such reimbursement, they will have access to auction proceeds to cover the cost of consumer education requirements. We also reject NAB's argument that the Commission should not impose consumer education requirements on broadcasters. *See id*. Because broadcasters will have unique access to the viewers that will be affected by the auction and repacking process, consumer education requirements will be a critical means to avoid unnecessary service disruptions. As explained herein, we are adopting flexible requirements that can be catered to a station's individual transition circumstances.

[1656] For purposes of this requirement and the requirement of notice to MVPDs, discussed below, we define "Transitioning Stations" as full power and Class A television stations that are: (1) reassigned to new channels by the Commission, (2) winning UHF-to-VHF and high-VHF-to-low-VHF bidders, (3) winning license relinquishment bidders, or (4) parties to a winning channel sharing bid. Channel sharer stations will be required to participate in consumer education only if they are reassigned to a new channel in the repacking process.

station will terminate operations on its pre-auction channel. The requirements we are adopting are similar to those the Commission imposed during the DTV transition as well as the ongoing LPTV transition.[1657] We agree with NHMC that these measures are necessary to "mitigate any consumer disruption caused by lack of consumer understanding."[1658] As commenters correctly note, in contrast to the DTV transition, in which all stations were required to cease analog broadcasts on the same day, stations assigned new channels in the repacking process and winning auction bidders will be transitioning under varying circumstances and on different schedules.[1659] Accordingly, as commenters suggest, we will provide stations with flexibility to target their messages to their specific situations in order to minimize public confusion and the effect of any service disruptions.[1660]

588. *Viewer Notifications for Commercial Full Power Stations and Class A Stations.* Transitioning Stations that operate on a commercial basis will be required to air a mix of Public Service Announcements ("PSAs") and crawls.[1661] Such stations must air at least one transition PSA and run at least one transition crawl in every quarter of every day for 30 days prior to the date that the station terminates operations on its pre-auction channel.[1662] Further, one of the required PSAs and one of the required crawls must be run during primetime hours each day.[1663] Crawls must run during programming for no less than 60 consecutive seconds across the bottom or top of the viewing area[1664] and be provided in the same language as a majority of the program carried by the station. Although we do not dictate the exact content of crawls, they must include the date that the station will terminate operations on its pre-auction channel, inform viewers of the need to rescan if the station has received a new channel assignment, and explain how viewers may obtain more information by telephone or online.[1665] PSAs must have a duration of at least 15 seconds,[1666] and each PSA must provide, at a minimum, the same information as required for crawls. For stations relocating to new channels, PSAs also must provide instructions to both over-the-air and multichannel video programming viewers regarding how to continue

[1657] *See DTV Consumer Education Initiative*, MB Docket No. 07-148, Report and Order, 23 FCC Rcd 4134 (2008) (*Consumer Education R&O*); *LPTV DTV Second R&O*, 26 FCC Rcd at 10756, paras. 49-50.

[1658] NHMC Reply at 5.

[1659] *See* Disney Comments at 39-40. For example, Disney notes, "some stations will seek to transition to their new channels very quickly whereas other stations may be required to take time to construct facilities on their repacked channels. Moreover, the nature of the relocation will vary among stations, as some stations may be moving from a UHF channel to a VHF channel, others may be sharing channels, and others may be ceasing broadcasts." *Id.*

[1660] *See* Disney Comments at 39-40; *see also Consumer Education R&O*, 23 FCC Rcd at 4138, para. 6; *LPTV DTV Second R&O*, 26 FCC Rcd at 10755-56, para. 50.

[1661] A "crawl" is "text that advances very slowly across the bottom or top of the screen." *See In the Matter of Review of the Emergency Alert System*, EB Docket No. 04-296, First Report and Order and Further Notice of Proposed Rulemaking, 20 FCC Rcd 18625, 18657 n.222 (2005). Stations may use alternative forms of crawls, including a text "flipper," which is a message on the screen that flips to a new line of text instead of crawling across the screen.

[1662] For the purposes of these requirements, each broadcast day can be broken into four quarters: 6:01 am to 12:00 pm, 12:01 pm to 6:00 pm, 6:01 pm to 12:00 am, and 12:01 am to 6:00 am.

[1663] For the purposes of this requirement, "primetime" is defined as the hours between 8:00 pm and 11:00 pm in the Eastern and Pacific time zones, and between 7:00 pm and 10:00 pm in the Mountain and Central time zones.

[1664] The crawls should not block any closed captioning or emergency information. *Cf.* 47 C.F.R. § 79.2(b)(3) (prohibiting closed captioning from blocking emergency information, and vice versa).

[1665] For example, viewers could be given the option of calling the station at a number provided, visiting the station's website, calling the Commission at 1-888-CALL-FCC, or visiting the Commission's website.

[1666] Broadcasters are free to air additional PSAs that do not meet all of these requirements, as long as the information included is accurate and not misleading.

watching the station. In addition, we require that transition PSAs be closed-captioned.[1667] We expect that broadcasters will air transition PSAs in addition to, and not in lieu of, PSAs on other issues of importance to their local communities. We encourage stations to include any other details about their transition that they believe to be important in their notifications, and stations are free to air additional notifications regarding the transition that they deem beneficial to their viewers.

589. *Viewer Notifications for NCE Stations*. During the DTV transition, NCE full power stations were given the option of complying with consumer education requirements through an alternate plan suggested by APTS.[1668] We conclude that a similar alternative is appropriate here.[1669] NCE stations may choose to comply with notification requirements either through the framework set forth above or by airing 60 seconds per day of on-air consumer education PSAs for 30 days prior to termination of operations on their pre-auction channel. NCE stations choosing the alternate plan will have the discretion to choose the timeslots for these PSAs. The NCE transition PSAs must include the same information as noted above and must be closed-captioned. We expect NCE stations electing this alternative to air these PSAs in addition to, and not in lieu of, PSAs on other issues of importance to their local communities.

590. *Certification of Compliance.* We will not impose periodic reporting requirements on Transitioning Stations. Although stations were required to periodically file FCC Form 388 reporting on their education efforts during the DTV transition, such requirements will not be necessary during the forthcoming transition given the less extensive nature of the consumer education requirements we are adopting. Instead, we will require that stations transitioning to a new channel place a certification of compliance with consumer notification requirements in their online public files within 30 days after beginning operations on their post-auction channels. In the case of winning license relinquishment bidders, we will require that stations include the certification in their notifications of discontinuation of service.[1670] A certification will ensure compliance with our consumer education requirements while minimizing the recordkeeping and reporting burden on Transitioning Stations.

591. *Commission Outreach Efforts*. The Commission directs the Consumer and Governmental Affairs Bureau ("CGB"), working in coordination with the Media Bureau and the Wireless Bureau, to develop a comprehensive consumer outreach plan to enhance consumer awareness regarding the transition. These efforts should be coordinated with stakeholder groups' outreach efforts. For example, CGB should consider updating the Commission's existing call center capabilities to offer consumer assistance on such matters as rescanning and other means to resolve potential reception issues. We also direct CGB to encourage the development of third-party call centers, such as one that might be established by a group of Transitioning Stations working together. In addition, CGB should examine the possibility of providing additional information and guidance to consumers on how to prepare for the transition through the Commission's website (www.fcc.gov). For example, the staff could post maps online to inform consumers regarding the station signals that will be affected by the transition, as it did during the DTV transition. CGB also should endeavor, where staff and resources are available, to conduct in-person outreach at the most relevant consumer events. We agree with NHMC that, by

[1667] We recognize that our rules exempt PSAs that are shorter than 10 minutes in duration from the captioning requirements. *See* 47 C.F.R. § 79.1(d)(6). Due to the critical information to be included in these PSAs, however, we expressly require that transition PSAs be closed captioned regardless of their duration.

[1668] *See Consumer Education R&O*, 23 FCC Rcd at 4150-51, para. 34.

[1669] *See id*. (citing Letter from Lonna Thompson, Senior Vice President and General Counsel, Association of Public Television Stations, to Honorable Kevin J. Martin, Chairman, FCC, MB Docket No. 07-148 (filed Feb. 12, 2008) (explaining that consumer education requirements must "recognize the many differences between commercial and noncommercial stations" and "take into account the unique constraints—financial, personnel- and content-related—that Public Television stations face")).

[1670] *See* 47 C.F.R. § 73.1750.

devoting resources to public outreach and education and engaging multiple stakeholders in those efforts, we will help ensure that all communities across the country are well informed.[1671]

4. Notice to MVPDs

592. *Background*. The Commission sought comment in the *NPRM* on whether to require stations that receive new channel assignments or cease broadcasting as a result of the auction to provide notice to affected MVPDs of channel changes and other technical changes that could affect carriage.[1672] Assuming such notice requirements are adopted, the Commission also asked what information should be provided, what form the notice should take, and what the timeframe for providing notice should be.[1673]

593. *Discussion*. We adopt the proposal in the *NPRM* to require all Transitioning Stations to provide notice to relevant MVPDs.[1674] We conclude that the notice requirements set forth below will minimize the impact of the transition on MVPDs and their subscribers by providing MVPDs with sufficient time to make changes to their systems and notify subscribers of upcoming channel or other technical changes. Commenters reinforce the importance of adequate notice obligations.[1675]

594. We require Transitioning Stations to provide notice to those MVPDs that: (1) no longer will be required to carry the station because it will cease operations or because of the relocation of a channel sharing sharee station; (2) currently carry and will continue to be obligated to carry a station that will change channels; or (3) will become obligated to carry a station due to a channel sharing relocation.[1676] Although MVPDs will receive notice of relevant channel changes from the *Channel Reassignment PN*, the Public Notice will not inform MVPDs of the timing of channel changes. As DIRECTV/DISH notes, this broad announcement "may not fully reflect broadcasters' plans."[1677]

[1671] *See* NHMC Reply at 5 (citing PTV Comments at 30).

[1672] *See NPRM*, 27 FCC Rcd at 12467, para 333. In addition, in the *Channel Sharing Report and Order*, the Commission stated that, following the conclusion of the reverse auction and the repacking process, it will be important that MVPDs be "apprised of any potential disruption to current operations, allowing MVPDs to properly alert their subscribers." *Channel Sharing Report and Order*, 27 FCC Rcd at 4633, para. 34 (quoting Dish Network Comments, ET Docket No. 10-235 at 3).

[1673] *See NPRM*, 27 FCC Rcd at 12467, para. 333.

[1674] *See* n.658 (defining Transitioning Stations). Although channel sharer stations will not be required to participate in consumer education efforts unless they are reassigned to new channels in the repacking process, they will be required, in conjunction with sharee stations, to notify affected MVPDs prior to initiation of shared operations. For purpose of the notice requirement, we use the statutory definition of MVPD. *See* Spectrum Act § 6001(19) (defining a "multichannel video programming distributor" as having the meaning given such term in § 602 of the Communications Act); 47 U.S.C. § 522 (defining an MVPD as "an entity such as, but not limited to, a cable operator, a multichannel multipoint distribution service, a direct broadcast satellite service, or a television receive-only satellite program distributor, which makes available for purchase, by subscribers or customers, multiple channels of video programming.").

[1675] *See* NCTA Comments at 19 n.58; DIRECTV/DISH Comments at 13; *Reassignment Costs Report PN*, 29 FCC Rcd at 3030. Several MVPD commenters detail the types of changes necessary to accommodate new channel assignments. *See* Comcast Comments at 28 (installation of additional antennas and receivers at headends); DIRECTV/DISH Comments at 6 (new and modified local receiver facility equipment including retuning of existing receiver equipment and adding or replacing tower mounted antennas and associated receiver equipment); NCTA Comments at 20 (installation of new antennas to receive the new channel allocation or new equipment to transport the broadcast signal via fiber, microwave or satellite distribution).

[1676] *See* § VI.A.2 (Channel Sharing Operating Rules) (addressing potential changes in MVPD carriage obligations).

[1677] DIRECTV/DISH Comments at 13. For example, "with respect to channel sharing stations, an MVPD may not easily know which programming stream is associated with each call sign with carriage rights." *Id.*

Therefore, specific individual notices from stations to affected MVPDs are necessary to provide adequate information to MVPDs and avoid disruptions of service.[1678]

595. The required notice must be provided in the form of a letter notification.[1679] We adopt the DIRECTV/DISH suggestion that the letter contain the following information: (1) date and time of any channel changes; (2) pre-auction and post-transition channel assignments; (3) modification, if any, to antenna position, location, or power levels; (4) stream identification information for channel sharing stations; and (5) engineering staff contact information.[1680] Should any of this information change during the station's transition, an amended notification must be sent. For cable systems, the letter must be addressed to the system's official address of record provided in the cable system's most recent filing in the Cable Operations and Licensing System ("COALS") Form 322.[1681] For all other MVPDs, the letter must be addressed to the official corporate address registered with their State of incorporation.

596. Further, we require that stations provide notice within the following time frames: (1) for winning license relinquishment bidders, not less than 30 days prior to terminating operations; (2) for channel sharing sharee stations, not less than 30 days prior to terminating operations of the sharee's pre-auction channel; (3) for all channel sharing stations (i.e., both the sharer station and sharee station(s)), not less than 30 days prior to initiation of operations on the sharer channel; and (4) for all other stations transitioning to a new channel, including stations that are assigned to new channels in the repacking process and winning UHF-to-VHF and high-VHF-to-low-VHF bidders, not less than 90 days prior to the date on which they will begin operations on their reassigned channel.[1682] In addition, should a station's anticipated transition date change due to an unforeseen delay or change in transition plan, the station must send a further notice to affected MVPDs informing them of the new anticipated transition date. We reject the longer notice periods proposed by DIRECTV/DISH (120 days)[1683] and NCTA (180 days).[1684] It is not likely that stations will know that far in advance when construction will be completed and operation on a new channel will begin. In addition, the timeframes outlined above, as well as the requirement to notify MVPDs of any change to anticipated transition dates, will provide ample time for MVPDs to make the necessary changes to their systems.

597. In addition, we waive the 30-day advance notice requirement in section 76.1603(c) of our rules with respect to deletions from a cable system's channel line up resulting from a winning license relinquishment bid.[1685] Section 76.1603(c) requires cable operators to provide 30 days written notice to

[1678] Stations assigned to a new channel in the repacking process may submit the cost of preparation and mailing of MVPD notices for reimbursement from the Reimbursement Fund. However, winning reverse auction bidders are not eligible for such reimbursement.

[1679] Although § 76.57(e) of the Commission's rules already provides that television stations must notify cable systems of their choice of channel positions, in this Order we adopt more specific notification requirements to be used in connection with the post-auction band transition. 47 C.F.R. § 76.57(e).

[1680] DIRECTV/DISH Comments at 13.

[1681] Additional information on COALS is available on the FCC's website: https://apps fcc.gov/coals.

[1682] Channel sharing sharer stations that are assigned a new channel in the repacking process will be required to send two notifications—one before they begin channel sharing on their pre-auction channel and a second before they begin operations on their reassigned channel. Sharee stations that share with a station that is assigned a new channel in the repacking process also will be required to send these notifications.

[1683] *See* DIRECTV/DISH Comments at 13; DIRECTV/DISH Reply at 4.

[1684] *See* NCTA Comments at 19 n.58.

[1685] 47 C.F.R. § 76.1603(c). Section 76.1603(b) requires cable operators to provide written notice to subscribers of changes in channel positions "as soon as possible." 47 C.F.R. § 76.1603(b). Notice must be given to subscribers a minimum of 30 days in advance of channel changes if the change is within the control of the cable operator. *Id*. Because channel changes resulting from the reverse auction or the repacking process will not be within the control of the cable operator, the minimum notice period does not apply to such changes.

both subscribers and local franchising authorities before implementing any service change, including the deletion of a channel. Because license relinquishment bidders must notify MVPDs only 30 days prior to terminating operations, it may not be feasible for cable operators to provide the required advance notice of the resulting channel deletion. We instead require them to provide such notice as soon as practical. We note that significant advance notice from cable operators to subscribers is not necessary in this context because of the consumer education requirements we adopt for license relinquishment stations, which will require them to notify viewers that they will terminate operations through PSAs and crawls.[1686]

5. Reimbursement of Relocation Costs

598. The Spectrum Act requires the Commission to reimburse broadcast television licensees for costs "reasonably incurred" in relocating to new channels assigned in the repacking process and MVPDs for costs reasonably incurred in order to continue to carry the signals of stations relocating to new channels as a result of the repacking process or a winning reverse auction bid.[1687] As explained in the *NPRM*,[1688] Congress specified that these reimbursements be made from the TV Broadcaster Relocation Fund (the "Reimbursement Fund"),[1689] and that the amount available for reimbursement of relocation costs is $1.75 billion.[1690] In addition, under the Spectrum Act, the Commission must make all reimbursements within three years after completion of the forward auction (the "Reimbursement Period").[1691]

599. In this Section, we discuss the implementation of the Reimbursement Fund. We discuss the entities that will be eligible for reimbursement, the procedure we will use to provide reimbursements, and how the Commission will determine the expenses that will be eligible for reimbursement. We also mandate the use of various measures to protect the Reimbursement Fund against waste, fraud, and abuse. In addition, we conclude that the record in this proceeding is not yet sufficient to make final decisions regarding some aspects of the reimbursement process. Accordingly, we delegate rulemaking authority to the Media Bureau to address additional aspects of the reimbursement process at the appropriate time.

a. Television Station Licensees and MVPDs Eligible for Reimbursement

600. *Background*. The entities eligible for reimbursement are set forth in section 6403(b)(4)(A) of the Spectrum Act. With respect to broadcasters, the Commission tentatively concluded

[1686] *See* para. 586. We also conclude that section 76.1601 of our rules and section 614(b)(9) of the Communications Act, which require cable operators to provide written notice to broadcast television stations prior to deleting the station from carriage or repositioning its channel, does not apply to channel changes or deletions resulting from the reverse auction or repacking process. 47 C.F.R. § 76.1601; 47 USC 534(b)(9).

[1687] Spectrum Act § 6403(b)(4)(A)(i), (ii).

[1688] *See NPRM*, 27 FCC Rcd at 12467-68, paras. 335-336.

[1689] *See* Spectrum Act § 6403(d).

[1690] *See* Spectrum Act § 6402 (adopting 47 U.S.C. § 309(j)(8)(G)(iii)(I), (II)). We disagree with arguments that the $1.75 billion Reimbursement Fund is a cap on or limits our repacking authority. *See* § V.C.5 f (Other Reimbursement Issues). Of this $1.75 billion, the Commission is authorized to borrow up to $1 billion from the United States Treasury to use toward the reimbursement of relocation costs pursuant to § 6403(b)(4)(A), but must reimburse the Treasury for any amounts borrowed as funds are deposited into the Reimbursement Fund. *See* Spectrum Act §§ 6403(d)(3)(A)–(B). The statute provides for deposits from the forward auction proceeds into the Reimbursement Fund in new Communications Act § 309(j)(8)(G)(iii). That provision mandates that, from the forward auction proceeds that are not distributed to winning bidders in the reverse auction and that are not retained by the Commission to cover its administrative costs, $1.75 billion shall be deposited into the Reimbursement Fund.

[1691] Spectrum Act § 6403(b)(4)(D). As discussed in § V.A (Auction Completion and Effective Date of the Repacking Process), the forward auction will be complete when a public notice announces that the auction has ended.

that the statute requires reimbursement only for full power and Class A television licensees that are reassigned to new channels in the repacking process, not winning reverse auction bidders.[1692] The Spectrum Act also requires the FCC to reimburse costs reasonably incurred by an MVPD "in order to continue to carry the signal of a broadcast television licensee" reassigned to a new channel either in the repacking process or as a result of a winning reverse auction bid, including a channel sharing bid.[1693]

601. *Discussion.* With respect to broadcasters, we adopt the tentative conclusion that the reimbursement mandate applies only to full power and Class A television licensees that are involuntarily reassigned to new channels in the repacking process pursuant to section 6403(b)(1)(B)(i). We will not reimburse winning reverse auction bidders (i.e., winning UHF-to-VHF, high-VHF-to-low-VHF, or channel sharing bidders) for voluntary frequency changes.[1694] This interpretation is both consistent with the language of section 6403(b)(4) and reasonable, in that successful reverse auction bidders can be expected to cover any relocation costs stemming from their successful bids out of auction proceeds. As proposed in the *NPRM*, sharer stations that participate in a channel sharing arrangement will be eligible for reimbursement only if they are reassigned to a new channel in the repacking process.[1695] Moreover, consistent with the proposal in the *NPRM*, and as required by section 6403(b)(4)(A)(i), we will reimburse any station formerly on channel 51 that must relocate again because its new channel is reassigned in the repacking process, even if it previously relocated from channel 51 pursuant to a private agreement.[1696]

602. Stations that are not reassigned to a new channel will not be eligible for reimbursement. Section 6403(b)(4)(A)(i) expressly mandates reimbursement only for television licensees "that [are] reassigned under [section 6403(b)(1)(B)(i)]" in the repacking process, and does not require reimbursement for stations that are not reassigned to new channels. Some commenters argue that the Commission has discretionary authority to reimburse such broadcasters.[1697] Even assuming that we have

[1692] *See NPRM*, 27 FCC Rcd at 12468, para. 337.

[1693] Spectrum Act § 6403(b)(4)(ii). The Spectrum Act defines an "MVPD" in the same manner as it is defined in § 602 of the Communications Act, 47 C.F.R. § 522. *See* Spectrum Act § 6001(19).

[1694] The Spectrum Act mandates reimbursement of broadcast television licensees only for the following three types of channel reassignments, none of which include a reassignment from UHF to VHF channels: (1) a UHF channel to a different UHF channel, (2) a VHF channel to a different VHF channel, or (3) a VHF channel to a UHF channel. *See* Spectrum Act § 6403(b)(4)(A)(i). We also conclude that the Spectrum Act does not mandate reimbursement of stations submitting winning high-VHF-to-low-VHF bids in the reverse auction. As discussed in § IV.B.1.b.iv (Additional Bid Options), while the statute does not provide for high-VHF-to-low-VHF bids, it does not preclude the FCC from adopting this bid option. The reference to VHF-to-VHF reassignments in § 6403(b)(4)(A)(i), however, is best read as referring to the involuntary reassignments contemplated in the Spectrum Act, not to reassignments resulting from additional bid options the Commission may allow. Because the Spectrum Act contemplates only involuntary VHF-to-VHF reassignments, we conclude that § 6403(b)(4)(A)(i) does not refer to voluntary VHF-to-VHF reassignments resulting from successful bids. We find this interpretation is consistent with other provisions of the Spectrum Act, which provide for only voluntary UHF-to-VHF reassignments and do not provide reimbursement for such reassignments. *Compare* Spectrum Act § 6403(a)(2)(B) (UHF-to-VHF bid option) *with id*. § 6403(b)(3)(A) (precluding involuntary UHF-to-VHF reassignments); *id*. § 6403(b)(4)(A)(i) (excluding UHF-to-VHF reassignments from reimbursement). This interpretation also avoids a result where winning high-VHF-to-low-VHF bidders receive cost reimbursement, yet winning UHF-to-VHF bidders do not, without any apparent purpose consistent with the policies underlying the Spectrum Act.

[1695] *See NPRM*, 27 FCC Rcd at 12468, para. 337. A "sharer" is a station that does not relinquish its spectrum, but shares its frequencies with one or more "sharees" that relinquish their frequencies in order to move to the sharer's frequencies. *Id.* at 12442, para. 245.

[1696] *See id.* at 12472, para. 349. Because the Lower 700 MHz A Block is adjacent to television broadcast channel 51, there have been some arrangements between wireless licensees and channel 51 broadcasters to relocate stations currently on channel 51 to avoid interference. Channel 51 stations that relocated pursuant to a private arrangement may or may not need to relocate a second time as a result of the repacking process.

[1697] *See, e.g.*, Affiliates Associations Comments at 52-53; NAB Comments at 57-58.

such authority, we decline to exercise it. In light of the limited amount of money Congress made available to reimburse broadcasters and MVPDs for relocation costs, we will limit reimbursements to those provided for by the Spectrum Act. We note that, in some cases, stations that are not reassigned to new channels but that sustain expenses due to the repacking process may be reimbursed indirectly.[1698] For example, where multiple stations share a tower, a reassigned station that makes changes may be required to cover certain expenses incurred by other tower occupants.[1699] In such circumstances, the Commission will consider a claim from the reassigned station for reimbursement of such costs, so long as the reassigned broadcaster has a contractual obligation to pay these expenses through a contract entered into on or before the release date of this Order.[1700] We also note that there may be instances in which a non-reassigned station may benefit indirectly from a reimbursement to a reassigned station.[1701]

603. MVPDs will be eligible for reimbursement when they reasonably incur costs in order to continue to carry broadcast stations that are reassigned as a result of the auction.[1702] We anticipate that the vast majority of MVPD carriage expenses will be due to channel changes made by broadcast stations that an MVPD already carried prior to the auction. Moreover, we anticipate that most MVPD carriage costs will result from broadcasters being reassigned to new channels, and not from a successful channel sharing bid.[1703] However, there may be a limited number of situations in which an MVPD incurs a new carriage obligation due to the relocation of a sharee station.[1704] We conclude that MVPDs that must fulfill any such new carriage obligations will be eligible for reimbursement of their reasonably incurred costs, just as they will be eligible for reasonably incurred costs to continue carrying other reassigned stations and winning bidders.[1705]

604. We interpret section 6403(b)(4)(A)(ii)(III), which mandates reimbursement of MVPDs' costs "in order to continue to carry" a broadcaster that relinquishes its spectrum to share with another licensee, to cover costs an MVPD reasonably incurs so that a broadcaster continues to be carried on an

[1698] We note, however, that in such a situation only the reassigned station would be eligible to seek reimbursement from the Reimbursement Fund for any such costs.

[1699] *See* NAB Comments 57-58 and Appendix A; Affiliates Associations Comments at 52-53. We note that many towers used by television stations have multiple occupants, including other television and radio stations as well as non-broadcast facilities. Changes to the facilities of one station may affect other broadcast stations on the tower if, among other things, other station antennas must be moved to accommodate the change.

[1700] Parties may receive such reimbursement with respect to contracts entered into after that date if they can show good cause for such reimbursement.

[1701] This would occur if, for example, a reassigned station is reimbursed for new equipment that is shared with a non-reassigned station.

[1702] Spectrum Act § 6403(b)(4)(A)(ii) (requiring the Commission to reimburse MVPDs for their eligible costs without regard to whether the carriage obligation results from must-carry obligations or a retransmission consent agreement).

[1703] In the case of an involuntary channel reassignment or a winning UHF-to-VHF or high-VHF-to-low-VHF bid, an MVPD that already carried the station in question will need to accommodate its new channel assignment. In the case of most channel sharing arrangements where the MVPD likely already carries the sharer station, we expect that the MVPD's transition costs will be relatively inexpensive because it will not be required to accommodate a new channel assignment. *See* NCTA Comments at 19-20.

[1704] *See* § VI.A.2 (Channel Sharing Operating Rules) (describing the impact of channel sharing on MVPD carriage obligations).

[1705] The Spectrum Act does not expressly mandate reimbursement for costs to continue to carry stations that submit winning high-VHF-to-low-VHF bids. *See* Spectrum Act § 6403(b)(4)(A)(i). However, we conclude above that the Spectrum Act does not preclude the Commission from adopting this additional bid option, and we similarly conclude that the Spectrum Act does not preclude us from reimbursing MVPDs for the reasonably incurred costs to continue carrying winning high-VHF-to-low-VHF bidders. *See* § IV.B.1.b. (Reverse Auction Bid Options).

MVPD service after the auction, regardless of whether that particular MVPD or a different one previously carried the station. Although the statute does not directly address this issue, section 6403(a)(4) guarantees that a channel sharee that had carriage rights before the auction will have the carriage rights that apply at its new shared location rather than its original location. Since Congress expressly preserved channel sharing broadcasters' carriage rights at their new locations regardless of whether an individual MVPD's carriage obligations are changed, it is reasonable to infer that Congress intended for MVPDs to be eligible for reimbursement when they incur costs in accommodating those rights. As NCTA explains, reading the statute as "precluding reimbursement of a cable operator acting to fulfill the broadcaster's right to carriage would create an asymmetry" that would penalize MVPDs.[1706] We agree with NCTA that such an outcome would be contrary to Congress' intent.

b. Reimbursement Process

605. *Background*. Our goals in developing a reimbursement process are threefold. First, the process must be as simple and straightforward as possible to minimize the costs associated with reimbursement as well as the burdens on both affected parties and the Commission. Second, the process must be prompt and efficient in light of the three-year statutory deadline for issuing reimbursements.[1707] Third, the process must be fair: it must cover broadcasters' and MVPDs' eligible costs reasonably incurred and maximize the funds available for reimbursement by avoiding waste, fraud, and abuse.

606. The Commission proposed in the *NPRM* to allow broadcasters to elect reimbursement of their eligible relocation costs based on either their estimated costs or their actual, out-of-pocket expenditures.[1708] Under that proposal, stations choosing to receive reimbursement based on the estimated cost approach would receive their reimbursement through an advance payment based on a predetermined amount, while stations choosing reimbursement based on actual costs would receive reimbursement only after paying and documenting their costs. The Commission also invited comment on alternative reimbursement procedures.[1709] In addition, the Commission sought comment on whether to allow MVPDs to be reimbursed through advance payments based on estimated costs[1710] and whether the Commission should appoint a third-party auditor to oversee the Reimbursement Fund.[1711]

607. *Discussion*. We adopt a reimbursement process that provides initial allocations of funds to broadcasters and MVPDs based on their estimated costs. The funds will be available for draw down as the broadcasters and MVPDs incur expenses, followed by a subsequent allocation to the extent necessary.[1712] As discussed more fully below, all entities seeking reimbursement will be required to provide an estimate of their eligible costs following the release of the *Channel Reassignment PN*. The Media Bureau will review the estimates based on the Catalog of Eligible Expenses being developed by the Bureau.[1713] Eligible entities will be issued an initial allocation from the Reimbursement Fund equal to

[1706] Letter from Rick Chessen, Senior Vice President, NCTA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed July 29, 2013).

[1707] *See* Spectrum Act § 6403(b)(4)(D).

[1708] *See NPRM*, 27 FCC Rcd at 12468-70, para. 338-341.

[1709] *Id*. at 12470, para. 342.

[1710] *Id*. at 12472, para. 350.

[1711] *Id.* at 12473, para. 354.

[1712] These allocations of funds will be placed in designated individual accounts in the U.S. Treasury.

[1713] The Media Bureau has developed and released for public comment a Catalog of Eligible Expenses, which is a preliminary list of the expenses broadcasters and MVPDs will incur during the repacking process that may be eligible for reimbursement. *See Media Bureau Seeks Comment on Catalog of Eligible Expenses and Other Issues Related to the Reimbursement of Broadcaster Channel Reassignment Costs*, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 13787 (2013) (*Reassignment Costs PN*). In addition, the Media Bureau is developing a set of

(continued….)

a set percentage of their estimated eligible costs.[1714] Prior to the end of the three-year Reimbursement Period, entities will provide information regarding their actual and remaining estimated costs and will be issued a final allocation, if appropriate, to cover the remainder of their eligible costs. If an overpayment is discovered after the end of the Reimbursement Period, entities will be required to return the excess to the Commission.

608. *Reimbursement Period*. As discussed above, the Spectrum Act requires the Commission to make all required reimbursements no later than three years after completion of the forward auction.[1715] We conclude above that the forward auction will be "complete" when a public notice announces that the auction has ended.[1716] Accordingly, all required reimbursements must be made within three years of the date of that announcement. The Commission will not issue any reimbursements before completion of the forward auction.[1717]

609. *Estimated Versus Actual Cost Approach.* We decline to adopt our proposal in the *NPRM* to give broadcasters and MVPDs a choice between an estimated cost approach with advance payments or an actual cost approach with reimbursement after eligible entities pay and document their costs. Rather, a uniform approach to reimbursement will simplify the reimbursement process and reduce the chance that entities will be unable to finance necessary relocation changes.[1718] Therefore, instead of offering a choice, we will issue all eligible broadcasters and MVPDs an initial allocation of funds based on estimated costs, which will be available for draw down (from individual accounts in the U.S. Treasury) as the entities incur expenses, followed by a subsequent allocation to the extent necessary. All commenters who address the issue support providing advance payments.[1719] Although the process we establish is similar to an approach based on advance payments, we have concluded that such advances would not be permissible under Title 31 of the United States Code and applicable U.S. Treasury regulations and guidance thereunder.[1720] Specifically, in order to comply with U.S. Treasury requirements, we must allocate funds

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predetermined cost estimates for these expenses that will be included in a final Catalog of Eligible Expenses. *See Reassignment Costs Report PN*, 29 FCC Rcd 2989.

[1714] The amount available to be issued as initial allocations will depend, in part, on the total amount of repacking expenses reported on the estimated cost forms. In addition, the timing of the initial allocations will depend on when money in the Reimbursement Fund becomes legally available for obligation to eligible entities. *See* para. 615.

[1715] Spectrum Act § 6403(b)(4)(D).

[1716] *See* § V.A (Auction Completion and Effective Date of the Repacking Process).

[1717] *See* § V.B (Processing of Bid Payments).

[1718] We agree with those commenters who argue that we should permit MVPDs to access money from the Reimbursement Fund in the same manner as broadcasters. While DIRECTV and DISH Network agree that the Commission will be able to identify estimated costs for MVPDs in advance, NCTA argues that the majority of costs likely to be incurred by cable operators will be labor costs that are highly variable, making it difficult for the Commission to establish tiers of estimated costs in advance for cable operators. *See* DIRECTV/DISH Comments at 7; NCTA Comments at 21. As discussed below, the reimbursement process we adopt permits entities to provide their own cost estimates if the Commission's predetermined estimate does not fully account for the entity's transition circumstances and provides ultimately for reimbursement based on actual relocation costs. This approach addresses the concerns raised by NCTA.

[1719] *See* PTV Comments at 27–28 (providing advance payment based on estimated costs will allow the Commission to meet the statutory mandate to make all payments within three years) and US Cellular Comments at 58 (offering advance payment for broadcaster relocation costs will expedite clearing of the 600 MHz Band). *See also* NAB Comments at 53-55; Comcast Comments at 24-25; CEA Comments at 35; Belo Comments at 19–20; Entravision Comments at 14; Harris Broadcast Comments at 18–19; Vision Comments at 13; ION Reply at 5; Capitol Reply at 7.

[1720] *See, e.g.*, 31 U.S.C. § 3321(a) (granting disbursement authority to the Department of Treasury); 31 U.S.C. § 3322(a)(2)(A) (requiring disbursing officials to draw money from the Treasury only as needed to make payments);
(continued….)

to designated individual accounts within the U.S. Treasury that will be available for draw down as broadcasters and MVPDs incur eligible expenses. Under this approach, consistent with an advance payment approach, entities will be able to use federal funds initially to pay their expenses as they are incurred. The process we adopt allows us to comply with our statutory obligations both to reimburse costs reasonably incurred under section 6403(b)(4)(A) and to provide entities with the funds to implement their relocation changes within the statutory three-year reimbursement period under section 6403(b)(4)(D). In addition, it preserves the integrity of the Fund by reducing the likelihood of waste, fraud, and abuse.

610. *Submission of Estimated Costs*. No later than three months following release of the *Channel Reassignment PN*, all broadcasters and MVPDs[1721] that are eligible for reimbursement will be required to file a form providing an estimate of their channel relocation costs.[1722] These forms will be due at the same time that broadcasters assigned new channels must file their construction permit applications to implement the channel reassignments. Entities must update the form if circumstances change substantially.[1723] The estimated cost forms, along with the submissions discussed below, will be filed with the Commission electronically and will be publicly available.[1724]

611. On the estimated cost form, eligible broadcasters will provide an estimate of the costs they expect to reasonably incur to change channels, and MVPDs will estimate the costs they expect to reasonably incur to accommodate new channel assignments.[1725] The estimated cost form for television stations will reference the final Catalog of Eligible Expenses, which will contain a list of many, but not

(Continued from previous page)
31 U.S.C. § 3324(b) (restricting agency authority to issue advances); 31 U.S.C.§ 3302(c) (requiring, as part of the Miscellaneous Receipts Act, 31 U.S.C. § 3302(b), that persons possessing public money not needed for current expenditure must deposit same into the Treasury).

[1721] MVPDs must review the *Channel Reassignment PN* to determine whether stations they currently carry are changing channels.

[1722] If an entity that did not file an estimated cost form becomes aware of an expense eligible for reimbursement after the three-month deadline, it may file a late estimated cost form together with an explanation of why the form could not be timely filed. The Media Bureau will consider any late-filed forms on a case-by-case basis.

[1723] For example, such an updated form would be required if entities later become aware of substantial expenses that were not identified on the initial form or if they make a subsequent determination that money from the Reimbursement Fund should be expended for equipment or other expenses different from those outlined in the initial estimated cost form.

[1724] The Media Bureau will develop one or more forms, discussed below, and seek public comment prior to the commencement of the reimbursement process. Any submissions will contain provisions designed to protect against waste, fraud and abuse, including, *inter alia,* a certification pursuant to 18 U.S.C. § 1001. Entities requesting confidential treatment of information included in either form should submit a request under § 0.459 of the Commission's rules. Even if some forms or documents are confidential, the Media Bureau will make public the amounts distributed from the Reimbursement Fund to each broadcaster and MVPD.

[1725] Eligible broadcasters will also have to list their current equipment on their estimated cost form. We decline to adopt the suggestion that we require all broadcasters, prior to the reverse auction, to provide us with an inventory of their equipment and facilities that would be affected by the repacking process as well as a preliminary estimate of their relocation costs. *See* Sprint Comments at 11–12; CTIA Comments at 35–36; Comcast Comments at 28; AT&T Reply at 66–67; T-Mobile Reply at 92–93. Relocation costs will depend on a variety of factors, including the type of equipment the station uses and whether that equipment can be used on the new channel. Because of the complexity of the transition and the number of variables that cannot be determined in advance, we decline to impose a burdensome inventory requirement. As stated in § III.B.3 (Facilities to Be Protected), we will require broadcasters to certify the accuracy of the technical information in the Commission's CDBS database prior to the auction. In addition, we decline to ask broadcasters to estimate their individual relocation costs prior to the auction because such estimates generally cannot be made accurately until post-auction channel assignments have been made and we will not know before the auction which stations will incur reimbursable expenses.

necessarily all, of the modifications a station may have to make in order to change its channel, as well as the predetermined estimate of the cost, or range of costs, for equipment and other expenses associated with those modifications.[1726] Similarly, the estimated cost form for MVPDs will contain a list of many, but not necessarily all, of the cable or satellite system changes an MVPD may be required to make to accommodate new station channel assignments, as well as the predetermined estimate of the cost or cost range for most of those changes. For equipment or other changes for which there is a predetermined cost estimate, stations and MVPDs may select either the predetermined cost estimate or provide their own individualized estimate if they believe the predetermined estimate does not fully account for their specific circumstances. Entities that reject the predetermined estimate as too low will be required to justify the higher cost. For any expenses for which there is not a predetermined cost estimate, the station or MVPD will be required to provide an individualized cost estimate. We will require entities that provide such individualized cost estimates to submit supporting evidence and to certify that the estimate is made in good faith.

612. Regardless of whether they are claiming predetermined cost estimates or their own individualized estimated costs, each broadcaster and MVPD will be required to certify, *inter alia*, that: (1) it believes in good faith that it will reasonably incur all of the estimated costs that it claims as eligible for reimbursement on the estimated cost form, (2) it will use all money received from the Reimbursement Fund only for expenses it believes are eligible for reimbursement, (3) it will comply with all policies and procedures relating to allocations, draw downs, payments, obligations, and expenditures of money from the Reimbursement Fund,[1727] (4) it will maintain detailed records, including receipts, of all costs eligible for reimbursement actually incurred, and (5) it will file all required documentation of its relocation expenses as instructed by the Media Bureau.[1728]

613. After the estimated cost forms have been submitted, the Media Bureau will review them. For entities that choose to provide their own cost estimate (i.e., either a cost estimate higher than the predetermined cost estimate or an individualized cost estimate for an expense for which the Commission does not provide a predetermined cost estimate), the Bureau will review the required justification for the estimate and may accept it or substitute a different amount for purposes of calculating the initial allocation. Regardless of the basis for the estimate, the Bureau may determine, based on its reasonableness review of an estimated cost form and any submitted documentation, that a station or MVPD should receive a different allocation from that claimed on the form.

614. *Initial Allocation Stage*. Once the Media Bureau completes its review, it will issue an initial allocation from the Reimbursement Fund to the broadcaster or MVPD, which will be available to the entity to draw down as expenses are incurred.[1729] Subject to timing constraints on allocations from the Fund that are discussed below, we intend to issue NCE broadcasters initial allocations equivalent to up to 90 percent of their estimated costs eligible for reimbursement, and all other broadcasters and MVPDs initial allocations equivalent to up to 80 percent of their estimated costs eligible for reimbursement. We will issue initial allocations to NCEs equivalent to a higher percentage of their estimated costs due to their unique funding constraints.[1730] For other broadcasters and MVPDs, a slightly smaller initial allocation will be sufficient to permit them to fund construction or other reimbursable costs until a subsequent

[1726] The Catalog of Eligible Expenses is discussed below. *See* § V.C.5.c (Expenses Eligible for Reimbursement).

[1727] *See* para. 619 (delegating authority to the Media Bureau to adopt necessary policies and procedures relating to allocations, draw downs, payments, obligations, and expenditures of money from the Reimbursement Fund to protect against waste, fraud, and abuse and in the event of bankruptcy).

[1728] Eligible broadcasters and MVPDs also must make certifications on the estimated cost form pertaining to reimbursements for new equipment. *See* § V.C.5.f (Other Reimbursement Issues).

[1729] The issuance of an initial allocation from the Reimbursement Fund based on these estimates does not create an obligation on the part of the Commission to pay the entity's total estimated or actual relocation costs.

[1730] *See* PTV Comments at 28–29.

allocation phase, when all stations and MVPDs can request an additional allocation from the Reimbursement Fund if necessary to cover the remainder of their costs eligible for reimbursement.[1731] It is appropriate to withhold at least 10 percent (for NCEs) or at least 20 percent (for other stations and for MVPDs) of estimated costs until a subsequent allocation phase. We conclude that this approach should ensure that broadcasters and MVPDs do not face an undue financial burden while also reducing the possibility that we allocate more funds than necessary to cover actual relocation expenses.

615. The amount available to be issued as initial allocations will depend, in part, on the total amount of repacking expenses reported on the estimated cost forms. In addition, the timing of initial allocations will depend on when money in the Reimbursement Fund becomes legally available for obligation to eligible entities. The Spectrum Act authorizes the Commission to borrow up to $1 billion from the U.S. Treasury, upon the effectiveness of any reassignments or reallocations under section 6403(b)(1)(B), to use toward reimbursement of relocation expenses,[1732] but the Commission must reimburse the Treasury for any amounts borrowed as funds are deposited into the Reimbursement Fund from forward auction proceeds.[1733] Thus, the amount available for initial allocations from the Reimbursement Fund may be limited initially to $1 billion. The remainder of the $1.75 billion will not be legally available for allocation until at least some wireless licenses have been granted to forward auction winners and sufficient forward auction proceeds are deposited into the Reimbursement Fund. If necessary, the initial allocations of funds to broadcasters and MVPDs will be made in tranches as funds become legally available.

616. *Final Allocation Stage*. Upon completing construction or other changes that are eligible for reimbursement, or by a specific deadline prior to the end of the of the Reimbursement Period to be announced by the Media Bureau, whichever is earlier, all stations and MVPDs that received an initial allocation from the Reimbursement Fund must provide the Commission with information and documentation regarding their actual expenses incurred, plus any remaining estimated expenses for entities that have not yet completed their transition. After reviewing this information, the Media Bureau will determine whether the broadcaster or MVPD incurred or will incur eligible relocation costs that are not covered by the initial allocations from the Reimbursement Fund and issue a final allocation, if appropriate, to the broadcaster or MVPD. If any allocated funds remain in an entity's Treasury account in excess of the entity's actual costs determined to be eligible for reimbursement, those funds will revert back to the Reimbursement Fund. The Media Bureau will provide additional details on the filing and process requirements, including filing deadlines, for this final allocation stage in a subsequent public notice.

617. *Final Accounting Stage*. Any entities that have not completed their transition by the deadline announced by the Media Bureau during the final allocation stage must submit their final expense documentation to the Commission shortly after completing their transition and regardless of whether this occurs after the Reimbursement Period.[1734] This documentation will contain actual costs for all eligible expenses and will serve as a final accounting of all actual expenses incurred to complete the transition. The Media Bureau will provide additional details on the filing and process requirements, including filing deadlines, for this final accounting stage in a subsequent public notice.

[1731] *See* Harris Broadcast Comments at 19.

[1732] *See* Spectrum Act § 6403(d)(3)(A); *see also id*. § 6403(f)(2) ("no reassignments or reallocations under subsection (b)(1)(B) shall become effective until the completion of the reverse auction . . . and the forward auction").

[1733] *See* Spectrum Act §§ 6403(d)(2), (d)(3)(B).

[1734] Entities that have finished construction and have submitted all actual expense documentation by the final allocation stage deadline (to be determined by the Media Bureau) will not be required to file anything at the final accounting stage.

618. *Reimbursement Contractor and Delegation of Authority.* We direct the Media Bureau to engage a contractor to assist in the reimbursement process and administration of the Reimbursement Fund. We note that commenters who address the issue of whether we should hire a third-party to assist with administering reimbursements generally are supportive, so long as administrative costs are carefully controlled.[1735] We conclude that the costs associated with administering the Reimbursement Fund are appropriately included in the Commission's overall costs to "mak[e] any reassignments or reallocations" under section 6403(b)(1)(B).[1736] Accordingly, administrative costs will not be deducted from the Reimbursement Fund.[1737] The Commission delegates authority to the Media Bureau to engage a third-party contractor to assist in the reimbursement process, which will be overseen by the Bureau.

619. The Commission also delegates authority to the Media Bureau to create one or more forms to be used by entities to claim reimbursement from the Reimbursement Fund, as well as to report on entities' use of money disbursed from the Fund and the status of their construction efforts, and for any other Reimbursement Fund-related purposes. We also delegate authority to the Media Bureau to establish the timing and calculate the amount of the allocations to eligible entities from the Reimbursement Fund, develop a final Catalog of Eligible Expenses, and make other determinations regarding eligible costs and the reimbursement process. Finally, we delegate authority to the Media Bureau to adopt the necessary policies and procedures relating to allocations, draw downs, payments, obligations, and expenditures of money from the Reimbursement Fund in order to protect against waste, fraud, and abuse and in the event of bankruptcy.[1738] Given the importance of maintaining the integrity of the Fund, the Media Bureau will consult with the Office of General Counsel and the Office of the Managing Director in acting pursuant to this delegation.

c. Expenses Eligible for Reimbursement

620. *Background*. In order to implement the Spectrum Act's reimbursement provisions, we must determine which expenses will be eligible for reimbursement from the Reimbursement Fund and how to quantify those expenses. The Commission sought comment in the *NPRM* on the types of relocation costs that broadcast stations and MVPDs are likely to incur, and how to determine which costs are "reasonable" for purposes of the reimbursement mandate.[1739] The Commission also sought comment on how to estimate relocation costs and whether cost estimates should be the same for all stations or based on tiers of fixed rates related to specific criteria including, among others, the type of channel change and

[1735] *See* Affiliates Associations Comments at 49; Belo Comments at 20; CTIA Reply at 41–42; NAB Comments at 60–61; Sprint Comments at 16. We have received one comment arguing that hiring a third-party to assist with administering reimbursements would result in additional expense and delay. Block Stations *Reassignment Costs Report PN* Comments at 8. We disagree. Rather, a third-party contractor will help streamline the process of administering reimbursements thereby making it more efficient. And, importantly, the costs associated with such administration will not be deducted from the Reimbursement Fund.

[1736] The Commission is required to cover its administrative expenses related to the auction. *See* Spectrum Act § 6403(c)(2)(C). The statute provides further that the proceeds of the forward auction must exceed the total of the amount the Commission must pay the successful bidders in the reverse auction, the cost of conducting the forward auction, and the estimated relocation costs the Commission must reimburse. *See* Spectrum Act §§ 6403(c)(2)(A)–(B).

[1737] Commenters agree with this interpretation. *See* Affiliates Associations Comments at 49; Belo Comments at 20-21; NAB Comments at 60.

[1738] *See* para. 612 (requiring broadcasters and MVPDs to comply with all policies and procedures relating to allocations, draw downs, payments, obligations, and expenditures of money from the Reimbursement Fund).

[1739] *See NPRM*, 27 FCC Rcd at 12470-71, para. 340.

the extent of the technical modifications involved.[1740] Because the Spectrum Act prohibits reimbursements for "lost revenues,"[1741] the FCC also sought comment on how to interpret this restriction.

621. In addition, in September 2013, the Media Bureau released a Public Notice seeking comment on a preliminary Catalog of Eligible Expenses as well as strategies to mitigate the cost of channel relocations.[1742] The Media Bureau released a subsequent Public Notice seeking comment on a revised Catalog of Potential Expenses and Estimated Costs that a contractor, Widelity, Inc., developed for the Media Bureau, and which is based on the results of Widelity's interviews with broadcast engineers, radiofrequency and structural engineers, suppliers, support companies, manufacturers, attorneys, and network engineers.[1743] The Catalog is intended to identify reimbursable costs with as much specificity as possible, provide guidance to entities seeking reimbursement, streamline the reimbursement process, and increase accountability. The creation of the Catalog is highly complex.[1744] The Media Bureau has taken significant steps in compiling a detailed and robust record to assist in this effort[1745] and will release, prior to the commencement of the reverse auction, a final Catalog of Eligible Expenses, which will include predetermined estimates or ranges for reimbursable costs.

622. *Discussion.* We cannot, at this juncture, forecast all types of reasonable expenses. The appropriate scope of "costs reasonably incurred" necessarily will have to be decided on a case-by-case basis. Moreover, as discussed above, we delegate authority to the Media Bureau to make reimbursement determinations and to finalize the Catalog of Eligible Expenses. However, we provide guidance in response to issues that were raised by commenters.[1746] We discuss our interpretation of the "costs reasonably incurred" standard and make general findings regarding whether certain categories of costs will be reimbursable. In addition, we outline the kinds of expenses that will be considered "lost revenues" and thus not eligible for reimbursement. While this discussion and a final Catalog of Eligible Expenses are intended to provide specific guidance regarding the kinds and amounts of expenses that will be reimbursed, they are not a guarantee of reimbursement for any individual expense claimed by a

[1740] *Id*.

[1741] Spectrum Act § 6403(b)(4)(C).

[1742] *See Reassignment Costs PN*, 28 FCC Rcd 13787.

[1743] *See Reassignment Costs Report PN*, 29 FCC Rcd 2989.

[1744] *See, e.g.*, Harris Broadcast Comments at 13–14 (noting that costs will depend on a range of factors including whether transmission equipment can be reused with modifications or must be replaced and the cost of modified versus new equipment); NCTA Comments at 19 (noting that cost to cable operators to continue to carry a station with a new channel assignment will depend upon numerous factors at each of the thousands of headends where broadcast stations are received including, among other things, whether stations are assigned to new channels not already carried by the cable system, or are sharing a channel already carried on the system); DIRECTV/DISH Comments at 8–9 (listing the kinds of equipment and services they argue should be reimbursed, including retuning of receive equipment, the cost of new antennas, tower crews, electricians, and any lease modifications or other facility changes to accommodate a new antenna or antenna location).

[1745] The Commission retained Widelity, Inc., as a contractor to assist in developing the Catalog of Eligible Expenses, including determination of a predetermined estimated cost or range of costs for equipment and other expenses. The contractor also identified resources that will be needed to complete the broadcast transition process, including tower crews, engineering services, and equipment vendors, and recommended strategies to ensure that available resources are used efficiently. The Media Bureau also held two workshops on the reimbursement process. *See FCC Announces Panelists for September 30, 2013 Workshop on Issues Surrounding the Reassignment of TV Stations After the Incentive Auction*, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 13805 ((2013); "FCC Announces Details for June 25, 2012 TV Broadcaster Relocation Fund Workshop," GN Docket No. 12-268, News Release, 2012 WL 1965368 (rel. June 1, 2012).

[1746] Spectrum Act §§ 6403(b)(4)(A)(i)–(ii).

broadcaster or MVPD. All claimed expenses are subject to review by the Media Bureau to ensure that each expense is reasonable.

623. *Costs Reasonably Incurred.* We interpret the Spectrum Act's mandate to reimburse "costs reasonably incurred" to require that we reimburse costs that are reasonable to provide facilities comparable to those that a broadcaster or MVPD had prior to the auction that are reasonably replaced or modified following the auction, as a result of the repacking process, in order to allow the broadcaster to operate on a new channel or to allow the MVPD to carry the signal of a broadcaster on a new channel. We will permit broadcasters and MVPDs to be compensated for both "hard" expenses, such as new equipment and tower rigging, and "soft" expenses, including legal and engineering services.[1747] We will allow reimbursement for modification or replacement of facilities on the post-auction channel consistent with the technical parameters identified in the *Channel Reassignment PN*.[1748] We reserve the right to require broadcasters to take reasonable steps to mitigate costs and share resources where possible, as such efforts may save overall Reimbursement Fund resources or contribute to more efficient use of the broadcast spectrum.[1749]

624. *Equipment Upgrades.* As a general matter, we expect stations and MVPDs to obtain the lowest-cost equipment that most closely replaces their existing equipment.[1750] We do not anticipate providing reimbursement for optional features beyond those already present. However, we also expect that some stations and MVPDs will not be able to replace older, legacy equipment with equipment that is comparable in terms of functionality and cost because of advances in technology and because manufacturers often cease supporting old equipment when newer products become available. We disagree with Sprint that entities with older, more inefficient equipment should not be reimbursed for an upgrade to equipment that meets current technical standards.[1751] If the cost to replace certain equipment is reasonably incurred as a result of the repacking process, we intend to reimburse for the cost of that equipment and recognize that this equipment necessarily may include improved functionality. We do not, however, anticipate providing reimbursement for new, optional features in equipment unless the station or MVPD documents that the feature is already present in the equipment that is being replaced.[1752] Eligible

[1747] The Media Bureau will exercise its discretion in determining the reasonableness of legal and other professional fees, as well as other transition costs.

[1748] Specifically, we will permit broadcasters to be reimbursed for eligible costs reasonably incurred in constructing transmission facilities for channels assigned in the repacking process if such facilities do not extend the coverage area by more than one percent in any direction based on the technical parameters for the channel assignment specified in the *Channel Reassignment PN*. *See* § V.C.1 (License Modification Procedures).

[1749] In the *NPRM*, the Commission sought comment on using the "Minimum Necessary Cost Standard" as it did in the 800 MHz rebanding program. *NPRM*, 27 FCC Rcd at 12470–71, para. 343. We decline to adopt this standard, which may conflict in some instances with our statutory mandate to reimburse for costs "reasonably incurred." *See* Affiliates Associations Comments at 50–51; NAB Comments at 58–59. The standard we adopt, which ties reimbursement to facilities comparable to those in use prior to the auction, will ensure that entities can continue to operate facilities post-auction that are similar to those in operation pre-auction. For example, a full power or Class A station presently using distributed transmission system (DTS) technology will be eligible for reimbursement for a DTS. A DTV DTS employs multiple synchronized transmitters spread around a station's service area, rather than a single transmitter.

[1750] *NPRM*, 27 FCC Rcd at 12471, para. 343.

[1751] *See* Sprint Comments at 15–16 (arguing that, to avoid windfalls to licensees, the Commission should reimburse only those meeting a minimum system standard and not those who intentionally have chosen not to invest in efficient technology).

[1752] For example, a station whose current antenna or other facilities contain components enabling the transmission of ATSC Mobile/Handheld signals and that reasonably incurs the cost to replace this equipment may claim reimbursement for replacement equipment with mobile capability. A station that does not have mobile capability, however, may not claim reimbursement for the cost of adding that capability in its replacement equipment.

stations and MVPDs may elect to purchase optional equipment capability or make other upgrades at their own cost, but only the cost of the equipment without optional upgrades is a reimbursable expense.

625. *Alternate Channels and Expanded Facilities*. We will reimburse costs associated with requests for an alternate channel assignment or expanded facilities for eligible stations that receive priority processing, as described below.[1753] Such stations will be able to apply for, and receive, reimbursement for eligible costs associated with constructing alternate channels or expanded facilities modifications. In the case of priority stations, such costs are "reasonably incurred . . . in order for the licensee to relocate its television service" to another channel because, absent construction of the alternate channel or expanded facility, such stations will be unable to relocate their service.[1754]

626. We will not provide additional reimbursement to other, non-priority stations that apply for an alternate channel or expanded facilities; we will reimburse these stations only for the eligible costs of relocating to the channel and facilities specified in the *Channel Reassignment PN*. In the case of non-priority stations, costs related to alternate channels or expanded facilities are not "reasonably incurred . . . in order for the licensee to relocate its television service" to another channel. Such stations will be able to continue to serve their coverage area and population served on the channel and pursuant to the technical parameters assigned in the repacking process without having to rely on an alternate channel or expanded facilities.[1755]

627. *Interim Facilities.* Stations that are assigned a new channel in the repacking process may need to use interim facilities to avoid prolonged periods off the air during the transition.[1756] Some stations currently have licensed auxiliary facilities or own backup equipment that may be used for interim operations post-auction, while others may need to purchase or rent equipment or facilities. We will treat interim facilities as a relocation expense eligible for reimbursement and will reimburse costs for such facilities that are reasonably incurred in order for a station to meet its construction deadline or to avoid

[1753] *See* § V.C.1.b (Alternate Channels and Expanded Facilities Opportunities) (explaining the possibility that some stations will be unable to construct facilities for newly assigned channels as defined by the technical parameters specified in the *Channel Reassignment PN* for reasons beyond their control).

[1754] Spectrum Act § 6403(b)(4)(A)(i). Stations that apply for priority processing will not be required to file an estimated cost form within three months after the release of the *Channel Reassignment PN*, as other stations eligible for reimbursement must do. Instead, they must file an estimated cost form within 30 days of receiving a construction permit for an alternate channel or expanded facilities, as set forth in § V.C.1.b (Alternate Channels and Expanded Facilities Opportunities).

[1755] Spectrum Act § 6403(b)(4)(A)(i). For example, non-priority stations that wish to move to an alternate channel or to construct expanded facilities may incur certain costs twice during the post-auction transition process, such as the cost of completing an engineering study or preparation of a Form 301; however, we will reimburse such duplicative costs only once. Even if they intend to apply for alternate channels or expanded facilities, these stations will be required to file an estimated cost form based on the facility specified in the *Channel Reassignment PN* three months after the release of the PN. Stations will receive up to 80 or 90 percent (depending on the type of station) of their estimated expenses. Ultimately, these stations will be required to make a showing that any costs for which they are seeking reimbursement are not greater than those they would have incurred if they had constructed the facility originally assigned. If a station can show that it would have incurred a particular cost regardless of the facility being constructed, and the Media Bureau determines that the cost is "reasonably incurred," the cost will be eligible for reimbursement.

[1756] The use of interim facilities may be appropriate in the following situations, among others: (1) a station may need an additional transmitter or antenna for interim use on either its pre- or post- auction channel; (2) a station with a top mounted antenna may need to run a side mounted antenna; (3) a station with an antenna at "X" feet on a tower may need to operate at "Y" feet temporarily; (4) a station may need to operate with an antenna mounted on a different tower while it finishes mounting final facilities on its current tower or a new tower; (5) a station may need to operate on a different channel with different facilities than its final channel or facilities; or (6) a station may need to use its auxiliary or back-up facility as its main facility while it finishes final facilities.

prolonged periods off the air while repacking changes are made.[1757] We will also reimburse for the costs to replace or modify existing interim facilities where such costs are reasonably incurred to accommodate a new channel assignment.

628. *Non-Recurring Signal Delivery Costs*. We also provide guidance on reimbursement for the cost of establishing delivery of a good quality signal to an MVPD in cases where signal delivery is affected by post-auction channel changes. Under our rules, whether an MVPD or broadcast station is responsible for the initial and ongoing cost of delivering a good quality broadcast signal to a cable headend or a satellite receive facility depends on whether the station is carried pursuant to must-carry requirements or a retransmission consent agreement. As a general matter, winning bidders are not eligible for reimbursement of their transition expenses, including any costs they incur to deliver their signal to an MVPD.[1758] However, as stated above, MVPDs will be eligible for reimbursement of their reasonably incurred costs in order to continue to carry broadcast stations that are reassigned as a result of the auction.[1759] Reimbursable MVPD expenses include the reasonable costs to set up delivery of a signal that the MVPD is required to carry under our must-carry rules or by retransmission consent contracts, regardless of whether the station is a winning bidder or is involuntarily reassigned to a new channel in the repacking process.

629. Specifically, if a station is carried pursuant to must-carry requirements, it is required to bear delivery costs and, if it is involuntarily reassigned to a new channel, will be eligible for reimbursement of any non-recurring costs to set up delivery to the cable headend or satellite receive facility that is comparable to the delivery method used prior to the transition.[1760] If an MVPD carries a station pursuant to our must-carry rules, the MVPD will be eligible for reimbursement for any non-recurring costs associated with setting up delivery of the station's signal from the headend or receive facility to its subscribers, because MVPDs may reasonably incur such costs in order to continue to carry stations relocating as a result of a winning reverse auction bid. If a station is carried pursuant to a retransmission consent agreement, the issue of which party is responsible for delivery costs likely will be governed by the relevant contract.[1761] If, under the contract, the MVPD is responsible, it will be eligible for reimbursement of the non-recurring costs to set up delivery. If, under the contract, the broadcast station is responsible for delivery costs, it will be eligible for reimbursement of the non-recurring cost to set up delivery to the headend or receive facility if it was reassigned involuntarily. Further, the MVPD will be eligible for reimbursement of any non-recurring costs associated with setting up delivery of the signal from the headend or receive facility to its subscribers.

630. *Lost Revenues*. As discussed above, the Spectrum Act prohibits reimbursement for "lost revenues."[1762] We define "lost revenues" for purposes of reimbursement to include revenues that a station or MVPD loses as a direct or ancillary result of the reverse auction or the repacking process. For example, we will not reimburse a station's loss of advertising revenues while it is off the air implementing

[1757] This includes reimbursement for costs reasonably incurred by stations that receive permission to operate, on an interim basis, on a channel relinquished by a winning reverse auction bidder. *See* § V.C.2.c (Additional Flexibility for Stations with New Channel Assignments).

[1758] *See* Spectrum Act § 6403(b)(4)(A)(i).

[1759] *See* para. 603.

[1760] *See* 47 C.F.R. § 76.60(a); *see* 47 U.S.C. § 534(h)(1)(B)(iii); 47 U.S.C. § 535(i)(1); 47 C.F.R. § 76.55(c)(3); *see also* 47 U.S.C § 338(b) (similar requirement applying to satellite carriage); 47 C.F.R. § 76.66(g).

[1761] *See Retransmission Consent and Exclusivity Rules: Report to Congress Pursuant to Section 208 of the Satellite Home Viewer Extension and Reauthorization Act of 2004*, para. 83 (rel. Sept. 8, 2005) available at: http://hraunfoss fcc.gov/edocs_public/attachmatch/DOC-260936A1.doc; *Carriage of DTV Broadcast Signals*, CS Docket No. 98-120, First Report and Order and Further Notice of Proposed Rulemaking, 16 FCC Rcd 2598, 2654, para. 105 (2001).

[1762] Spectrum Act § 6403(b)(4)(C).

a channel change resulting from the repacking process. In addition, we will not reimburse any refunds a station is required to make for payments for airtime as a result of being off the air in order to implement a channel change.[1763] Similarly, with respect to MVPDs, we will not provide reimbursement for lost advertising revenues or subscriber fees for any period of time a television station carried by the MVPD is off the air because of channel changes resulting from the reverse auction or repacking process.

d. Measures to Prevent Waste, Fraud, and Abuse

631. *Background.* We are cognizant of the need to establish strong measures to protect against waste, fraud, and abuse with respect to disbursements from the Reimbursement Fund. In addition to our general fiduciary responsibility with respect to management of public funds, mismanagement of the Reimbursement Fund could frustrate our fulfillment of the statutory reimbursement mandate.[1764] The Commission sought comment on how to prevent waste, fraud, and abuse, including how to ensure that reimbursements based on estimated costs are actually used for eligible relocation expenses.[1765]

632. *Discussion.* In addition to the delegation described above to ensure appropriate financial safeguards are applied to the Reimbursement Fund,[1766] we take several additional actions to prevent waste, fraud, and abuse with respect to the Reimbursement Fund. We adopt requirements for entities seeking reimbursement to provide a justification when their estimated costs exceed predetermined cost estimates. We also require entities to document their actual expenses and will conduct audits of, data validations for, and site visits to entities that receive disbursements from the Reimbursement Fund. In addition, to ensure transparency with respect to the Reimbursement Fund, we will make available to the public estimated and actual cost information, as well as information regarding Reimbursement Fund disbursements. These measures accommodate the need to reimburse eligible broadcasters and MVPDs promptly, to impose rigorous accountability requirements, and to ensure transparency regarding the amount of money disbursed to eligible entities.

633. *Documentation Requirements*. We establish several requirements to ensure that disbursements based on estimated costs do not exceed actual costs. As discussed above, eligible broadcasters and MVPDs will be required to submit an estimated cost form and all actual cost information in order to receive any allocations from the Reimbursement Fund. These forms will include certifications that must be made by an owner or officer of the company under penalty of perjury under 18 U.S.C. § 1001 in order to ensure that money from the Reimbursement Fund will be used only for eligible costs.

634. We also require eligible entities to submit detailed records documenting their actual costs, including all relevant invoices and receipts. The record supports requiring recipients to submit actual expense records.[1767] In addition, we require broadcasters and MVPDs to submit progress reports, on a regular basis, to show how the disbursed money has been spent and what portion of their construction is complete.[1768] Further, we adopt a document retention requirement for any entity seeking reimbursement. Although records of expenditures will have been submitted as a condition of receiving

[1763] We note that stations can plan in advance for or mitigate the effects of temporary interruptions in service by, for example, alerting advertisers beforehand, declining to accept advance payments for airtime during relevant post-auction periods, and offering make-ups after the station returns to the air in lieu of refunds of advance payments.

[1764] Spectrum Act § 6403(b)(4)(A); *id.* § 6402, adding 47 U.S.C. § 309(j)(8)(G)(iii)(I).

[1765] *See NPRM*, 27 FCC Rcd at 12473, paras. 353-354.

[1766] *See* para. 619.

[1767] Commenters generally support requiring broadcasters and MVPDs to submit records of their actual costs to guard against waste, fraud, and abuse. *See*, *e.g.*, Belo Comments at 19–20; Capitol Reply at 7; NAB Comments at 54; T-Mobile Reply at 95–96. In addition to preventing waste, fraud, and abuse, maintaining specific records can help broadcasters and MVPDs in case of a dispute with a vendor.

[1768] The Media Bureau will develop a form for progress reports, and seek public comment on these forms prior to the commencement of the reimbursement process.

reimbursement, each entity must retain all relevant documents (e.g., records documenting the type of equipment a reassigned broadcaster replaced with new equipment) for a period ending 10 years after the date it receives its final payment from the Reimbursement Fund.[1769]

635. *Audits, Data Validations, and Site Visits*. We conclude that audits, data validations, and site visits are essential tools in preventing waste, fraud, and abuse, and that use of these measures will maximize the amount of money available for reimbursement. Accordingly, the Commission, or a third-party audit firm on behalf of the Commission, may conduct audits of entities receiving disbursements from the Reimbursement Fund, and these audits may occur both during and following the three-year Reimbursement Period. Entities receiving money from the Reimbursement Fund must make available all relevant documentation upon request from the Commission or its contractor.[1770]

636. In addition to audits, we prescribe data validations, which can be a more efficient way of verifying the accuracy of a disbursement.[1771] Data validations will allow the Media Bureau to ensure quickly the validity of specific claims on an entity's cost form so as to adequately protect the Reimbursement Fund while not inhibiting an entity's construction process. The Bureau can select specific claims for validation, and then a broadcaster or MVPD will be required to provide additional documentation or explanation to verify its claim for a particular type of equipment or service before it can be reimbursed for it. The Bureau or an authorized contractor also may conduct site visits to confirm that equipment paid for from the Reimbursement Fund has been deployed.[1772] Although the statutory reimbursement period is limited to three years, we expect that the Media Bureau or a third-party auditor will continue to validate expenses after that period ends and, where appropriate, recover any money that should be returned, consistent with the Commission's obligation to recover improper payments.[1773] If any

[1769] The Commission adopted a 10-year record retention requirement for recipients of high-cost and low-income support from the federal Universal Service Fund after finding that a shorter period is inadequate for purposes of litigation under the False Claims Act, 31 U.S.C. §§ 3729-33. *See, e.g., In the Matter of Lifeline and Link Up Reform and Modernization et al.,* WC Docket No. 11-42 et al., CC Docket No. 96-45, Report and Order and Further Notice of Proposed Rulemaking, 27 FCC Rcd 6656, 6857 (2012) (*Lifeline/Link Up Order*).

[1770] While no reimbursements will be made after the Reimbursement Period, if funds are recovered after the Reimbursement Period from an entity that received payments in excess of its actual costs eligible for reimbursement, the Commission reserves the right to recover those funds and redistribute them to any eligible entity whose actual costs exceed payments received from the Reimbursement Fund, consistent with applicable law. While the Spectrum Act provides that any amounts that remain in the Reimbursement Fund after the three year statutory deadline will be transferred to the Public Safety Trust Fund, we interpret this provision to refer to amounts not disbursed from the Reimbursement Fund prior to the end of the Reimbursement Period, and not to funds (previously disbursed) that are recovered as a result of audit findings after the end of the Reimbursement Period. Spectrum Act § 6403(d)(4)(A).

[1771] The Commission has identified duplication in the Lifeline program by directing that program's administrator, the Universal Service Administrative Company (USAC), to conduct in-depth data validations in addition to audits. *See, e.g., Lifeline/Link Up Order*, 27 FCC Rcd at 6766, 6807.

[1772] We note that the National Telecommunications and Information Administration (NTIA) used site visits as an effective tool to monitor compliance with Broadband Technology Opportunities Program (BTOP) rules. *See, e.g.*, FY12 BTOP Monitoring and Assessment Plan available at http://www2 ntia.doc.gov/files/BTOPFY12MonitoringandAssessmentPlan_111611.pdf.

[1773] The Commission is obligated to recapture funds disbursed in violation of our rules pursuant to applicable rules and statutes including, but not limited to, the Improper Payments Information Act of 2002, Pub. L. No. 107-300, 116 Stat. 2350 (2002), and the Improper Payments Elimination and Recovery Act of 2010 (IPERA), Pub. L. No. 111-204, 124 Stat. 2224. The Debt Collection Improvement Act of 1996 (DCIA) governs the collection of funds owed to the United States. DCIA, Pub. L. No. 104-134, 110 Stat. 1321 (1996). *See also* Memorandum For the Heads of Executive Departments and Agencies (Mar. 22, 2010), *available at* http://www.whitehouse.gov/sites/default/files/omb/assets/a123/a123_appx-c.pdf; Memorandum For the Heads of Executive Departments and Agencies (Apr. 14, 2011), *available at* http://www.whitehouse.gov/sites/default/files/omb/memoranda/2011/m11-16.pdf.

of these investigatory measures reveals evidence of intentional fraud, the Commission will refer the matter to its Inspector General's office or to law enforcement for criminal investigation, as appropriate.

e. Service Rule Waiver in Lieu of Reimbursement

637. *Background*. Section 6403(b)(4)(B) of the Spectrum Act provides that a television licensee may, instead of being reimbursed for relocation costs, receive a waiver of the Commission's "service rules" permitting it to make "flexible use" of its spectrum in order "to provide services other than broadcast television services."[1774] Such waivers are "subject to interference protections" and "shall only remain in effect" while the licensee provides on its spectrum "at least 1 broadcast television program stream . . . at no charge to the public."[1775] Section 6403(b)(4)(B) provides the Commission discretion to grant these waivers "as it considers appropriate."[1776] The Commission sought comment on how to interpret this provision as well as the appropriate process for filing and reviewing waiver requests.[1777]

638. Several parties address issues related to the service rule waiver provision. Sinclair argues that a waiver should permit use of a broadcast transmission standard other than the Advanced Television Systems Committee's ("ATSC") digital television standard.[1778] LIN and Sinclair assert that the Commission should grant a permanent waiver to any broadcaster that requests one.[1779] In *ex parte* filings, Sinclair, Gray Television, and Young Broadcasting urge the Commission to consider adopting a broad approach to the service rule waiver provision that would permit a broadcast television licensee to apply for and receive a service rule waiver for all of its stations prior to the incentive auction regardless of whether the station is ultimately eligible for reimbursement under the Spectrum Act.[1780] In addition,

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[1774] Spectrum Act § 6403(b)(4)(B) ("In lieu of reimbursement for relocation costs under subparagraph (A), a broadcast television licensee may accept, and the Commission may grant as it considers appropriate, a waiver of the service rules of the Commission to permit the licensee, subject to interference protections, to make flexible use of the spectrum assigned to the licensee to provide services other than broadcast television services. Such waiver shall only remain in effect while the licensee provides at least 1 broadcast television program stream on such spectrum at no charge to the public.").

[1775] *Id.*

[1776] *Id.*

[1777] *See NPRM*, 27 FCC Rcd at 12471-72, paras. 347-48.

[1778] Sinclair Comments at 8–9; *see* 47 C.F.R. § 73.682(d) (requiring broadcasters to transmit signals using the ATSC digital TV standard).

[1779] Sinclair Comments at 9 (arguing that the Commission should determine that any licensee is entitled to a service rule waiver simply by requesting it); LIN Comments at 6 (arguing that the Commission should grant automatic flexible use waivers). LIN also suggests that waivers should be granted for "the remainder of that station's license term with a renewal expectancy (that can be automatically transferred with the station's license)." LIN Comments at 7; *see also* Letter of Joshua N. Pila, Senior Counsel for LIN Media, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Oct. 25, 2013) (reiterating its support for making the service rule waiver available automatically upon request for the remainder of a station's license term with a renewal expectancy).

[1780] Letter from John K. Hane, Counsel for Sinclair Broadcast Group, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Sept. 4, 2013) (Sinclair Sept. 4, 2013 *Ex Parte* Letter); Letter from Hilton H. Howell, Jr., President and Chief Executive Officer for Gray Television, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Oct. 21, 2013) (Gray TV Oct. 21, 2013 *Ex Parte* Letter); Letter from Robert Peterson, Vice President, Station Operations of Young Broadcasting, LLC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Oct. 25, 2013) (Young Broadcasting Oct. 25, 2013 *Ex Parte* Letter). Under this approach, the Commission would grant a service rule waiver both to stations that ultimately are assigned new channels in the repacking process, and to those that are not. Sinclair contends that permitting both reassigned and non-reassigned stations to receive a waiver is important from a business perspective because it provides the necessary "critical mass" that will make it practical for large station groups to implement a new broadcast transmission standard and encourage device manufacturers to provide support for the new standard. Sinclair Sept. 4, 2013 *Ex Parte* Letter at 3;

(continued….)

Sinclair, Univision, and SEI urge the Commission to relax its service rules in order to encourage greater spectral flexibility.[1781]

639. *Discussion*. We conclude that broadcasters seeking to take advantage of section 6403(b)(4)(B) may submit a request for a waiver of any of our service rules, including a request to use a transmission technology other than the ATSC standard. We agree with Sinclair that we should interpret this provision broadly in terms of the kinds of service rules we will consider waiving.[1782] This interpretation is supported by the language of section 6403(b)(4)(B), which does not make reference to any specific service rules eligible for a waiver, instead referencing them generally.

640. We delegate authority to the Media Bureau to evaluate and act on these service rule waiver requests on a case-by-case basis. We direct the Bureau to apply our general waiver standard when considering such requests.[1783] We also direct the Bureau to ensure that the applicant will protect against interference and provide at least one broadcast television program stream at no charge to the public, as required by section 6403(b)(4)(B).[1784] Delegating discretion to the Media Bureau to evaluate and act on waiver requests in accordance with these parameters is in line with the discretion afforded under section 6403(b)(4)(B) to grant waivers "as [the Commission] considers appropriate."[1785]

(Continued from previous page)
see also Gray TV Oct. 21, 2013 *Ex Parte* Letter at 2 (stating that it agrees "with Sinclair that the waivers will be of little value to anyone if they are not sought by and granted to a large number of licenses").

[1781] *See* Sinclair Reply at 6–9 (urging the Commission to use repacking as a means to support the deployment of the next generation television broadcasting standard); *see also* Univision Comments at 18-19 ("Univision encourages the Commission to initiate a separate proceeding to relax its television service rules for all licensees that continue to operate after the incentive auction, including those that choose to participate in a channel sharing arrangement and regardless of whether the licensee retains UHF spectrum or moves to a VHF channel."); SEI, Inc. Comments at 7–10 (encouraging the Commission to permit spectrum flexibility for LPTV stations). Similarly, Tribune contends that permitting greater flexibility in the use of broadcast spectrum would permit broadcasters to integrate existing broadcast facilities with wireless networks to provide greater network capacity for video services. Tribune Comments at 4–6.

[1782] *See*, *e.g.*, Sinclair Comments at 8.

[1783] The Commission's rules may be waived if good cause is shown. 47 C.F.R. § 1.3. The Commission may exercise its discretion to waive a rule where the particular facts make strict compliance inconsistent with the public interest. *See Northeast Cellular*, 897 F.2d at 1166. In addition, the Commission may take into account considerations of hardship, equity, or more effective implementation of overall policy on an individual basis. *See WAIT Radio*, 418 F.2d at 1159; *Northeast Cellular*, 897 F.2d at 1166. Waiver of the Commission's rules is appropriate only if both (i) special circumstances warrant a deviation from the general rule, and (ii) such deviation will serve the public interest. *See Northeast Cellular*, 897 F.2d at 1166. The Media Bureau should consider the applicant's agreement to forego relocation costs as one factor weighing in favor of a waiver grant.

[1784] We note that the Commission has previously provided guidance on what constitutes "broadcasting," although we do not foreclose alternative showings demonstrating compliance with the § 6403(b)(4)(B) requirement that the waiver recipient will "provide[] at least 1 broadcast television program stream on such spectrum at no charge to the public." *See* 47 U.S.C. § 153(6) (defining "broadcasting" as "the dissemination of radio communications intended to be received by the public, directly or by the intermediary of relay stations"); *In re Subscription Video*, GN Docket No. 85-305, Report and Order, 2 FCC Rcd 1001, 1006, para. 41 (1987) (finding that there are three indicia of intent that a service is not meant to be received by the public and thus does not qualify as "broadcasting" and explaining that the presence or absence of any one indicia is not necessarily determinative: (1) the service is not receivable on conventional television sets and requires the viewer use special equipment; (2) the programming is encrypted, so a viewer needs a decoder even if the service can be received with conventional equipment; and (3) the provider and the viewer are engaged in a private contractual relationship), *aff'd sub nom., Nat'l Ass'n for Better Broad. v. FCC*, 849 F.2d 665 (D.C. Cir. 1988).

[1785] Spectrum Act § 6403(b)(4)(B).

641. We decline to grant waivers solely upon request (i.e., automatically) without further analysis, as is advocated by some commenters.[1786] In evaluating a waiver request, the Media Bureau will need to determine whether the request meets our general waiver standard and complies with the statutory requirements pertaining to interference protection and the provision of one broadcast television program stream at no charge to the public. This will require a case-specific analysis of each waiver request and makes commenters' suggested "standard waiver" approach unworkable.[1787]

642. We also decline to permit stations that are not eligible for reimbursement to operate pursuant to a service rule waiver under section 6403(b)(4)(B). Section 6403(b)(4)(B) expressly limits the availability of waivers to stations that request them in lieu of reimbursement of relocation costs.[1788] Therefore, permitting a licensee to receive a service rule waiver, even if the station is not reassigned to a new channel in the repacking process, as advocated by some commenters,[1789] is both inconsistent with and outside the scope of the Spectrum Act.[1790] Accordingly, only full power and Class A stations that are assigned new channels in the repacking process, and consequently are eligible for reimbursement, will be permitted to operate pursuant to a waiver granted under section 6403(b)(4)(B).[1791]

643. The Media Bureau will accept waiver requests filed pursuant to section 6403(b)(4)(B) during a 30 day window commencing upon the date that the *Channel Reassignment PN* is released. Licensees may request that a waiver be granted on either a temporary or a permanent basis. A licensee

[1786] *See* Sinclair Comments at 9 (arguing that the Commission should determine that any licensee is entitled to a service rule waiver simply by requesting it); *see also* LIN Comments at 6 (arguing that the Commission should grant automatic flexible use waivers); Sinclair Sept. 4, 2013 *Ex Parte* Letter at 3 (asserting that any licensee in good standing should be granted a service rule waiver simply by requesting it).

[1787] *See* Sinclair Sept. 4, 2013, *Ex Parte* Letter at 3; *see also* Gray TV Oct. 21, 2013 *Ex Parte* Letter at 2 (supporting the establishment of a "standard waiver" that is available to all stations and is not conditioned on whether a station is eligible for reimbursement or reassigned a new channel in the repacking process).

[1788] Section 6403(b)(4)(B) of the Spectrum Act specifies that a waiver is available "[i]n lieu of reimbursement for costs under subparagraph (A)," thus indicating that full power and Class A stations that are ineligible for reimbursement are not eligible for a waiver under § 6403(b)(4)(B). As discussed in this Order and under the plain reading of the Spectrum Act, only full power and Class A television stations assigned new channels in the repacking process, pursuant to § 6403(b)(1)(B)(i), are eligible for reimbursement under § 6403(b)(4)(A). *See* § V.C.5.a (Television Station Licensees and MVPDs Eligible for Reimbursement).

[1789] *See* Sinclair Sept. 4, 2013 *Ex Parte* Letter at 4 (arguing that any licensee that requests a service rule waiver and commits to forgoing reimbursement should be entitled to a waiver regardless of whether the station is reassigned to a new channel in the repacking process); Young Broadcasting Oct. 25, 2013 *Ex Parte* Letter at 3 (supporting the grant of service rule waivers to stations that are not reassigned to a new channel in the repacking process so long as those stations request a waiver prior to the reverse auction).

[1790] Our decision, however, does not foreclose broadcasters from seeking waiver of our rules for stations that are not assigned new channels in the repacking process under our general waiver authority. *See* 47 C.F.R. § 1.3. For example, we note that the Media Bureau has granted requests by several broadcast television licensees for authority to operate experimental digital facilities in order to evaluate the performance of non-ATSC transmission standards. *See* Letter from Barbara Kreisman, Chief, Video Division, FCC to New York Spectrum Holding Company, LLC, dated June 20, 2013, Request To Operate an Experimental Facility, File No. BPEXLD-20130313ADO. This experimental facility will use Converged Mobile Multimedia Broadcasting (CMMB) technology, which proponents hope will expand mobile video and data delivery in a spectrum-efficient manner. Nothing in this Order is intended to modify the scope of these experimental authorizations or exclude these licensees, if otherwise eligible, from seeking a waiver under § 6403(b)(4)(B).

[1791] A full power or Class A station in a channel sharing arrangement may apply for a waiver under § 6403(b)(4)(B) in cases where the sharer station has been assigned a new channel in the repacking process and is therefore eligible for reimbursement. We adopt our proposal in the *NPRM* to require each licensee that is subject to a channel sharing arrangement and operates pursuant to a service rule waiver under § 6403(b)(4)(B) to provide one broadcast television program stream at no charge to the public. *NPRM*, 27 FCC Rcd at 12472, para. 347 n.525.

will have 10 days following the grant of a waiver by the Media Bureau to notify the Media Bureau whether it accepts the terms of the waiver.

644. As proposed in the *NPRM*, a licensee that is granted and accepts the terms of a waiver under section 6403(b)(4)(B) will not qualify for reimbursement, regardless of the duration of the waiver.[1792] However, licensees are required to meet all requirements for obtaining reimbursement established by the Commission, such as filing a timely estimated cost form, until they are granted and accept the terms of their waiver.[1793] Furthermore, unless otherwise instructed by the Media Bureau, licensees that are granted and accept the terms of a waiver under section 6403(b)(4)(B) or licensees with a pending waiver application must comply with all filing and notification requirements, construction schedules, and other post-auction transition deadlines, established in this Order.[1794]

f. Other Reimbursement Issues

645. In this Section, we address the $1.75 billion statutory limit on reimbursements. We also address several methods of potentially reducing channel reassignment-related costs. Cost mitigation is critically important to ensure that the money in the Reimbursement Fund is used efficiently.

646. *Reimbursement Limit*. We disagree with commenters who argue that the $1.75 billion Reimbursement Fund serves as a limit on our repacking authority.[1795] While our goal in administering the Reimbursement Fund will be to reimburse all eligible costs reasonably incurred, the statute on its face does not condition the Commission's repacking authority on our ability to do so. Rather, section 6403(b)(4)(A) requires only that the Commission "reimburse costs reasonably incurred" by eligible broadcasters and MVPDs "from amounts available" in the Fund.[1796] By contrast, Congress authorized reimbursement of the relocation costs of channel 37 incumbent users "provided that all such users can be relocated and that the total relocation costs of such users do not exceed $300,000,000."[1797] Congress's

[1792] *Id.* at n.526. Once a licensee accepts the terms of its waiver under § 6403(b)(4)(B), a licensee will not later become eligible for reimbursement if its waiver no longer is effective because, for example, it expires, it is canceled for failure to comply with any terms or conditions of waiver, or the licensee voluntarily chooses to broadcast in accordance with current Commission rules.

[1793] *See* § V.C.5.b (Reimbursement Process) (establishing requirements for obtaining reimbursement in accordance with § 6403(b)(4)(A) of the Spectrum Act). Compliance with such reimbursement-related requirements is necessary to ensure timely reimbursement in the event a station's waiver request is denied or the station declines to accept the terms of a waiver grant. If a waiver request is granted and the station accepts the terms of the grant, the station will no longer be subject to reimbursement-related requirements.

[1794] *See* § V.C.1-4 (License Modification Procedures; Construction Schedules and Deadlines; Consumer Education; Notice to MVPDs) (adopting filing requirements, notification obligations, and deadlines for completing construction the post-auction transition).

[1795] The main argument advanced by broadcasters is that the $1.75 billion Reimbursement Fund effectively limits the number of television stations that can be reassigned to new channels in the repacking process because Congress mandated that broadcasters be held harmless in the repacking process. *See, e.g.*, Affiliates Associations Comments at 46-47; Affiliates Associations Reply at 13–14; Belo Comments at 19; NAB Comments at 49. *See also* ION Reply at 4-5. We address and reject broadcasters' "hold harmless" interpretation of the Spectrum Act in § III.B.2. *See* paras. 123, 137 n.454. Congress required only "all reasonable efforts" to preserve broadcasters' coverage areas and populations served; it did not require the Commission to ignore the other objectives in the Spectrum Act. Likewise, for the reasons discussed below, we do not interpret the reimbursement mandate to elevate full reimbursement of broadcasters' relocation costs above other statutory goals.

[1796] Spectrum Act § 6403(b)(4)(A).

[1797] *Id.* § 6403(c)(2)(A).

determination not to similarly tie reimbursement of broadcaster relocation costs to the total amount of those costs[1798] supports our reading of section 6403(b)(4)(A).[1799]

647. We also reject assertions that the reverse auction will not be "voluntary" within the meaning of the statute if broadcasters might incur out-of-pocket relocation costs.[1800] As directed by the Spectrum Act, incentive auction participation for broadcasters will be "voluntary." [1801] However, the Spectrum Act also grants the Commission broad authority to reorganize the broadcast television spectrum in order to carry out the incentive auction, subject to the "all reasonable efforts" mandate.[1802] Participation *in repacking* is not voluntary; to the contrary, the Spectrum Act expressly precludes broadcasters from exercising rights that would otherwise be available to them under section 316 to "protest" license modifications made pursuant to section 6403(b).[1803] As discussed above, we do not interpret the Spectrum Act to insulate broadcasters from any and all uncertainty in the repacking process in derogation of the statute's other objectives.[1804] Likewise, we do not interpret the statute to require the Commission to insulate broadcasters from the mere possibility of out-of-pocket expenses in order to ensure that their choice of whether or not to participate *in the reverse auction* is voluntary. Nor is there any evidence in the record to suggest that such a possibility would have a coercive effect.

648. We also conclude that conditioning the closing of the auction on the sufficiency of the Reimbursement Fund to cover all reimbursable relocation costs or delaying the closing of the auction until the Fund is determined to be sufficient to cover all such costs[1805] would jeopardize the other objectives in the Spectrum Act. As set forth above, the repacking approach we adopt provides speed and certainty by finalizing the channel assignment for each station that will remain on the air only *after* the final stage rule is satisfied and bidding stops (but before the incentive auction concludes). [1806] By imposing another constraint on repacking that is not authorized by the statute, NAB's proposed "hold-harmless" policy would impinge on the speed and certainty required for successful implementation of the incentive auction and would prevent an efficient final channel assignment scheme.[1807] In addition,

[1798] Congress explicitly placed other financial conditions on the Commission in the Spectrum Act as well, such as establishing a minimum proceeds requirement for the forward auction. *See* Spectrum Act § 6403(c)(2)(A). Congress did not, however, require that that the forward auction proceeds be sufficient to cover the total relocation costs that might be eligible for reimbursement. On the contrary, it required that such proceeds be sufficient to cover, *inter alia*, "the estimated costs for which the Commission is required to make reimbursements under subsection (b)(4)(A)." Spectrum Act § 6403(c)(2)(B)(iii).

[1799] *See, e.g., Wolverine Power Co. v. FERC*, 963 F.2d 446, 451 (D.C.Cir. 2010) ("Congress knew how to draft an enforcement provision applicable to a 'licensee' but not a 'person.' Accordingly, we believe that, in enacting section 31(c), Congress meant what it said."). As noted below, however, we have no reason to believe that $1.75 billion will be insufficient to cover broadcasters' total relocation costs. *See* para. 650. We will seek to minimize repacking costs, and stay within the $1.75 billion Congress provided, by optimizing channel assignments at the conclusion of the auction. *See* para. 648, 650.

[1800] *See* NAB Reply at 39; Letter from Rick Kaplan, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Attachment at 4-5 (filed Apr. 23, 2014).

[1801] *See* Spectrum Act § 6403(a).

[1802] *See generally* Spectrum Act § 6403.

[1803] *See* Spectrum Act § 6403(h).

[1804] *See* n.454 and accompanying text.

[1805] Harris Broadcast suggests that the FCC delay the closing of the forward auction until it solicits estimates from broadcasters and determines whether the Reimbursement Fund will cover all relocation costs. If the estimated costs exceed $1.75 billion, Harris Broadcast suggests that the Commission seek additional funding from Congress or retroactively alter its repacking methodology to reduce relocation costs. Harris Broadcast Comments at 18–19.

[1806] *See* paras. 113-18.

[1807] *See* paras. 111.

contrary to some commenters' arguments, we cannot provide additional funding in order to guarantee that all broadcasters are fully reimbursed.[1808] Section 6402 of the Spectrum Act expressly provides for a deposit of no more than $1.75 billion into the Reimbursement Fund.[1809] Providing additional funding would be contrary to the express language of the Spectrum Act.

649. In addition, it will not be possible for the Commission to estimate the precise amount of relocation costs until all eligible broadcasters and MVPDs submit their individual estimates three months after the Channel Reassignment PN is issued. Before that, we will not know which reassigned stations will have to replace equipment rather than reusing it, or to what extent MVPDs will incur expenses associated with fulfilling the carriage rights of reassigned broadcasters. Nor will there be any basis to estimate the number of stations that will forego cost reimbursement by taking advantage of the flexible use waiver option under § 6403(b)(4)(B) of the Spectrum Act.

650. We emphasize that we have no reason, at this time, to believe that the Fund will be insufficient to cover all eligible relocation costs. Moreover, we plan to take appropriate measures to disburse funds from the Reimbursement Fund as fairly and efficiently as possible.[1810] As indicated above, after the final stage rule is satisfied and the bidding stops, we intend to optimize the final broadcast channel assignments to minimize relocation costs.[1811] We also note that reassigned broadcasters will have the opportunity, post-optimization, to seek an alternate channel in the interest of minimizing relocation costs.[1812] We have discussed at length above the various measures we adopt to ensure that the Reimbursement Fund is used as efficiently as possible, and we address below cost mitigation measures that also may help to reduce demands on the Reimbursement Fund. If future developments suggest that $1.75 billion will be insufficient to cover all eligible costs, the Commission delegates authority to the Media Bureau to develop a prioritization scheme for reimbursement claims.

651. *Equipment Repurposing.* In the *NPRM*, the Commission sought comment on methods to encourage broadcasters to make use of equipment that is no longer needed by a reassigned or channel sharing licensee.[1813] All entities seeking reimbursement from the Reimbursement Fund should reuse their own equipment, to the extent possible, rather than obtaining new equipment paid for by the Reimbursement Fund. To the extent eligible broadcasters and MVPDs seek reimbursement for new equipment, they must provide a justification when submitting their estimated cost form as to why it is reasonable under the circumstances to purchase new equipment rather than modify their corresponding current equipment in order to change channels or to continue to carry the signal of a broadcaster that changes channels.[1814] We also encourage winning reverse auction bidders to repurpose their equipment to

[1808] *See*, *e.g.*, Affiliates Associations Comments at iii; NAB Comments at 49; Belo Comments at 19; n.1807.

[1809] *See* Spectrum Act § 6402, adding 47 U.S.C. § 309(j)(8)(G)(iii).

[1810] We note that although the broadcast industry expresses concern that $1.75 billion will be insufficient, other commenters argue that this amount will be more than enough to reimburse eligible entities. *Compare* APTS/CPB Comments at 29, n.75; Affiliates Associations Comments at 47; Testimony of Jay Adrick, Vice President of Broadcast Technology at Harris Corporation, Broadcaster Relocation Fund Workshop (June 25, 2012) *with* U.S. Cellular Comments at 8–9; AT&T Reply at 65.

[1811] We are cognizant that the expenses associated with channel reassignments will vary widely. *See Reassignment Costs Report PN*.

[1812] *See* § V.C.1.b (Alternate Channel and Expanded Facilities Opportunities), para. 553 (recognizing that, in some cases, a broadcaster may determine that a different channel will be more desirable or will make the transition process simpler and less costly.)

[1813] *See NPRM*, 27 FCC Rcd at 12471, para. 346.

[1814] In light of the limited amount of money available for reimbursement of relocation costs from the Reimbursement Fund, we will be reluctant to reimburse for the cost of new equipment when a broadcaster or MVPD could modify its corresponding current equipment. We will assess the justification provided with the estimated cost form to determine whether the cost of new equipment is reasonably incurred under the circumstances.

the extent possible. In addition, we encourage reassigned broadcasters to seek out previously used equipment no longer needed by other stations, and to make any equipment that is no longer needed available for use by another entity.

652. Unlike the DTV transition, in which there was little demand for used analog equipment, following the incentive auction broadcasters could obtain used digital equipment, either on the secondary market or through an equipment swap, which is significantly less expensive than new equipment. In addition to cost savings, repurposing equipment could help address any potential equipment shortages.[1815] A reassigned broadcaster that cannot retune its transmitter to accommodate its new channel position may be able, for example, to sell the transmitter directly to another broadcaster or to an entity that purchases used equipment for resale. A broadcaster also may be able to purchase a previously used transmitter that works on its newly assigned channel. In addition, broadcasters in the same geographic region may consider swapping equipment that is no longer needed or usable on their newly assigned channels. We recognize that there may be significant costs associated with transporting used equipment and that cost savings may be achievable only if appropriate used equipment is available locally. We encourage broadcasters and MVPDs that cannot sell or swap unneeded equipment to consider donating it to an educational institution or other charitable organization.[1816] We decline to require licensees to return key components of their old equipment to a central repository for verification to prevent waste, fraud, and abuse.[1817] As described above,[1818] we will use site visits to validate that entities that received reimbursement for purchasing new equipment actually have deployed that new equipment.[1819]

653. *Equipment Sharing.* We encourage broadcasters to consider ways in which they may save expenses by sharing equipment. For example, it may be possible for broadcasters to share an antenna or other facilities in a manner that reduces the participating stations' overall relocation costs or contributes to more efficient use of the broadcast spectrum. In particular, we encourage broadcasters to consider whether joint use of a broadband antenna would be possible and would represent an overall cost savings as compared to the purchase of separate antennas for each of the participating stations.

654. *Bulk Purchasing*. At this time, we decline to arrange for the bulk purchase of equipment or services or to oversee any such effort.[1820] The record does not provide clear information regarding whether bulk purchasing would provide substantial benefits, in part because certain equipment, such as antennas, must be specialized for particular channels, locations, and coverage areas and because many broadcasters have existing relationships with equipment vendors.[1821] It may be useful for broadcasters

[1815] *See, e.g.*, APTS/CPB Comments at 25 (ability to obtain custom equipment to achieve repacking is limited); Harris Broadcast Comments at 12 (noting that there currently are only two major antenna manufacturers).

[1816] We encourage stations and MVPDs to dispose of any equipment that they cannot sell, swap, or donate in a manner consistent with applicable laws regarding recycling and disposal of electronic equipment.

[1817] *See* Sprint Comments at 16.

[1818] *See* § V.C.5.d (Measures to Prevent Waste, Fraud, and Abuse).

[1819] Sprint also suggests that the Commission could contract with a third-party warehouse to dispose of the equipment either through recycling or sales. Sprint Comments at 16. Private market solutions either exist or may emerge to facilitate the resale and disposal of used broadcast equipment without intervention from the Commission.

[1820] In the *NPRM*, the Commission sought comment on whether to explore bulk purchasing opportunities or bulk services arrangements that could reduce the relocation costs of television stations. *See NPRM*, 27 FCC Rcd at 12471, para. 346.

[1821] Sprint states that it does not believe there will be any substantial benefit from entering into bulk purchase agreements. According to Sprint, in the BAS relocation such efforts were necessary to provide assurance to equipment manufacturers that they would be reimbursed for the large quantities of raw materials needed to seed production lines, but these concerns are not present in this situation as costs will be covered by the Reimbursement Fund. Sprint also warns that bulk purchasing associated with the BAS relocation was complicated. *See* Sprint Comments at 15.

and MVPDs to consider whether these kinds of arrangements could generate cost savings and result in more efficient use of the $1.75 billion Reimbursement Fund.

D. Transition Procedures for Other Services and Unlicensed Operations

655. As described above, all full power and Class A television stations must cease operations in the spectrum repurposed for the 600 MHz Band no later than 39 months from issuance of the *Channel Reassignment PN* (i.e., by the end of the Post-Auction Transition Period).[1822] We expect new 600 MHz wireless licensees to commence offering services at varying times before and after that 39-month deadline, depending on when the spectrum becomes available, their respective business plans, and other factors. Meanwhile, the other users of the current UHF television band—LPTV, BAS, TVWS devices, and licensed and unlicensed wireless microphone users—may continue to use the UHF band for a period of time during its reorganization under certain conditions. The public interest is best served by establishing a UHF band transition process that promotes ready access to the repurposed spectrum by 600 MHz Band wireless licensees when and where they need it, while at the same time providing for an orderly transition process for secondary and unlicensed users that currently are serving various important consumer needs using this spectrum. We discuss below the processes by which LPTV and TV translator, BAS, LPAS, and unlicensed services and operations will transition out of the repurposed spectrum.[1823]

1. LPTV and TV Translator Stations

656. *Background*. As explained above, the facilities of LPTV and TV translator stations, including digital replacement translators ("DRTs"), will not be protected in the repacking process.[1824] As a result of the incentive auction and the repacking process, some LPTV and TV translator stations are likely to be displaced.[1825] Recognizing the important services that such stations provide to their communities, the Commission sought comment in the *NPRM* on measures to help ensure that the programming on displaced stations continues to reach viewers.[1826] Among other proposals, the Commission invited comment on whether to open a filing window allowing displaced LPTV and TV translator stations to submit displacement applications after the repacking process becomes effective. The Commission also sought comment on whether and how to avoid mutual exclusivity among displacement applications.[1827]

657. *Discussion*. The record in this proceeding demonstrates the important services provided by, and the continued need for, LPTV[1828] and TV translator stations.[1829] The record also demonstrates the

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[1822] *See* § V.C.2 (Construction Schedule and Deadlines).

[1823] We address below the question of whether these secondary services and unlicensed operations may operate in the portion of the reallocated spectrum that constitutes the various guard bands (including the duplex gap).

[1824] *See* § III.B.3.d (Facilities That Will Not Receive Discretionary Protection). These stations have secondary interference protection to all primary users. Accordingly, full power and Class A stations may be assigned new channels that, once constructed and operating, will interfere with existing LPTV and TV translator facilities. Similarly, LPTV and TV translator stations may receive interference from a new licensee when it begins operating on licensed spectrum obtained through the auction. Where such interference exists, or where an existing LPTV or TV translator station would cause interference to a primary status licensee, the LPTV or TV translator station will have to relocate to a new channel that does not cause interference, or discontinue operations.

[1825] *See NPRM*, 27 FCC Rcd at 12475, para. 358.

[1826] *See id.* at para. 359.

[1827] *See id.* at 12476–77, paras. 360–61.

[1828] *See*, *e.g.*, ATBA Comments at 1–2 (noting that "approximately eleven million Americans continue to rely solely on free over-the-air broadcast television stations, including low-power stations, for news, local information and entertainment"); DTVAmerica Comments at 1–2 (noting that, according to NAB statistics, "there is an estimated 30 million U.S. consumers that rely solely on free over-the-air broadcast television station[s], which would include LPTV stations and translators, for news, local information and entertainment"); Entravision Comments at 15 ("OTA (continued….)

potential for a significant number of LPTV and TV translator stations to be displaced as a result of the auction and repacking process.[1830] As described in more detail below, we adopt several measures to help preserve these local television services and to ensure that the important programming they provide continues to reach viewers. Specifically, after primary stations relocating to new channels have submitted their construction permit applications and have had an opportunity to request alternate channels or expanded facilities, the Media Bureau will open a special filing window to offer operating LPTV and TV translator stations, including DRTs, that are displaced an opportunity to select a new channel. We also modify our rules to allow stations with mutually exclusive displacement applications to reach a settlement or an engineering solution.[1831] We establish a priority for displaced DRTs in the event that a DRT licensee files a mutually exclusive displacement application that cannot be resolved. We also intend to initiate a rulemaking proceeding shortly after the release of this Order to consider additional means to mitigate the potential impact of the auction and repacking process on low power stations ("LPTV/TV Translator Proceeding").[1832] Further, LPTV and TV translator stations may continue operating in the spectrum repurposed for use by new 600 MHz Band licensees unless and until they are notified of displacement pursuant to the procedures set forth below.

658. In addition, we adopt rules governing the processes by which new 600 MHz Band licensees must notify LPTV and TV translator stations that they will be displaced and by which these stations must vacate displaced channels. Finally, we discuss the notification process for LPTV stations to cease operations in the 600 MHz Band guard band spectrum.

659. *Displacement Process*. We modify our displacement rules with respect to operating LPTV and TV translator stations that are displaced as a result of the incentive auction or the repacking process.[1833] We agree with commenters that doing so may enable displaced stations to continue

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Spanish-language programming via LPTV Stations has become an increasingly important avenue for providing specialty programming to often underserved audiences"); ICN Comments at 2 ("the Commission must recognize the importance in the communications world of LPTV service to local communities by minority, independently-owned operators"); Block Stations Comments at 6–7 ("in markets with few full-power television stations, low-power stations often provide the only in-market network affiliate programming or other important local service"); LIN Comments at 9 ("lower power stations provide emergency information, news, and entertainment, often to rural and underserved areas"); NRB Comments at 3 ("it is hard to imagine any broadcasting entity that is closer to the community, or that meets more of the truly 'local' needs of its broadcast market than LPTV stations"); SEI Comments at 3 (LPTV "is often the only economically feasible video programming outlet for small communities that cannot economically support a full power station").

[1829] *See* PTV Comments at 10 ("CPB-Qualified Stations rely on hundreds of translators operating in remote, rural areas to provide viewers in these areas television programming, to transmit emergency alerts, and to provide other important informational and programming services"); NYSBA Comments at 16 ("stations in the upstate area [of New York] rely on translators to reach viewers whose reception of their signals is blocked by terrain or are beyond the reach of their primary signal").

[1830] *See* ATBA Comments at 2 (arguing that "to implement an incentive auction, particularly without strong safeguards to protect LPTV stations in the repacking process, puts this local LPTV service that millions of viewers depend on at risk"); PTV Comments at 10 (arguing that "viewers who receive these signals for free over-the-air would be left in the dark if translator service is lost due to repacking"); Leadership Conference Comments at 4 (arguing that "a number of low power stations owned by women or people of color could be put in jeopardy during the eventual repacking"); NYSBA Comments at 16–17 (arguing that the "Commission should carefully evaluate the role that particular translators play before adopting a repacking plan that would preclude their existence").

[1831] *See* Appendix A (revising 47 C.F.R. § 73.3700 by, among other things, adding § 73.3700(g)(3)).

[1832] As discussed above, the Commission may consider modifying the rules governing the DRT service to create a new "digital to digital" replacement translator service in a future rulemaking proceeding. *See* § III.B.3.d (Facilities That Will Not Receive Discretionary Protection).

[1833] The Commission also modified its displacement rules in the context of the DTV transition. *See DTV MO&O on Recon of 6th R&O*, 13 FCC Rcd at 7465–66, para. 116. All of the requirements of our current displacement rules (continued….)

operating.[1834] After the release of the *Channel Reassignment PN* and after eligible full power and Class A television stations have an opportunity to file construction permit applications for their new facilities, including an alternate channel or an expanded facility,[1835] the Media Bureau will announce a limited window for operating LPTV and TV translator stations to submit displacement applications.[1836] This filing window will be open only to operating stations that (1) are displaced by a full power or Class A television station as a result of the incentive auction or the repacking process, (2) will cause interference to or receive interference from frequencies repurposed for new, flexible use by a 600 MHz Band wireless licensee, or (3) are licensed on frequencies that will serve as part of the 600 MHz Band guard bands.[1837] We delegate authority to the Media Bureau to announce the terms of the limited displacement window consistent with the approach outlined above.[1838]

660. We disagree with NTA that the Commission should allow displacement relief applications to be filed at any time without requiring stations to wait for a window.[1839] NTA opposes the use of filing windows, claiming that "they tend to multiply conflicting application cases."[1840] Accepting displacement applications during a limited window will ensure that all affected stations are given an equal opportunity to obtain a new channel and will avoid the "race to the courthouse" that occurs with first-come, first-served filing opportunities. Further, because the Commission typically receives a large number of conflicting applications on the first day of first-come, first-served processing, we disagree with NTA that such an approach would avoid the possibility of multiple conflicting applications.

661. Under our existing rules, mutually exclusive applications (i.e., those that cannot be granted without causing interference to each other) generally are resolved through an auction.[1841] In this case, the public interest would be served by allowing LPTV and TV translator stations with mutually

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will continue to apply (e.g., required interference showing and limits on transmitter moves), except for the requirement that displacement applications be submitted only after the primary station obtains a construction permit or license. *See* 47 C.F.R. §§ 73.3572(a)(4) and 74.787(a)(4).

[1834] *See, e.g.*, Entravision Comments at 15–16; SEI Comments at 10–11.

[1835] The *Channel Reassignment PN* will announce the new channel assignments for full power and Class A stations resulting from the incentive auction and the repacking process.

[1836] *See* § V.C.1 (License Modification Procedures). Displaced stations may apply only for a channel that remains allocated to broadcast television service and is not repurposed for new, flexible uses or reserved as guard bands. When requesting a new channel in a displacement application, LPTV and TV translator stations will be required to demonstrate that they would not cause interference to the predicted service of full power or Class A stations on: (1) existing channels assigned to full power and Class A stations; (2) new channels assigned to full power and Class A stations pursuant to the *Channel Reassignment PN*; and (3) alternative channels and expanded facilities proposed by such stations during the applicable filing window.

[1837] All displacement applications submitted during the window will be considered filed on the last day of the window and will be processed in accordance with our existing rules. *See* 47 C.F.R. §§ 73.3572(a)(4) and 74.787(a)(4).

[1838] We note that digital LPTV and TV translator stations filing displacement applications may propose a change in transmitter site of not more than 30 miles (48 kilometers) from the reference coordinates of the existing station's community of license, provided in § 76.53 of the rules. *See* 47 C.F.R. §§ 76.53 (reference points list), 74.787(a)(4) (digital displacement); *see also* 47 C.F.R. § 73.3572(a)(4)(i) (analog displacement).

[1839] NTA Comments at 10–11.

[1840] *Id.* at 11.

[1841] Consistent with § 309(j) of the Communications Act, our rules require resolution of mutual exclusivity through competitive bidding. *See* 47 C.F.R. § 73.5000, *et seq.* The Communications Act, however, provides that the Commission shall use engineering solutions, negotiation, threshold qualifications, and other means to avoid mutual exclusivity where the Commission determines that doing so would serve the public interest. *See* 47 U.S.C. § 309(j)(6)(E).

exclusive displacement applications to explore engineering solutions or agree on a settlement to resolve the mutual exclusivity.[1842] This approach will expedite the displacement process and prevent processing delays that could result in stations having to go silent.[1843] Should no resolution of mutually exclusive applications occur through an engineering solution or settlement, we will grant a selection priority to the licensees of any displaced DRTs. This means that the DRT displacement application will be processed first and, if granted, will result in the dismissal of all pending displacement applications that are mutually exclusive with it. DRTs are used to fill in loss areas in the pre-DTV transition analog service areas of full power television stations that could not otherwise be replicated with post-transition digital facilities.[1844] We conclude that DRT displacement applications should be given priority over mutually exclusive displacement applications filed for LPTV and other TV translator stations in order to help preserve the existing services of full power stations.[1845] Should two or more stations remain mutually exclusive after the application of the selection priority, we will use an auction as a last resort to resolve remaining displacement groups.

662. We reject PTV's proposal to grant a selection priority to the displacement applications filed by TV translator stations that are operating on an NCE basis and are eligible to receive a community service grant from the Corporation for Public Broadcasting ("CPB-Qualified Stations").[1846] PTV argues that such a priority is appropriate in light of "CPB-Qualified stations' unique mission of public service and the strong preference of Congress to promote the nation's public television system."[1847] Many LPTV stations and other TV translator stations also have important public service missions, and PTV does not provide any evidence that Congress intended for CPB-Qualified TV translators to receive preferential treatment over other low power stations. Further, stations are permitted to change their designation from "low power television" to "translator" without prior Commission approval; thus, stations could change their designation to gain the selection priority if we granted the proposal.

[1842] Globe supports a limited settlement opportunity. *See* Globe Comments at 8. We delegate authority to the Media Bureau to announce the terms of the engineering solution or settlement opportunity that will be provided to mutually exclusive displacement applications filed by LPTV or TV translator stations as a result of the auction or repacking process, consistent with our existing rules, including the monetary limits on settlement payments and reporting requirements. *See* 47 C.F.R. § 73.3525. *See also* Globe Comments at 8 (arguing that "monetary payments shall be limited to an applicant's reasonable and prudent expenses").

[1843] The Commission previously has found engineering solutions and settlement opportunities to be successful tools for reducing the number of mutually exclusive LPTV and TV translator applications, including displacement applications, because of the operating characteristics of these stations and the fact that they are not allotted channels using a Table of Allotments. *See Notice of Receipt of Settlement Agreements and Removal of Applications From Closed Broadcast Auction*, Public Notice, Report No. 24557A (rel. Aug. 25, 1999); *Auction 81 Final Settlement Window Announced*, Public Notice, 18 FCC Rcd 25141 (2003); *Auction 85 Announcement of Settlement Period Ending July 31, 2008*, Public Notice, 23 FCC Rcd 10819 (2008).

[1844] *See DRT R&O*, 24 FCC Rcd at 5938, para. 14 ("[T]he Commission's priority is to expeditiously assist full-service stations to maintain their analog service areas through the digital transition. Furthermore, the goal of this new service is digital replication of full-power analog television service areas, not their expansion.").

[1845] *See id.* at 5937, para. 13 (noting that "replacement digital television translator applicants will be full-service stations seeking to duplicate their pre-transition analog service areas, thereby serving an important public policy goal"). Such a priority is consistent with our current rules, which establish a processing priority for new DRTs over applications filed by LPTV and non-DRT TV translator stations, even if the latter are filed first. *See* 47 C.F.R. § 74.787(a)(5)(i); *DRT R&O*, 24 FCC Rcd at 5934, para. 6, and 5936, para. 11. Under the rules, a new DRT has co-equal priority with LPTV and non-DRT TV translator displacement applications; the Commission has never previously addressed the priority of displaced DRTs relative to displaced LPTVs and non-DRT TV translator stations.

[1846] PTV Comments at 14; PTV Reply at 8–9.

[1847] PTV Comments at 14.

663. In addition, we decline to adopt the particular selection priorities proposed in the *NPRM* for to displacement applications.[1848] Commenters that support this proposal advocate prioritizing applications from stations that provide network service to their community or other types of programming content.[1849] The Commission's longstanding policy has been to avoid involvement in the format and other content choices of licensees based on First Amendment concerns, and we conclude that adoption of these proposals would be inconsistent with that policy.[1850]

664. *LPTV/TV Translator Proceeding*. We intend to initiate the LPTV/TV Translator Proceeding shortly after the release of this Order to consider additional measures that may help alleviate the consequences of LPTV and TV translator station displacements resulting from the incentive auction and the repacking process, and we intend to issue an order in this proceeding prior to the commencement of the auction. First, the LPTV/TV Translator Proceeding will consider whether to modify the current September 1, 2015 deadline for LPTV stations to convert to digital service.[1851] The LPTV Spectrum Rights Coalition claims that many LPTV stations that are displaced may have to "double-build" digital facilities within a short period of time in order to both comply with the deadline for LPTV stations to convert to digital service and to relocate to new channels if displaced.[1852] The Commission recently reaffirmed the September 1, 2015 LPTV digital transition deadline.[1853] However, to address the concerns raised by the LPTV Spectrum Rights Coalition, we will consider whether to modify the deadline, based on the timing of the incentive auction and any other relevant factors.

665. Second, the LPTV/TV Translator Proceeding will consider whether to permit LPTV and TV translator stations to participate in channel sharing arrangements after the conclusion of the reverse auction.[1854] A number of commenters support extending the opportunity to channel share to these stations.[1855] We recognize the potential benefits of allowing LPTV and TV translator stations to explore

[1848] *NPRM*, 27 FCC Rcd at 12476, para. 361.

[1849] *See, e.g.*, LPTV Spectrum Aug. 27, 2013 *Ex Parte* at 5 (supporting "displacement filing priorities for stations which air civic content (government or education channels), stations which are Primary EAS providers for their communities, and those providing local news rather than just a national network feed"); Gray TV Comments at 8; AIC Reply at 5; Globe Comments at 8.

[1850] *See*, *e.g.*, *FCC v. WNCN Listener's Guild*, 450 U.S. 582 (1981). We note that neither the *NPRM* proposal nor our decision here implicates the Commission's policies promoting the "fair distribution" of broadcast stations, including allotment priorities for first or second "local" service, which do not apply to LPTV and TV translator stations. *Implementation of Section 309(j) of the Communications Act – Competitive Bidding for Commercial Broadcast and Instructional Television Fixed Service Licenses*, First Report and Order, 13 FCC Rcd 15920, ¶ 115 n.109 (1998) ("LPTV and television . . . translator stations are not required to meet basic full-service station requirements, *i.e.* provide responsive programming or maintain a presence in the community, cover the community with an adequate strength signal, etc. Although LPTV and translator stations are licensed to specific communities, the Commission has concluded that Section 307(b) issues are not relevant in the context of these secondary services.") (citing *Low Power Television and Television Translator Service,* 2 FCC Rcd 1278, 1281 (1987)); *see* 47 U.S.C. § 307(b) ("fair, efficient, and equitable distribution of radio service").

[1851] *LPTV DTV Second R&O*, 26 FCC Rcd at 10733, para. 2; *see also Amendment of Parts 73 and 74 of the Commission's Rules to Establish Rules for Digital Low Power Television, Television Translator, and Television Booster Stations and to Amend Rules for Digital Class A Television Stations*, MB Docket No. 03-185, Second Memorandum Opinion and Order, 28 FCC Rcd 14412, 14417, para. 11 (2013) (*Digital Low Power Second MO&O*).

[1852] LPTV Spectrum Aug. 27, 2013 *Ex Parte* at 5.

[1853] *See Digital Low Power Second MO&O,* 28 FCC Rcd at 14412, para 1.

[1854] *See NPRM*, 27 FCC Rcd at 12457, para. 359.

[1855] Entravision Comments at 15–16; ICN Comments at 2; SEI Comments at 11–12; Spectrum Bridge Comments at 7; WISPA Comments at 22; *see also* PTV Comments at 11–12; NTA Comments at 9 (channel sharing will not be feasible for most TV translator stations); Weigel Comments at 6.

channel sharing outside of the auction context, such as to ensure the continued viability of LPTV and TV translator services through new programming and business arrangements, to promote spectral efficiency by freeing up spectrum, and to promote the use of available digital capacity on other platforms to distribute programming. We conclude that the record on this issue is not sufficiently developed and that it would be more appropriate to consider this issue in a separate proceeding along with other remedial actions we will propose in the LPTV/TV Translator proceeding. We thus decline to permit LPTV and TV translator channel sharing at this time, but we will consider doing so in our forthcoming rulemaking proceeding.[1856]

666. Third, we will consider in the LPTV/TV Translator Proceeding whether to create a new digital replacement translator service for stations that experience losses in their pre-auction service areas. Fourth, we will explore ways of maximizing the number of channels available to LPTV and TV translator stations in the remaining television bands. Following the release of the *Channel Reassignment PN* and the processing of construction permit applications for new channel assignments, it may be possible to identify efficient ways to assign the remaining spectrum available for LPTV and TV translator stations. We will explore these options in the LPTV/TV Translator Proceeding, including the possible use of the repacking software to optimize frequency assignments. If feasible, the use of our software for this purpose may expedite and ease the post-auction transition process for many low power stations. In addition, because it is likely that a number of LPTV and TV Translator stations will be displaced from UHF channels, we will consider whether and, if so how, we should facilitate the ability of such stations to relocate to VHF channels where UHF channels are unavailable. Finally, we will invite input on any other measures we should consider to further mitigate the impact of the auction and repacking process on low power stations.

667. *Other Proposals*. We decline to adopt several other proposals. Although we are sympathetic to the objectives and concerns these commenters raise, these proposals either are not feasible at this time or would conflict with the other goals of the incentive auction. We reject the proposal to set aside channels 2-4 for the exclusive use of LPTV or TV translator stations.[1857] Such a set-aside would eliminate available channels that otherwise could be assigned to full power and Class A stations and would require relocating a number of full power and Class A stations to different channels.[1858] This proposal would also be inconsistent with our goal to allow market forces to determine the highest and best use of spectrum. We also reject NRB's proposal to provide displaced LPTV stations with cable carriage rights at their new location or channel.[1859] Neither NRB nor any other commenter maintains that such action would be within the Commission's statutory authority and, regardless, we decline to grant carriage rights beyond those required under the Communications Act.[1860]

[1856] Accordingly, we reject Mako's proposal to grant a selection priority in the displacement process to LPTV stations willing to enter into channel sharing agreements. *See* Mako Comments at 8.

[1857] Harris Broadcast Comments at 28.

[1858] To limit the displacement of rural TV translator stations, PTV asks the Commission to "avoid condensing the band more in rural areas than in urban areas." PTV Comments at 12; PTV Reply at 8. We clarify that, while the Commission does not intend to specifically repurpose broadcast spectrum more extensively in rural areas than urban areas, the 600 MHz Band Plan will enable us to offer fewer spectrum blocks in constrained markets where less spectrum is available.

[1859] NRB Comments at 8; *see also* LPTV Spectrum Aug. 27, 2013 *Ex Parte* at 5–6.

[1860] *See* 47 U.S.C. § 534(c) (low power station carriage obligations). In addition, we reject LPTV Spectrum Rights Coalition's proposal to "increase [ ] the LPTV fee structure to support more staff and resources dedicated to LPTV-related activities." LPTV Spectrum Aug. 27, 2013 *Ex Parte* at 6. This proposal did not receive support from other LPTV commenters, and we conclude that it would pose a hardship on many licensees without any clear offsetting benefits.

668. *Notification and Termination Provisions for LPTV Stations Displaced by the 600 MHz Wireless Service*. We also adopt rules to govern the process for new 600 MHz Band licensees to notify LPTV and TV translator stations that they will be displaced and for such stations to cease operations on displaced channels. These procedures are designed to ensure that stations are given adequate notice of when they will be displaced and that stations expeditiously terminate operations on a displaced channel after they receive such notice. Specifically, new 600 MHz wireless licensees must provide LPTV and TV translator stations advance notification if they intend to commence operations[1861] in areas of their geographic licenses where there is a likelihood of receiving harmful interference from an LPTV or TV translator station.[1862] After receiving such notification, the LPTV or TV translator station must cease operations or reduce power in order to eliminate the potential for harmful interference to the operations of the 600 MHz licensee.[1863]

669. The 600 MHz Band licensee must provide notice to the LPTV or TV translator licensee in the form of a letter, by certified mail, return receipt requested. The notice must indicate the date that the 600 MHz Band licensee intends to commence operations, and must be delivered to the LPTV or TV translator licensee not less than 120 days in advance of that date. The LPTV or TV translator licensee must cease operating or reduce power before the commencement date set forth in the notice.[1864] This obligation will apply even if the LPTV or TV translator station has submitted a displacement application that has not been granted.

670. LPTV and TV translator stations may continue operating on channels in the 600 MHz Band until a wireless licensee commences operations pursuant to the notification process we are adopting. Commenters support this approach as a means to mitigate the impact of the post-incentive auction transition on low power services by allowing these stations to continue to operate as long as possible,[1865] and we agree that this approach will serve the public interest.[1866]

671. The notice procedures we adopt are based on our experience with the transition of the 700 MHz Band from broadcast to wireless use.[1867] We conclude that it is appropriate to adopt more

[1861] The Commission will define the term "commence operations" for purposes of the above notification obligations and displacement of LPTV and TV translator stations, as well as displacement of other secondary licensees, in the pre-auction process.

[1862] Wireless licensees will be required to determine whether a likelihood of receiving harmful interference exists based on the methodology we adopt to prevent inter-service interference. *See* § III.A.2.d (Market Variation).

[1863] To the extent that the 600 MHz licensees are commencing operations in areas of their geographic licenses where harmful interference from LPTV or TV translator stations would not be likely, these stations are not required to cease operations.

[1864] If the date that the 600 MHz licensee will commence operations is delayed, a revised notification must be sent to the LPTV or TV translator licensee and filed with the Commission. If the wireless licensee does not commence operations by the date set forth in the letter, the LPTV or TV translator station must cease operating by the date the wireless licensee actually commences operations.

[1865] *See* NTA Comments at 7; PTV Comments at 13 (allowing stations to remain temporarily on displaced channels will provide stations sufficient time to investigate alternative spectrum options and thereby prevent disruption of service); PTV Reply at 8–9.

[1866] Similarly, as provided under our existing rules, LPTV and TV translator stations operating on channels that will continue to be allocated and assigned to full power broadcast television services may continue to operate until displaced by a full power or Class A television station that is reassigned a new channel in the repacking process. *See* 47 C.F.R. § 74.703(b). Because full power and LPTV stations follow informal notification procedures with respect to interference and displacement, we do not adopt notification requirements for these situations.

[1867] In the 2004 *Digital LPTV Order*, 19 FCC Rcd at 19355–56, paras 72–75, the Commission established provisions to allow a primary wireless licensee in the 700 MHz Band (former television channels 52–69) to notify affected digital LPTV and TV translator stations of its intent to initiate or change operations. In 2011, the Commission extended these provisions to analog LPTV and TV translator stations operating in the 700 MHz Band. *See LPTV*

(continued….)

definitive channel clearing obligations for LPTV and TV translator than were implemented in the 700 MHz transition in order to ensure that new 600 MHz Band licensees will have prompt and efficient access to their spectrum.[1868] This approach will provide certainty to new licensees, helping to ensure the success of the auction and a smooth transition.

672. *Displacement from the Guard Bands.* We will require that LPTV and TV translator stations operating on channels that include frequencies repurposed for 600 MHz Band guard band use (including the duplex gap) cease operations on those frequencies. NTA asks that LPTV stations be allowed to continue operating on any channels allocated as guard bands.[1869] As discussed above, the 600 MHz Band Plan designates spectrum to serve as guard bands,[1870] and consistent with the Commission's proposal in the *NPRM*, we will permit only low power device operations in those bands and make this spectrum available for innovative unlicensed use nationwide.[1871] In order to fully transition this spectrum for unlicensed use on a nationwide basis, all LPTV and TV translator licensees operating in spectrum repurposed for 600 MHz Band guard band use will be required to cease operating on that spectrum no later than the end of the Post-Auction Transition Period (i.e., 39 months after the issuance of the *Channel Reassignment PN*). In addition, as set forth above, an LPTV or TV translator licensee operating in spectrum reserved for the guard bands will be required to cease operating prior to that date if any 600 MHz Band licensee has notified them that their operations would be likely to cause harmful interference in areas where the wireless licensee intends to commence operations. LPTV stations that currently operate on channels that include frequencies that are repurposed as 600 MHz Band guard bands will be eligible to file an application for a new channel in the displacement window discussed above.

2. Television Fixed Broadcast Auxiliary Stations

673. As discussed above, we will continue to license fixed BAS on a secondary basis in the television bands following the incentive auction.[1872] As a result of the incentive auction and repacking process, however, BAS operators will be required to vacate the 600 MHz Band no later than the end of the Post-Auction Transition Period. Following the issuance of the *Channel Reassignment PN*, BAS operations will have significant advance notice of the channels they may need to vacate, which will assist them in advance planning for that process.

674. *Notification Procedures for Operations in the 600 MHz Band and the Post-Auction Television Bands.* We agree with CTIA that requiring BAS to discontinue operations and/or relocate is necessary to produce fully available spectrum to meet the growing demand for wireless services.[1873] Therefore, while we will continue to license fixed BAS on a secondary basis in the UHF spectrum that

(Continued from previous page)
DTV Second R&O, 26 FCC Rcd at 10749–50, para. 35. The 700 MHz Band was subsequently "cleared" of all LPTV services when, per the Commission's order, all LPTV and TV translator stations operating on 700 MHz frequencies were required to terminate operations and move to an "in-core" channel (2-51) by December 31, 2011. *Id.* at 10748–49, paras. 33–34.

[1868] In the 700 MHz proceeding, LPTV and TV translator licensees were afforded a 120-day period to cease operation of interference-causing facilities after receiving notice from a primary wireless licensee. *See Digital LPTV Order*, 19 FCC Rcd at 19355, para 73. In addition, the Commission implemented procedures in the 700 MHz proceeding enabling LPTV and TV translator licensees to negotiate alternative arrangements with primary wireless licensees and permitting them to seek a stay of the effect of an interference notification. *Id.* at 19355–56, paras 73–74.

[1869] NTA Comments at 8.

[1870] *See* § III.A.2.e (Guard Bands).

[1871] *See* § III.C.2.b (Guard Bands).

[1872] *See* § III.D.2 (Television Fixed Broadcast Auxiliary Stations).

[1873] CTIA Comments at 43.

remains allocated and assigned to full power television services nationwide, we will require all fixed BAS stations to cease operating and relocate from the 600 MHz Band no later than the end of the Post-Auction Transition Period (i.e., 39 months after issuance of the *Channel Reassignment PN*).[1874] Additionally, before the end of this transition period, if a new 600 MHz licensee intends to commence operations,[1875] the 600 MHz licensee must provide 30 days' advance notice to the BAS operator that it intends to commence operations and that the BAS station is likely to cause harmful interference to those operations. The BAS operator must cease operating on that channel within 30 days of receiving notice. The few commenters addressing fixed BAS relocation issues are generally supportive of this notification approach.[1876] The notice from the 600 MHz licensee to the BAS licensee must take the form of a letter, by certified mail, return receipt requested.[1877] A 30-day notice period will serve the public interest by both protecting BAS operations and speeding the deployment of new broadband wireless services.

675. In addition, as a secondary service, BAS may not cause interference to repacked television stations. Should a repacked broadcast television licensee in the 600 MHz Band or the repacked UHF Band[1878] experience harmful interference from a BAS licensee, the BAS licensee must, pursuant to the Commission's rules, immediately cease operations and may not resume operations until the interference problem is resolved.[1879]

676. *Operations in the Guard Bands.* We also will require that BAS operations on channels that include frequencies that will be reserved for guard bands pursuant to this Order cease operations on those channels. As discussed above, the 600 MHz Band includes guard bands (including the duplex gap), and consistent with the Commission's proposal in the *NPRM*, we will permit only low power operations in those bands.[1880] We will establish specific rules for low power operations in the guard bands in the 600 MHz and TVWS Part 15 Proceeding. All BAS operations in spectrum reserved for guard bands will be required to cease operating on that spectrum no later than the end of the Post-Auction Transition Period (i.e., 39 months after the issuance of the *Channel Reassignment PN*).[1881]

[1874] *See* § V.D (Transition Procedures for Other Services and Unlicensed Operations).

[1875] *See* § V.D.1 (LPTV and TV Translator Stations), n.1861.

[1876] *See, e.g.,* CTIA Comments at 43; Verizon Reply Comments at 50; *cf.* Affiliates Associations Comments at 41-42 (supports notification process, but requests 90-day notice period).

[1877] BAS stations must cease operation within 30 days of receiving a notification from a primary licensee. In addition, BAS licensees are obligated to notify the Commission when they discontinue operation by submitting an FCC Form 601 requesting license cancellation (*see* 47 C.F.R. § 1.955(a)(3)), or by obtaining prior approval to modify their authorization by filing an FCC Form 601 if they wish to change frequencies to a channel outside the 600 MHz Band (*see* 47 C.F.R. §§ 1.913, 1.947). We emphasize that filing an application for modification does not relieve a BAS station from the obligation to cease operation in the 600 MHz Band within 30 days of receiving notice, even if the Commission has not yet processed its modification application.

[1878] In order to accommodate market variation, there may be some broadcast television licensees that will be authorized to operate in the repurposed 600 MHz Band. *See* § III.A.2.d (Market Variation).

[1879] *See* 47 C.F.R. §§ 74.602(h), 74.702, 74.803(b). Thus, while Affiliates Associations sought a 90-day notice period for both broadcast and wireless operations, we do not adopt a notice requirement for broadcasters where BAS is likely to cause harmful interference to a repacked broadcast station. Instead we rely on existing Commission procedures for resolving interference under those circumstances.

[1880] *See* § III.C.2.b (Guard Bands).

[1881] In addition, as set forth above, a BAS licensee operating in spectrum reserved for the 600 MHz Band guard bands will be required to cease operating prior to that date if any 600 MHz Band licensee has notified them that their operations would be likely to cause harmful interference in areas where the wireless licensee intends to commence operations.

3. Television White Space (TVWS) and Unlicensed Device Operations

677. *Operations in the Post-Auction Television Bands.* As set forth above, we will continue to allow TVWS devices to operate under the current Part 15 rules in the spectrum that remains allocated and assigned for TV broadcast services following the incentive auction.[1882] We note that, as the television bands are repacked, there are likely to be fewer available channels for TVWS devices in this spectrum and we intend to designate one unused TV channel in each area for shared use by TVWS devices and wireless microphones. In the 600 MHz and TVWS Part 15 Proceeding, we plan to explore improvements to our TV bands databases to enable wireless microphone licensees more immediate access to protection from interference by TVWS devices in the television bands.[1883]

678. *Operations in the 600 MHz Band Guard Bands.* We will initiate a separate 600 MHz and TVWS Part 15 Proceeding in the near term to develop the technical parameters for unlicensed operations in the spectrum that, following the incentive auction, will serve as 600 MHz Band guard bands—specifically, the bands between broadcast television and wireless services, the duplex gap, and bands adjacent to channel 37.[1884] As part of that proceeding, we will also re-examine our current rules, with the goal of providing more flexibility for TVWS devices. As we proceed with developing rules for unlicensed operations in the 600 MHz Band guard bands, to the extent the pre-auction television channels that will be repurposed as guard bands are available for TVWS devices under existing rules, TVWS devices may continue to operate on those channels under these rules. Allowing these channels to remain available for TVWS operations during the post-auction transition will be particularly helpful to the unlicensed industry as fewer television channels will continue to be available. These unlicensed operations will be subject to whatever rules we ultimately establish for 600 MHz Band guard band operations in the separate rulemaking.

679. *Operations on Unused Television Channels Currently Designated for Wireless Microphones.* We will no longer require that up to two unused channels in any area be designated exclusively for wireless microphone operations.[1885] We will, however, continue to prohibit TVWS devices from operating on these channels until our rules to improve our TV bands databases to provide for more immediate protection of registered wireless microphone operations become effective,[1886] after which time TVWS devices potentially could operate on any of these channels. As noted above, we also intend to designate one television channel for shared use by wireless microphones and TVWS devices.[1887]

680. *Operations in the 600 MHz Band.* We will permit the continued operation of TVWS devices on repurposed spectrum except in those areas in which a 600 MHz Band licensee commences operations. A number of commenters agree with this approach of allowing unlicensed operations to continue in the 600 MHz Band spectrum repurposed until they build out their license areas.[1888] AT&T

[1882] *See* § III.C.2.a (addressing unlicensed operations in the reorganized television bands).

[1883] *See* §§ III.C.2.a (discussion of TVWS device operations in the post-auction television bands), III.D.3.a (discussion of wireless microphone operations in the post-auction television bands).

[1884] *See* § III.C (Unlicensed Operations). In this separate proceeding, we also plan to make improvements to our TV bands databases to enable wireless microphone licensees more immediate access to protection from interference by TVWS devices in the TV bands. *See* § III.D.3.a (Television Bands). We also plan to determine whether, if we were to allow unlicensed operations on channel 37, we can provide reliable protection to incumbent RAS and WMTS through use of a database similar to the TV bands database. *See* § III.C.2.c (discussing unlicensed operations on Channel 37).

[1885] *See* §§ III.C.2.a (discussion of channels designated for wireless microphones), III.D.3.a (same).

[1886] *See* § III.D.3.a (discussion of improvements relating to the TV Bands Databases).

[1887] *See* §§ III.C.2.a (Television Bands), III.D.3.a (Television Bands).

[1888] We note that in the *NPRM*, the Commission asked about a "use it or share it" approach in which unlicensed devices could gain access to unused 600 MHz Band spectrum where the licensee has failed to deploy service by the (continued….)

does not necessarily oppose unlicensed uses in the 600 MHz Band prior to wireless service deployment, but states it would have to be subject to strict enforcement mechanisms, and any unlicensed user would have to commit unequivocally to clear the spectrum immediately once the licensed operator is ready to make use of it.[1889] As discussed above, after obtaining their licenses we expect that 600 MHz Band licensees will be commencing operations at different places at different times depending on their business plans and other factors. We are not persuaded by those that unequivocally oppose unlicensed use of this repurposed spectrum following the incentive auction.[1890] Since TVWS devices can operate only on channels identified in the TV bands databases, these databases can serve to ensure that unlicensed operations will no longer occur on a channel on which a licensee has commenced service. When a 600 MHz Band licensee plans to commence operations on frequencies that include channels available for unlicensed operations under the rules for TVWS devices, that licensee can notify any of the TV bands database administrators when and where it plans to commence operations.[1891] Through these actions, the TV bands databases would be updated and would preclude unlicensed operations in those areas.

681. We disagree with T-Mobile's contention that allowing TVWS devices to operate in repurposed spectrum before new 600 MHz licensees deploy services will increase uncertainty surrounding the value of spectrum to be auctioned, decrease auction revenues, and complicate and delay broadband deployment.[1892] As already noted, TVWS devices rely on a database to ensure that users do not operate on channels that are being used by licensed services. Once a channel is indicated in the database as being unavailable for unlicensed use, the database will no longer provide that channel on the list of available channels to devices, effectively ending any further use of it. Thus, there will be no uncertainty concerning whether unlicensed device use will cease once a licensee is ready to commence service on a channel. The database approach also addresses AT&T's concern that allowing unlicensed operation before a licensee commences service will require enforcement mechanisms to ensure that unlicensed users clear the spectrum when the licensee commences service. We will work with the TV bands database administrators to ensure that their databases contain accurate information and that the databases provide lists of available channels in accordance with the rules.[1893]

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end of its build-out term. *NPRM*, 27 FCC Rcd at 12490, para. 405. Commenters supporting this approach, however, seek a "use it or share it" approach prior to that time. *See, e.g.*, Google/Microsoft Comments at 44-46 ("The FCC should permit unlicensed operations in the 600 MHz band in areas where auction winners have not yet begun providing service"); Spectrum Bridge Comments at 5 ("It could take years for rural build out of auctioned spectrum to occur and it does not have to remain fallow during that period if white space rules are applied and managed by a database."); WSDAG Comments at 3 ("spectrum where no licensed service is deployed can remain available for use until a relatively short time before a new service goes online without jeopardizing the rights of licensees."); CCIA Comments at 13-14 (arguing that the Commission should temporarily permit unlicensed use of 600 MHz spectrum until new services have been licensed and met at least one construction benchmark); WSA Comments at 19; PISC Reply Comments at 31-35. The NTA argues that in order to keep spectrum from lying fallow, the Commission should wait to displace translators until a winning forward auction bidder is in a position to build out and make use of the spectrum that is reallocated through the incentive auction process. NTA Reply Comments at 3.

[1889] AT&T Reply Comments at 36-37.

[1890] *See, e.g.*, CTIA Reply Comments at 59-62; NTCA Comments at 6.

[1891] We will work with the TV bands database administrators to develop procedures to implement this decision in a manner similar to how we protect wireless microphone operations over a specified geographic area. Specifically, the TV bands database could include the coordinates of four corners of a polygon that corresponds to the area where the 600 MHz Band licensee has commenced service, and prohibit operation of TVWS devices on the channel(s) used by the licensee within the defined area.

[1892] T-Mobile Reply at 99.

[1893] The Office of Engineering and Technology has delegated authority to oversee the TV bands database administrators. *See* 47 C.F.R. § 0.241(h).

4. Low Power Auxiliary Stations and Unlicensed Wireless Microphones

682. As discussed above, we are adopting several rule changes that address operations of licensed LPAS and unlicensed wireless microphones in the post-auction television bands, as well as the operation of these devices in the 600 MHz Band guard bands once the technical rules are established in a separate rulemaking.[1894] Wireless microphone operators today rely on UHF band spectrum to provide important broadcasting and production services, as well as other services, and will need some time to transition many of their operations to other spectrum bands.[1895] Accordingly, we will allow wireless microphone operations in the post-auction television bands, 600 MHz Band guard bands, and the 600 MHz Band spectrum repurposed for wireless services during the post-auction transition, as discussed below. The transition period will be helpful in addressing the important needs of wireless microphone users in the near term as future technologies are developed for accommodating their needs through a combination of more efficient use of post-auction television band spectrum as well as use of spectrum outside of the current UHF television band. As we also discussed above, we will be initiating a proceeding to address additional steps we can take help accommodate the needs of wireless microphone users outside of the UHF television band following the post-auction transition and over the long term.[1896]

683. *Operations in the Post-Auction Television Bands.* As discussed in Section III.D.3 above, licensed LPAS and unlicensed wireless microphone operations may continue to operate on available unused television channels under the revised rules for co-channel operations.[1897] We note that, with the post-auction transition and the repacking of television stations (including relocated full power stations, LPTV, and BAS), the particular channels available for wireless microphone users may change, and these users will need to adjust their operations accordingly. In addition, we intend to designate one television channel following the auction for shared use by wireless microphones and TVWS devices, and note that on any of the television channels available for TVWS devices, wireless microphone users can obtain protection from interference from TVWS devices by registering in the TV bands databases.

684. *Operations in the 600 MHz Band Guard Bands*. As discussed in Section III.D.3.b, we also will allow wireless microphone users to operate on the spectrum established for 600 MHz Band guard bands (including the duplex gap) to the extent that those channels are available for use under the revised separation distance rules for co-channel operation with TV broadcast stations.[1898] Wireless microphone users generally will be permitted to operate on an unlicensed basis in the guard bands, while broadcasters and cable programming networks operating wireless microphones on a licensed basis will be permitted to obtain interference protection from unlicensed devices in a portion of the duplex gap at specified times and locations, on an as-needed basis. Wireless microphone use in the guard bands will be subject to any rule revisions that the Commission later adopts in the planned 600 MHz and TVWS Part 15 Proceeding, which will develop rules for unlicensed and other low power operations in the guard bands that protect licensed operations outside of the guard bands.

685. *Operations on Unused Television Channels Currently Designated for Wireless Microphones.* As discussed above, given the repacking of the television bands and repurposing of spectrum in the 600 MHz Band that will follow the incentive auction, we will no longer continue to

[1894] *See* § III.D.3 (Low Power Auxiliary Stations and Unlicensed Wireless Microphones).

[1895] Shure et. al. Feb. 10, 2014 *Ex Parte* Letter at 2–3.

[1896] *See* § III.D.3.c (Long-Term Needs of Wireless Microphone Users).

[1897] *See* § III.D.3 (Low Power Auxiliary Stations and Unlicensed Wireless Microphones). We also note that wireless assist video devices, which are authorized under the Part 74, Subpart H rules, may continue to operate in the post-auction television bands under existing rules. *See* 47 C.F.R. §§ 74.801; 74.870.

[1898] We will not permit wireless assist video devices, which are only authorized on a licensed basis and operate pursuant to technical rules that differ from those applicable to wireless microphones and other low power auxiliary stations, in the guard bands. *See* 47 C.F.R § 74.870.

designate up to two unused television channels in any area exclusively for wireless microphone operations, although we do intend to designate one unused television channel for shared use by wireless microphone and TVWS devices.[1899] To help ensure that licensed wireless microphone operators can obtain access to available television channels they need free of interference from TVWS devices, in our planned 600 MHz and TVWS Part 15 Proceeding, we will be seeking comment on ways we can update the rules for TV bands databases to provide for more immediate reservation of unused and available channels in the television bands.[1900] However, for some period of time following the incentive auction, the two channels currently available exclusively for wireless microphones may, depending on the particular location, continue to be unused by either broadcasters or 600 MHz Band licensees. To the extent that one or both of these channels remain available for wireless microphones in particular locations, we will continue to prohibit TVWS devices from operating on these channels until the Commission's rules to improve our TV bands database registration process (providing for more immediate protection from interference by TVWS devices) become effective. After that time, any available channels could be used by either wireless microphones or TVWS devices.

686. *Operations in the 600 MHz Band*. Several commenters request that the Commission determine the extent to which wireless microphone users may continue to operate in the spectrum that will be repurposed during the post-auction transition. We agree with those commenters recommending that we allow wireless microphone operations to continue in the repurposed spectrum during the transition.[1901] Winning forward auction bidders will not have been granted their 600 MHz Band licenses immediately following the incentive auction, and may not commence operations for some period of time. In addition, as wireless microphone users and manufacturers point out, many wireless microphone users have recently incurred substantial costs associated with buying new UHF band wireless microphone equipment following their relocation outside of the 700 MHz Band.[1902] Thus, we disagree with commenters who argue that wireless microphone users should be cleared from the repurposed spectrum no later than the date of the incentive auction.[1903] We find that during the Post-Auction Transition Period the public interest will be served by allowing wireless microphone operations in the repurposed spectrum.

687. We will permit wireless microphone users to continue to operate in the 600 MHz Band during the Post-Auction Transition Period subject to certain conditions designed to protect the 600 MHz licensees' primary rights to make full use of their licensed spectrum. Specifically, for this transition period, to the extent that either licensed LPAS or unlicensed wireless microphone users operate in the 600 MHz Band, consistent with their secondary or unlicensed status they will not be entitled to any interference protection from operations of the primary 600 MHz licensees. We also require that wireless microphone users cease any operations in the 600 MHz Band if their operations cause harmful interference to any 600 MHz licensee's operations. Finally, we establish a hard date by which all wireless microphone operations must be transitioned out of the 600 MHz Band, requiring that all such operations cease no later than the end of the Post-Auction Transition Period (i.e., 39 months after the issuance of the *Channel Reassignment PN*).[1904] We find that establishing a hard date by which all licensed and unlicensed microphone operations must cease operations provides needed certainty and clarity that

[1899] *See* §§ III.C.2.a (Television Bands), III.D.3.a (Television Bands).

[1900] *See* § III.D.3.a (Television Bands).

[1901] *See, e.g.*, Sennheiser Reply at 18-19.

[1902] *See, e.g.*, NYSBA Comments at 23-24; Performing Arts Comments at 4-5; SBE Comments at 4; TV Programmers Reply at 11; Shure et. al. Feb. 10, 2014 *Ex Parte* Letter.

[1903] *See, e.g.*, CTIA Comments at 42-44; Verizon Comments at 69-70; CTIA Reply at 59-62; Ericsson Reply at 33.

[1904] Similarly, we are requiring that wireless assist video devices cease operations in the 600 MHz Band no later than the end of the post-auction transition. During the transition, such operations are permitted on a secondary basis, they are not entitled to interference protection from operations of primary 600 MHz band licensees, and operations must cease operations if they cause in they cause harmful interference to operations of 600 MHz Band licensees.

wireless microphone operators cannot continue operations in spectrum assigned to wireless licensees and helps ensure that wireless providers can operate without interference.[1905]

688. In taking these actions, we seek to accommodate the needs of wireless microphone users in the near term, providing some necessary time for transitioning operations out of the repurposed 600 MHz Band, while we protect the primary rights of 600 MHz licensees. Considering the various types of wireless microphone users, and the various types of wireless microphone devices in use today (including devices that can only operate on particular frequencies in the UHF band), some time is needed in order to obtain new equipment and transition wireless microphone users off of the frequencies that are being repurposed for 600 MHz Band service, whether to other available frequencies in the UHF band (i.e., the post-auction television bands or the 600 MHz Band guard bands) or to spectrum outside of the UHF band. And, as discussed above, we are initiating a proceeding to help accommodate the needs of wireless microphone users through use of additional spectrum outside of the 600 MHz Band.[1906]

VI. POST-TRANSITION REGULATORY ISSUES

A. Broadcast Issues

689. We adopt in this Section adjustments to some of the licensing, operational, and technical rules applicable to broadcasters as a result of the incentive auction and the repacking process. Specifically, we adopt a grandfathering policy for certain existing station combinations that otherwise would violate the Commission's media ownership rules after the conclusion of the reverse auction. We also address our ongoing efforts to promote ownership diversity among broadcast licensees. In addition, we adopt technical and operational rules that will apply to stations that enter into channel sharing agreements.

1. Media Ownership Rules and Diversity

a. Media Ownership Rules

690. *Background*. The Commission's media ownership rules include limits on the common ownership of commercial full power television stations, as well as the cross-ownership of such stations with other media outlets.[1907] The acceptance of bids in the reverse auction may reduce the number of broadcast television stations in a market or result in changes in stations' contours or frequency bands, which in turn may cause some existing station combinations to become non-compliant with the media ownership rules.[1908] The Commission proposed in the *NPRM* to grandfather existing station combinations that otherwise would no longer comply with the media ownership rules as a result of the auction.[1909]

691. *Discussion*. We will grandfather existing station combinations previously approved by the Commission that otherwise would no longer comply with the media ownership rules as a result of the

[1905] *See generally Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band,*WT Docket No. 08-166, Report and Order and Further Notice of Proposed Rulemaking,, 25 FCC Rcd 643, 665-66, para. 42 (2010) (establishing a hard date by which time all wireless microphone operations must cease operations in the 700 MHz Band licensed for wireless broadband; the spectrum in this band was being transitioned from broadcast service to wireless broadband).

[1906] *See* § III.D.3.c (Long-Term Needs of Wireless Microphone Users).

[1907] These rules include the local television ownership rule, the newspaper/broadcast cross-ownership rule, and the radio/television cross-ownership rule. 47 C.F.R. §§ 73.3555(b)–(d). In some cases, these rules are based on the number of stations in the relevant market and, in some cases, they are triggered by contour overlap between commercial full power television stations or between such stations and other media outlets. Our rules also include a limit on the percentage of television households that a single owner of commercial television stations may reach nationwide. *See* 47 C.F.R. § 73.3555(e).

[1908] *NPRM,* 27 FCC Rcd at 12474, para. 356.

[1909] *Id.*

reverse auction.[1910] Absent a waiver of the rules, however, we will not accept channel sharing bids in the reverse auction that would cause a media ownership rule violation by a party to the channel sharing arrangement based on the rules and facts as they exist at the time the application to participate in the auction is filed.[1911] Such a violation potentially could be caused by the relocation of a sharee station if the contour of the station newly overlaps or encompasses any other media outlets in which the licensee of the station has an attributable ownership interest. Because the licensee in this situation would exercise control over the triggering of a potential violation of our rules and because the licensee would have the ability to determine prior to the auction that such a violation would occur, grandfathering would be inappropriate and contrary to the public interest. We do not believe this limitation on grandfathering will unduly discourage reverse auction participation. In addition, we agree with commenters that it is appropriate to keep our grandfathering policy simple to avoid unnecessary disruption to the broadcast industry.[1912]

692. We reject arguments that grandfathering should not be permitted because it would "irreparably harm" ownership diversity.[1913] While we acknowledge concerns about the potential impact of the auction on broadcast ownership diversity, we conclude that grandfathering existing combinations that have been approved by the Commission is justified in these unique circumstances. The Commission structures transitional procedures as appropriate in light of the specific rule changes at issue, whether the changes could have been anticipated when the combinations were acquired, reliance on existing rules, and the nature and degree of disruption that would be caused by requiring immediate divestitures."[1914]

[1910] *See Review of the Commission's Regulations Governing Television Broadcasting*, MM Docket No. 91-221, Report and Order, 14 FCC Rcd 12903, 12932–33, para. 64 (1999) (*1999 Broadcast Ownership Order*) (holding that, if an entity acquires a duopoly under the Commission's current local television ownership rule, "it will not later be required to divest if the number of operating television voices within the market falls below eight or if the two merged stations subsequently are both ranked among the top four stations in the market; however, a duopoly may not automatically be transferred to a new owner if the market does not satisfy the eight voice/top four-ranked standard"). Further, as Verizon notes, "[i]n creating a one-time market-based mechanism for broadcast licensees to exit the market entirely through the reverse auction, Congress necessarily understood that there would be fewer broadcasters in many markets, which could place the remaining stations in violation of ownership rules." Verizon Comments at 31–32. Combinations that have not been previously approved by the Commission, including the ownership of a television station combined with a daily newspaper or the operation of an attributable local marketing agreement or joint sales agreement**,** will not be similarly grandfathered.

[1911] Specifically, we will not accept channel sharing bids that would trigger a violation of the local television multiple ownership rule, the newspaper/broadcast cross-ownership rule, or the radio/television cross-ownership rule by a channel sharing partner. We will accept reverse auction bids that would trigger a violation of the national television multiple ownership rule, which limits a broadcaster's national audience reach to 39 percent, subject to a "UHF Discount" attributing only 50 percent of the TV households in a DMA to UHF stations. *See* 47 C.F.R. § 73.3555(e); *see also Amendment of Section 73.3555(e) of the Commission's Rules, National Television Multiple Ownership Rule*, MB Docket No. 13-236, Notice of Proposed Rulemaking, 28 FCC Rcd 14324 (2013) (proposing elimination of the UHF discount). Successful UHF-to-VHF or channel sharing bids could lead owners to lose the UHF discount for certain stations, resulting in violations of the national cap. To avoid discouraging UHF stations from moving to the VHF band, any existing station groups that become non-compliant with the national cap as a result of a successful bid or bids in the reverse auction will be grandfathered.

[1912] LIN Comments at 8; *see also* Tribune Comments at 23 (supporting grandfathering of existing ownership combinations).

[1913] Leadership Conference Comments at 4; NHMC Comments at 7.

[1914] *See, e.g.*, *Amendment of Sections 73.34, 73.240, and 73.636 of the Commission's Rules Relating to Multiple Ownership of Standard, FM, and Television Broadcast Stations*, Docket No. 18100, Second Report and Order, 50 FCC 2d 1046, 1080, para. 112 (1975) (grandfathering existing daily newspaper and television or radio combinations except where the Commission found unacceptable levels of concentration); *2002 Biennial Regulatory Review – Review of the Commission's Broadcast Ownership Rules and Other Rules Adopted Pursuant to Section 202 of the Telecommunications Act of 1996*, MB Docket No. 02-277, Report and Order and Notice of Proposed Rulemaking,

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Broadcasters have made substantial long-term investments in their station combinations in reliance on Commission approval of their station acquisitions and our multiple ownership rules. It would be inequitable if owners of existing combinations were negatively affected if circumstances that they could not have anticipated and could not control subsequently change such that the combination no longer complies with the rules. For similar reasons, we reject NHMC's proposal that we review every combination "on a case-by-case basis, upon completion of the auction process" to assess whether the combination serves the Commission's public interest goals, including promoting ownership diversity, in the post-auction environment.[1915] NHMC's proposal would undermine the certainty regarding the auction and the repacking processes that is critical to the overall success of the incentive auction.[1916]

693. Upon the sale of a grandfathered station combination, we will require the new owner to comply with the media ownership rules in place at the time of the transaction or obtain a waiver. We reject Tribune's proposal to allow grandfathered combinations to be sold intact because it is inconsistent with prior FCC practice, and we are not persuaded that we should depart from our current policy here.[1917]

b. Diversity of Media Ownership

694. *Background*. In the *NPRM*, the Commission invited comment on measures that could be taken outside the context of the media ownership rules to address any impact on diversity that may result from the incentive auction.[1918] Several commenters raise concerns about the potential effect of the reverse auction and repacking process on minority and female owners of broadcast television stations, which historically have been underrepresented in the broadcasting industry.[1919] NHMC and Leadership Conference assert that the reverse auction could lead to a substantial decrease in the number of stations owned by minorities and women.[1920] They recommend that the Commission conduct extensive outreach to small and mid-sized television broadcasters, including those that are minority or female owned, to ensure that they are fully informed about the auction and "do not feel compelled to exit broadcasting

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18 FCC Rcd 13620, 13808-10, paras. 484-487 (2003) (grandfathering existing combinations of broadcast stations that exceeded the modified local radio and local television ownership rules); *2014 Quadrennial Regulatory Review*, *Review of the Commission's Broadcast Ownership Rules and Other Rules Adopted Pursuant to Section 202 of the Telecommunications Act of 1996 et al.,* MB Docket No. 14-50, Further Notice of Proposed Rulemaking and Report and Order, FCC 14-28 (rel. Apr. 15, 2014) (two-year transition period for attributable television JSAs where parties had long been on notice of attribution proposal and transition period gave them time to unwind agreements) (*2014 Quadrennial FNPRM*).

[1915] NHMC Comments at 7.

[1916] *See* § III.B.3 (Facilities to Be Protected).

[1917] Tribune Comments at 24; *see 1999 Broadcast Ownership Order*, 14 FCC Rcd at 12932–33, para. 64 (holding that a "duopoly may not automatically be transferred to a new owner if the market does not satisfy the eight voice/top four-ranked standard").

[1918] *NPRM*, 27 FCC Rcd at 12474–75, para. 357.

[1919] *See Promoting Diversification of Ownership in the Broadcasting Services*, MB Docket No. 07-294, Report and Order and Third Further Notice of Proposed Rulemaking, 23 FCC Rcd 5922, 5924, para. 1 (2008); *Policies and Rules Regarding Minority and Female Ownership of Mass Media Facilities*, MM Docket Nos. 91-140, 94-149, Notice of Proposed Rulemaking, 10 FCC Rcd 2788, 2789, para. 5 (1995) ("[D]espite the Commission's efforts to increase minority ownership of broadcast and cable facilities, minorities today remain significantly underrepresented among mass media owners.").

[1920] *See* NHMC Reply at 4–5; Leadership Conference Comments at 4. They argue that minority and female broadcasters often face significant competitive challenges and financial difficulties that may make them especially likely to exit the market through the reverse auction. NHMC Comments at 3; Leadership Conference Comments at 4. Leadership Conference further claims that "licensees who are women or people of color will face intense pressure to participate in the reverse auction." Leadership Conference Comments at 4; *see also* NHMC Comments at 4.

because of misinformation" about the auction process.[1921] These commenters also emphasize that the Commission should not restrict minority or female owners from participating in the auction.[1922]

695. *Discussion*. As an initial matter, we emphasize that all qualified broadcasters will have an opportunity to enter the reverse auction. Consistent with the Spectrum Act, auction participation will be voluntary: no broadcasters will be compelled to participate.[1923] We concur with commenters about the importance of outreach regarding the incentive auction to broadcasters, including those owned by minorities or females. As noted above, we have conducted numerous workshops and other direct outreach efforts to help broadcasters, including those that are minority- or female-owned, make informed business decisions about whether and how to participate in the reverse auction.[1924] As broadcast representatives have emphasized repeatedly, access to capital is an ongoing challenge for minority and female broadcasters.[1925] Voluntary participation in the reverse auction, via a channel sharing, UHF-to-VHF, or high-VHF-to-low-VHF bid, offers a significant and unprecedented opportunity for these owners to raise capital that may enable them to stay in the broadcasting business and strengthen their operations. We consider fostering minority and female ownership of broadcast stations an important goal, and our efforts to promote such ownership will continue after the auction and the repacking process.[1926]

696. We reject suggestions to assess the impact of the auction on minority and female ownership levels by collecting from all auction participants the same ownership information we already collect through our biennial ownership report forms.[1927] Although measuring the impact of the auction on

[1921] Leadership Conference Comments at 5; *see also* NHMC Comments at 5. Some commenters also express concern that the reverse auction and the repacking process could reduce opportunities for LPTV stations and thereby adversely impact traditionally underserved viewers. *See, e.g.*, UVM Reply at 16–18; NHMC Reply at 5–6; Signal Above Comments at 4; Leadership Conference Comments at 5; ICN Comments at 2. We discuss actions we are taking to mitigate the potential impact on LPTV stations above. *See* § V.D.1 (LPTV and TV Translator Stations).

[1922] *See* NHMC Comments at 3; NHMC Reply at 2; Leadership Conference Comments at 5 (stating that it "strongly believe[s] that all eligible broadcast licensees should be allowed to participate in the reverse auction").

[1923] *See, e.g.*, Spectrum Act § 6403(a)(1) (providing for voluntary reverse auction participation).

[1924] *See* n.8; *see also* Letter from James L. Winston, Executive Director and General Counsel, NABOB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Jan. 8, 2013); Letter from James L. Winston, Executive Director and General Counsel, NABOB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Jan. 24, 2013) (NABOB Jan. 24, 2013 *Ex Parte* Letter); Letter from James L. Winston, Executive Director and General Counsel, NABOB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed June 24, 2013) (NABOB June 24, 2013 *Ex Parte* Letter).

[1925] *See* NABOB Jan. 24, 2013 *Ex Parte* Letter; NABOB June 24, 2013 *Ex Parte* Letter; Leadership Conference Comments at 7.

[1926] For example, the Commission continues to refine and improve its collection and analysis of broadcast ownership information to improve its understanding of ownership diversity. *See Promoting Diversification of Ownership in the Broadcasting Services*, MB Docket No. 07-294, Report and Order and Fourth Further Notice of Proposed Rulemaking, 24 FCC Rcd 5896, 5910–5911, paras. 27, 30 (2009) (*Diversity Fourth FNPRM*), *recon. granted in part*, Memorandum Opinion and Order and Fifth Further Notice of Proposed Rulemaking, 24 FCC Rcd 13040 (2009) (*Diversity Fifth FNPRM*) (seeking comment on modifications to Form 323-E to gather race, ethnicity, and gender ownership data for noncommercial broadcast stations, including low-power FM); *Diversity Fifth FNPRM*, 24 FCC Rcd at 13047, para. 16 (seeking comment on whether to expand reporting to include certain non-attributable interests); *Promoting Diversification of Ownership in the Broadcasting Services*, MB Docket No. 07-294, Sixth Further Notice of Proposed Rulemaking, 28 FCC Rcd 461, 461–463, paras. 1–3 (2013) (seeking comment on whether to require a unique identifier generated by the Commission's Registration System for each attributable individual among other things); *2014 Quadrennial FNPRM*, FCC 14-28, at para 244 (seeking comment on "ways to expand the participation of minorities and women in the broadcast industry" and "specific measures . . . that may provide further opportunities for minorities and women to own and operate broadcast outlets").

[1927] *See* NHMC Comments at 6; NHMC Reply at 2–3; Leadership Conference Comments at 5. According to these commenters, the Commission then could use this information to inform subsequent quadrennial reviews of broadcast

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broadcast ownership diversity is important, the additional data collection efforts proposed would replicate existing efforts and thus impose an unnecessary burden.[1928]

2. Channel Sharing Operating Rules

697. *Background*. The FCC previously adopted a general framework for channel sharing in connection with the incentive auction.[1929] Among other things, it required channel sharing agreements ("CSAs") to contain a provision requiring that each channel sharing licensee retain spectrum usage rights adequate to ensure access to enough shared channel capacity to allow it to provide at least one Standard Definition ("SD") program stream at all times.[1930] The Commission also concluded that (1) NCE licensees must structure their channel sharing arrangements to ensure compliance with NCE rules; and (2) reserved channel NCE licensees that move to a non-reserved channel as part of a channel sharing arrangement must continue to operate on an NCE basis.[1931]

698. The Commission sought comment on a number of additional channel sharing issues in the *NPRM*.[1932] Specifically, the Commission asked whether it should require CSAs to include provisions delineating each station's rights and responsibilities with respect to key aspects of the channel sharing arrangement.[1933] The Commission also sought comment on how to relicense the spectrum usage rights of a channel sharing licensee in the event that its license is terminated.[1934] In addition, it asked whether channel sharing stations should be held individually or jointly responsible for compliance with certain technical obligations.[1935] The Commission also sought input on any additional conditions that should apply to NCE stations participating in channel sharing arrangements,[1936] issues related to channel sharing

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ownership rules or other diversity-related initiatives. *See* Leadership Conference Comments at 5; NHMC Comments at 6.

[1928] Our required biennial ownership reports provide extensive information about the ownership structure of each commercial broadcast licensee, including information about minority and female ownership status. The collection of data biennially and the use of a uniform "as of" date give the Commission successive "snapshots" of the status of minority and female ownership in the industry on a fixed, periodic schedule. This information provides a basis for analyzing ownership trends within the broadcast industry. *See 2010 Quadrennial Regulatory Review – Review of the Commission's Broadcast Ownership Rules and Other Rules Adopted Pursuant to Section 202 of the Telecommunications Act of 1996,* MB Docket No. 09-182, Report on Ownership of Commercial Broadcast Stations, 27 FCC Rcd 13814, 13814, para. 1 (2012). The Commission also has sought comment on whether to require NCE stations to submit gender and minority ownership information. *See Diversity Fourth FNPRM*, 24 FCC Rcd at 5910, para. 27.

[1929] *See Channel Sharing Report and Order*, 27 FCC Rcd at 4621–25, paras. 11–18.

[1930] *See id*. at 4624, para. 15; *see also* 47 C.F.R. § 73.3700(b)(3).

[1931] *See Channel Sharing Report and Order*, 27 FCC Rcd at 4628–29, para. 24.

[1932] *NPRM*, 27 FCC Rcd at 12477–80, paras. 362–72.

[1933] *Id.* at 12477, paras. 363–65.

[1934] *Id.* at 12478, para. 366–67.

[1935] *Id.* at 12478–12479, paras. 368–69.

[1936] The Commission specifically sought comment on issues that may arise when an NCE station operating on a reserved channel enters into a channel sharing agreement with a commercial station or an NCE station operating on a non-reserved channel. *Id.* at 12479, para. 370. As explained in the *NPRM*, there currently are two options for stations to operate on an NCE basis. They may broadcast on a channel reserved in our Table of Allotments exclusively for NCE use, or they may provide a noncommercial educational service on a channel that is not reserved for NCE use. *Id.* at 12479, para. 370 n.559 (citing 47 U.S.C. § 399b; *Reexamination of Comparative Standards for Noncommercial Educational Applicants*, MM Docket No. 95-31, Further Notice of Proposed Rulemaking, 13 FCC Rcd 21167, 21168, para. 2 (1998)). In either case, in order to maintain NCE status, the NCE licensee must remain a nonprofit educational organization or municipality and comply with NCE requirements, including that the station

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between full power and Class A stations,[1937] and the cable and satellite carriage rights of channel sharees.[1938]

699. *Discussion.* We will require all CSAs to include certain key provisions.[1939] Specifically, in addition to the existing requirement regarding access to shared channel capacity,[1940] we adopt our proposal in the *NPRM*[1941] that CSAs must contain provisions outlining each licensee's rights and responsibilities in the following areas: (1) access to facilities, including whether each licensee will have unrestrained access to the shared transmission facilities; (2) allocation of bandwidth within the shared channel; (3) operation, maintenance, repair, and modification of facilities, including a list of all relevant equipment, a description of each party's financial obligations, and any relevant notice provisions; and (4) termination or transfer/assignment of rights to the shared licenses, including the ability of a new licensee to assume the existing CSA.[1942] While channel sharing partners will be required to address these matters in their CSAs, they may craft provisions as they choose, based on marketplace negotiations,[1943] subject to pertinent statutory requirements and the Commission's rules and regulations.[1944] CSAs also must include a provision affirming compliance with the channel sharing requirements in this Order, the *Channel Sharing Report and Order*, and our rules.[1945] We reserve the right to review CSA provisions and require modification of any that do not comply with these requirements or the Commission's rules.

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"be used primarily to serve the educational needs of the community; for the advancement of educational programs; and to furnish a nonprofit and noncommercial television broadcast service." 47 C.F.R. § 73.621(a), (b).

[1937] *NPRM*, 27 FCC Rcd at 12480, paras. 371–72.

[1938] *Id.* at 12480, para. 372.

[1939] The requirements will apply to all CSAs, including any that may have been executed before the release of this Order. We note that the Commission previously put licensees on notice that it would be adopting additional requirements for CSAs in a future proceeding. *See Channel Sharing Report and Order*, 27 FCC Rcd at 4261–63, paras. 11, 13.

[1940] *See* 47 C.F.R. § 73.3700(b)(3) (requiring each CSA to contain a provision ensuring that each channel sharing licensee "retain spectrum usage rights adequate to ensure a sufficient amount of shared channel capacity to allow it provide one SD program stream at all times").

[1941] *See NPRM*, 27 FCC Rcd at 12477–78, paras. 363–65. No commenter provided input on these specific proposals.

[1942] Any rights of first refusal included in a CSA would have to be consistent with our media ownership rules and any other Commission rules and policies. *See* 47 C.F.R. § 73.1150(a) (prohibition on retention of reversionary interests).

[1943] *See* PTV Comments at 18.

[1944] We do not anticipate being involved in any disputes between channel sharing stations to the extent that such disputes are not directly related to compliance with the Communications Act or applicable Commission policies and rules. We expect that any disputes concerning the terms and conditions of the CSA, including those that are directly related to compliance with the Communications Act or our rules, would be handled in the first instance by the channel sharing stations as a private contractual enforcement matter and that we would independently determine if additional regulatory enforcement steps would be warranted. *See Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230, Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 20604, 20613, para. 7 (2003) (*Secondary Markets First R&O*).

[1945] As set forth above, on submission of an application to participate in the reverse auction, channel sharing parties must file an executed copy of their CSA and certify that it contains provisions addressing the aforementioned matters. *See* § IV.B.1.e (Information and Certifications Required in Application to Participate). As with any document filed with the Commission, parties may seek confidential treatment. *See* 47 C.F.R. § 0.459. In addition, the Commission will take reasonable steps to keep CSAs confidential pursuant to its statutory obligation during the
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700. Channel sharing will create new and complex relationships between television stations. Although stations have been sharing towers, studios, and transmission facilities for many years, they never before have been licensed to a shared channel.[1946] The provisions we are requiring in CSAs concern the issues most likely to lead to disagreements between channel sharing stations. By requiring stations to address these issues in their CSAs, we seek to avoid disputes that could lead to a disruption in service to the public and to ensure that each licensee is able to fulfill its independent obligation to comply with all pertinent statutory requirements and our rules. At the same time, the FCC ordinarily does not involve itself in private contractual agreements, and we do not wish to discourage channel sharing relationships.[1947] The approach we adopt will protect the public interest and ensure the success of channel sharing with minimal intrusion into channel sharing relationships.

701. *Termination and Assignment/Transfer of Channel Sharing Licenses*. Should a channel sharing station's license be terminated due to voluntary relinquishment, revocation, failure to renew, or any other circumstance, the remaining channel sharing station or stations will continue to have rights to their portion(s) of the shared channel.[1948] The rights to the terminated portion of the shared channel will revert to the Commission for reassignment.[1949] We will condition the final award of the rights to the terminated portion of the shared channel on the new channel sharing licensee agreeing to the terms of the existing CSA. If the new channel sharing licensee and the remaining channel sharing station(s) agree to renegotiate the terms of the existing CSA, the agreement may be amended, subject to Commission approval. If the negotiations to amend the agreement are unsuccessful, the remaining station or stations

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relevant time periods applicable to successful and unsuccessful reverse auction bids. *See* § IV.B.1.c (Confidentiality and Prohibition of Certain Communications).

[1946] As PTV argues, "[w]ith respect to certain limited issues, . . . public interest considerations may require some baseline requirements to ensure that one channel sharing participant's actions would not unduly disrupt viewers' ability to continue receiving the broadcast television services of other stations." PTV Comments at 18. PTV further claims that the Commission must "take steps to make channel sharing arrangements a viable option for stations to continue their broadcast television station operations, rather than a house of cards that unexpectedly falls apart months, or even years, into the arrangement to the unfair disadvantage of an innocent party." *Id*.

[1947] *See NPRM*, 27 FCC Rcd at 12477, para. 363. We note that the Commission's rules concerning stations operating on a "time sharing" basis require that certain provisions be included in the relevant contract to ensure the most efficient use of the spectrum. *See* 47 C.F.R. §§ 73.561(b)(1), 73.1715(a). The Commission also has provided guidance in other contexts regarding the permissibility of certain types of contractual provisions or relationships. *See, e.g., Network Affiliated Stations Alliance Petition for Inquiry into Network Practices and Motion for Declaratory Ruling*, Declaratory Ruling, 23 FCC Rcd 13610 (2008) (declaratory ruling of certain principles related to television network/affiliate contracts); *Use of the Frequencies in the Instructional Television Fixed Service*, MM Docket No. 93-106, Report and Order, 9 FCC Rcd 3360 (1994) (providing guidance on contractual arrangements to "channel load" requisite programming to a single channel); *Instructional Television Fixed Service*, *the Multipoint Distribution Service, and the Private Operational Fixed Microwave Service,* GN Docket No. 80-112, Report and Order, 94 FCC 2d 1203 (1983) (providing guidance on contractual arrangements to lease unused transmission time).

[1948] These rights are consistent with the existing rule that channel sharing stations continue to be treated as separate licensed stations. *See* 47 C.F.R. § 73.3700(a); *Channel Sharing Report and Order*, 27 FCC Rcd at 4624, para. 16. As set forth above, the licenses of channel sharing stations will be modified post-auction to reflect their shared status. *See* § V.C.1 (License Modification Procedures). In addition, shared channels permanently will be designated as shared in the Table of Allotments, absent a future rulemaking proceeding to redesignate the channel for non-shared use. Therefore, CSAs may not contain any provision that would seek to dissolve or modify the shared nature of the channel because such a provision would violate the Commission's rules. Likewise, CSAs may not contain provisions permitting one licensee to retain any reversionary interest in another licensee's portion of the shared channel. *See* 47 C.F.R. § 73.1150 (prohibition on retention of reversionary interests).

[1949] In such circumstances, the remaining licensees that are parties to the channel sharing agreement in question may participate in the auction or comparative selection process, if otherwise eligible.

may continue to operate while the channel remains a "shared" allocation and subject to reassignment.[1950] We will allow rights under a CSA to be assigned or transferred, subject to the requirements of section 310 of the Communications Act,[1951] our rules, and the requirement that the assignee or transferee comply with the applicable CSA.[1952] We agree with CIT that allowing such assignments "will allow the marketplace to freely facilitate the efficient implementation of the incentive auctions program."[1953]

702. *Joint Responsibility for Compliance with FCC Rules.* We decline to adopt a rule that would make channel sharing licensees jointly responsible for compliance with specific rules. As stated above, we previously determined that each channel sharing station is independently subject to all of the Commission's rules, including technical, operational, and programming obligations.[1954] We received no comment in response to the inquiry in the *NPRM* regarding whether requiring joint responsibility with respect to certain technical requirements is necessary or appropriate, and the record in this proceeding does not support a change to our existing policy.[1955]

703. *Reserved-Channel NCE Sharing Stations*. We adopt rules to govern NCE stations operating on reserved channels that choose to channel share.[1956] Specifically, we adopt the proposal in the *NPRM* that an NCE licensee operating on a reserved channel, whether it relinquishes its channel in order to share a non-reserved channel or agrees to share its reserved channel with a commercial station, will retain its NCE status and must continue to comply with the rules applicable to NCE licensees.[1957] In either case, the NCE station's portion of the shared channel (which, at a minimum, must enable the

[1950] We recognize that, in practice, very few television licenses are terminated, but it is important to clarify our rules so that stations considering a channel sharing bid in the reverse auction can factor them into their channel sharing negotiations. A Class A licensee that fails to meet the ongoing statutory eligibility requirements to maintain its Class A status is subject to modification of its license to LPTV status. *See*, *e.g., Reclassification of License of Class A Television Station WGSA-CA, Savannah, Georgia*, Order to Show Cause, 27 FCC Rcd 2544 (2012). A Class A station whose license is modified to LPTV status no longer would be entitled to channel share, because channel sharing is permitted only between full power stations, between Class A stations, and between full power and Class A stations. *See Channel Sharing Report and Order*, 27 FCC Rcd at 4626–27, paras. 19–20; 47 C.F.R. § 73.3700(b)(1). Under these circumstances, the rights to the portion of the shared channel that are lost by a downgraded Class A station will be reassigned by the Commission. We will allow a Class A channel sharing station that loses its Class A eligibility to file a displacement application to move to another channel as an LPTV station.

[1951] 47 U.S.C. § 310.

[1952] The assignee or transferee must agree to the terms of the CSA in existence at the time of the transfer or assignment, unless the assignee/transferee and the remaining sharing station(s) agree to amend the CSA and the amendment is approved by the Commission. *See* CIT Comments at 7; PTV Comments at 18.

[1953] CIT Comments at 7.

[1954] *Channel Sharing Report and Order*, 27 FCC Rcd at 4624, para. 16; 47 C.F.R. § 73.3700(a).

[1955] *See NPRM*, 27 FCC Rcd at 12478-79, paras. 368–69. Accordingly, in the event that there is a potential or actual violation of any of our technical, operational, or programming rules with respect to a channel sharing station, the Commission will take any necessary enforcement actions, such as issuing a notice(s) of apparent liability for forfeiture, to the individual licensee(s) participating in the channel sharing arrangement alleged to have violated our rules.

[1956] These rules will not apply to a channel sharing station that has elected to operate as an NCE station, but that is licensed to a non-reserved channel. As noted in the *NPRM*, we do not believe we need special rules related to channel sharing between a non-reserved channel NCE station and a commercial station, given our requirement that each station must continue to abide by the terms of its separate license after implementation of the channel sharing arrangement. *See NPRM*, 27 FCC Rcd at 12479, para. 370 n.559 (citing *Channel Sharing Report and Order*, 27 FCC Rcd at 4628–29, para. 24).

[1957] *NPRM*, 27 FCC Rcd at 12479–80, para. 370.

broadcast of one SD programming stream) will continue to be reserved for NCE-only use.[1958] Further, as proposed in the *NPRM*,[1959] a reserved-channel NCE sharing station may assign its license only to a qualified NCE entity.[1960] Similarly, if a reserved-channel NCE sharing station's license is relinquished or terminated, only another entity meeting the NCE eligibility criteria will be considered for reassignment of the license.[1961]

704. In adopting these rules, we seek to ensure that we continue to reserve adequate NCE channel space in light of our previous decision to permit channel sharing between reserved-channel NCE stations and commercial stations.[1962] The existence of reserved channels in the Table of Allotments ensures a nationwide distribution of NCE stations, and in order to preserve this distribution, commercial stations generally may not operate on reserved channels.[1963] As APTS/CPB notes, historically, the Commission has denied requests to delete reserved channels, principally in order to preserve the future availability of such channels.[1964] We agree with APTS/CPB that NCE "[s]tations should have the flexibility to enter into channel sharing arrangements with commercial stations, as long as the Commission ensures that these arrangements do not result in the dereservation of a noncommercial educational station's channel consistent with the Commission's longstanding policy against de-reservation."[1965]

705. *Class A/Full Power Sharing Agreements*. We adopt rules governing the power levels at which stations may operate and the applicable MVPD carriage rights when both a full power and a Class A station participate in a channel sharing agreement. The Part 73 rules that govern full power stations authorize operation at higher maximum power levels than those allowed under the Part 74 rules governing Class A stations.[1966] Channel sharing stations must share a single transmission facility and therefore broadcast at the same power level. To encourage channel sharing, we will allow a Class A station to operate under the Part 73 rules governing power levels and interference if it shares a full power television station's channel.[1967] Similarly, a full power station sharing a Class A station's channel must operate

[1958] In addition, we note that, although an NCE licensee may channel share with a commercial licensee, it must continue to satisfy the obligation set forth in § 73.621 of our rules to "be used primarily to serve the educational needs of the community; for the advancement of educational programs; and to furnish a nonprofit and noncommercial television broadcast service." 47 C.F.R. § 73.621(a). In addition, because NCE licensees are prohibited from broadcasting advertisements, NCE stations that participate in channel sharing agreements will be prohibited from broadcasting advertisements on their portion of a shared channel. 47 U.S.C. § 399b(b)(2).

[1959] *See NPRM*, 27 FCC Rcd at 12479–80, para. 370.

[1960] This rule is consistent with our current rules regarding the assignment of a reserved-channel NCE station. *See* 47 C.F.R. § 73.621. Any such assignment would be subject to Commission approval.

[1961] As noted previously, we also will condition the final award of the rights to the terminated portion of the shared channel upon the new NCE licensee agreeing to terms of the existing CSA with the other sharing station(s), unless the new NCE licensee and the remaining sharing station(s) agree to amend the CSA and the amendment is approved by the Commission. *See* para. 701.

[1962] *See Channel Sharing Report and Order*, 27 FCC Rcd at 4628–29, paras. 23–24.

[1963] *See NPRM*, 27 FCC Rcd at 12479-80, para. 370 & nn. 556, 557.

[1964] PTV Comments at 17.

[1965] *Id*.

[1966] *Compare* 47 C.F.R. § 73.622(f) *with* 47 C.F.R. § 74.735(b).

[1967] A Class A licensee that channel shares with a full power station will continue to be subject to the restrictions set forth in § 336(f)(7)(B) of the Communications Act. *See* 47 U.S.C. § 336(f)(7)(B); *see also* 47 C.F.R. §§ 73.6012, 73.6019; *Class A R&O*, 15 FCC Rcd at 6389–90, para. 80–81. Among other things, that provision prohibits the Commission from approving the modification of a Class A license unless the licensee shows that the Class A station will not cause interference within the protected contour of any LPTV or TV translator station that "(i) was licensed prior to the date on which the application . . . for the modification of such a license[] was filed; (ii) was authorized

(continued….)

under the Part 74 power level and interference rules. This approach will help to eliminate any technical barriers to full power and Class A channel sharing.[1968]

706. A channel sharing station is entitled to the same cable and satellite carriage rights at its shared location as it would have at that same location were it not channel sharing.[1969] The cable and satellite carriage rules, however, provide Class A stations fewer carriage rights than those afforded to full power stations.[1970] As the Commission tentatively concluded in the *NPRM*,[1971] we interpret the Spectrum Act to entitle a Class A station that channel shares with a full power sharer only to those carriage rights to which a Class A station would be entitled at the shared location were it not sharing. We also clarify that, under section 6403(a)(1), a full power sharee, whether a commercial or NCE station, that channel shares with a Class A licensee will have the same carriage rights at the channel sharing location that a non-channel sharing full power station would have at that location.[1972] In addition, we agree with DIRECTV/DISH that low power stations, including Class A stations, lack statutory mandatory carriage rights on DBS systems, and that lack of such rights will continue when a Class A station channel shares with a full power station.[1973]

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by construction permit prior to such date; or (iii) had a pending application that was submitted prior to such date." 47 U.S.C. § 336(f)(7)(B). This restriction will apply to license and frequency modifications sought by Class A licensees, including those that share with a full power sharer station, except for those modifications implementing the new channel assignments resulting from the reverse auction and repacking process. *See* § III.B.3 (Facilities to Be Protected) (concluding that § 336(f)(7)(B) of the Communications Act does not restrict the Commission's channel reassignments in the reverse auction and repacking process).

[1968] We note that, although Class A stations are permitted to share a full power television station's technical facilities, the Class A station must continue to air a minimum of 18 hours a day and an average of at least three hours per week of locally-produced programming each quarter, as required by § 73.6001 of the rules. *See* 47 C.F.R. § 73.6001(b).

[1969] *See* Spectrum Act § 6403(a)(4); *see also* 47 C.F.R. § 76.56(g).

[1970] Class A stations have the same limited must carry rights as LPTV stations; in other words, they are "low power stations" for mandatory carriage purposes. *See Establishment of a Class A Television Service*, MM Docket No. 00-10, Memorandum Opinion and Order on Reconsideration, 16 FCC Rcd 8244, 8259–60, paras. 40, 42. Low power stations are not entitled to mandatory satellite carriage. 47 U.S.C. § 338(a)(3). Low power stations may be entitled to mandatory cable carriage, but only in limited circumstances. Both the Communications Act and the Commission's rules mandate that only a minimum number of qualified low power stations must be carried by cable systems, *see* 47 U.S.C. § 534(c)(1); 47 C.F.R. § 76.56(b)(3), and, in order to qualify, such stations must meet several criteria. *See* 47 U.S.C. § 534(h)(2)(A)–(F); 47 C.F.R. § 76.55(d)(1)–(6). For example, if a full power station is located in the same county or other political subdivision (of a State) as an otherwise qualified low power station, then the low power station will not be eligible for cable must-carry status. *See* 47 U.S.C. § 534(h)(2)(F); *see also Implementation of the Cable Television Consumer Protection and Competition Act of 1992, Broadcast Signal Carriage Issues*, MM Docket No. 92-259, Report and Order, 8 FCC Rcd 2965, 2983, para. 67 & n.211 (1993) (*Must Carry Order*). Moreover, an otherwise qualified low power station qualifies for cable carriage only if the community of license of that station and the franchise area of the cable system on which it seeks carriage are both located outside of the largest 160 Metropolitan Statistical Areas, ranked by population, as determined by the Office of Management and Budget on June 30, 1990, and the population of the community of license on that date did not exceed 35,000. *See* 47 U.S.C. § 534(h)(2)(E).

[1971] *NPRM*, 27 FCC Rcd at 12480, para. 371.

[1972] Comcast, DIRECTV/DISH, and NCTA support this interpretation. *See* Comcast Comments at 47; DIRECTV/DISH Comments at 5–6; NCTA Comments 21–22.

[1973] DIRECTV/DISH Comments at 5–6. *See* 47 U.S.C. § 338(a)(3); *see also Implementation of the Satellite Home Viewer Improvement Act of 1999: Broadcast Signal Carriage Issues, Retransmission Consent Issues*, CS Docket Nos. 00-96 and 99-363, Report and Order, 16 FCC Rcd 1918, 1977 para. 136 (2000).

707. We note that, as a result of channel sharing with a Class A station and operating with the Class A station's reduced power level, a full power station may find it needs to use alternative means, such as fiber or microwave, to deliver a good quality signal to a cable system headend it previously could reach with its over-the-air signal.[1974] This change, however, will not affect its right to demand carriage throughout its market.[1975] Similarly, NCE stations that share with a Class A station will retain the ability to cure their signal and secure must-carry rights, but only with respect to headends located within 50 miles of their communities of license, or located within their noise limited service contours – the same rights they possess today.[1976]

708. *Carriage Rights of Relocating Channel Sharing Stations*. We clarify in this Section the impact that station relocations made to implement a channel sharing arrangement may have on a station's MVPD carriage rights.[1977] We discuss how channel sharing arrangements may result in the modification of certain stations' television markets, and how these arrangements may impact the ability of stations to exercise their network nonduplication and syndicated-exclusivity rights or to invoke their significantly viewed status in certain counties or communities.

709. As discussed above, stations in certain circumstances will be able to submit channel sharing bids in the reverse auction pursuant to which they will relocate to a different community of license, so long as they remain in the same DMA.[1978] A station's carriage rights will not be expanded or diminished through this process,[1979] although its ability to exercise these rights may change based upon the facts of its specific channel sharing arrangement.[1980] For example, certain NCE and Class A stations

[1974] As Comcast notes, full power stations "must account for the technical prerequisites for carriage when deciding whether to enter into a channel sharing agreement." Comcast Comments at 47.

[1975] Full power commercial stations are considered "local" to the entire market to which they are assigned and are entitled to assert mandatory carriage rights on cable systems located throughout that same market. *See* 47 U.S.C. §§ 534(a), (b)(1)(A)-(B), (h)(1)(A) & (C)(i); *see also Must Carry Order*, 8 FCC Rcd at 2975, para. 37. A commercial broadcast television station's market is its DMA as determined by The Nielsen Company. *See* 47 C.F.R. § 76.55(e)(2). However, to obtain carriage, a local commercial television station must be capable of delivering a good quality signal to a cable system headend or bear responsibility for the cost of delivering such a good quality signal. *See* 47 U.S.C. § 534(h)(1)(B)(iii) and 47 C.F.R. § 76.55(c)(3) (defining "local commercial television station" to exclude those stations failing to deliver a good quality signal to a cable system's headend, unless the station bears the cost of delivering such signal).

[1976] *See* 47 U.S.C. § 535(l)(2)(A)–(B); 47 C.F.R. §§ 76.55(b)(1)–(2); *see also* 47 U.S.C. § 535(i)(1) (stating that an NCE station "may be required to bear the cost associated with delivering a good quality signal or a baseband video signal to the principal headend of the cable system").

[1977] Commenters have expressed divergent views concerning whether channel sharing arrangements should impact stations' carriage rights. *Compare* Tribune Comments at 24–25 (arguing that the Spectrum Act "explicitly requires the FCC to preserve intact the cable and satellite carriage rights of broadcasters that elect to enter into a channel sharing arrangement," and asking that the Commission "adopt rules explicitly preserving and protecting the cable carriage rights of all full power and Class A broadcasters that continue to operate, regardless of their post-auction facilities") *with* NCTA Reply at 12–16 (arguing that "Congress intended to hold cable operators harmless from changes resulting from the Spectrum Act" and suggesting that the Commission should restrict channel sharing arrangements involving a change in community of license that have the potential to increase cable operators' carriage obligations) *and* DIRECTV/DISH Comments at 4 (asking that the Commission "refrain from expanding or altering the mandatory carriage rights of broadcasters on MVPD systems").

[1978] *See* § IV.B.1.b (Reverse Auction Bid Options).

[1979] *See* Spectrum Act § 6403(a)(4); *NPRM*, 27 FCC Rcd at 12480, para. 372; *see also Channel Sharing Report and Order*, 27 FCC Rcd at 4629, para. 26 (stations will retain the same carriage rights operating on a channel sharing basis from a particular location as they would operating from the same location on a non-channel sharing basis).

[1980] The Commission has cautioned that, "in order to ensure carriage, broadcasters must continue to meet the eligibility requirements in our rules after implementing the channel sharing arrangement." *Channel Sharing Report and Order*, 27 FCC Rcd at 4631, para. 30. For example, "carriage rights extend only to those local commercial

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may gain carriage on some cable systems, but lose carriage on others, as a result of the movements of their facilities or the changes in their communities of license.[1981] In addition, a full power commercial station that relocates within its DMA may gain carriage on some cable systems, but lose carriage on others, as a result of market modification requests.[1982] A broadcaster may seek to add communities to its market which it can now reach from its new location, and, conversely, a cable system may seek to exclude communities from the broadcaster's market that the station no longer serves as a result of its move.[1983] Because full power commercial stations have market-wide carriage rights, their movements within their assigned DMA should not automatically result in modification petitions, but unique factual situations may arise, such as a station's move resulting in its serving new communities outside of its DMA.[1984] Although it is thus possible that some cable operators may see a change in the local stations they must carry as a result of channel sharing agreements, either by gaining or losing stations, the statutory caps on the number of must-carry stations these systems are required to carry will not change.[1985]

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stations that provide a 'good quality signal' of at least -61 dBm to the cable or satellite provider," and stations will have to provide this signal level to qualify for carriage from a shared location. *Id*. at para. 30 n.101 (citing 47 U.S.C. §§ 338(b), 534(h)(1)(B)(iii)); *see also* para. 707 (NCE and full power commercial stations can cure a low quality signal through alternative means, provided they bear the cost).

[1981] An NCE station is eligible for mandatory carriage only with respect to cable systems with headends located within 50 miles of its community of license or located within its noise limited service contour. *See* 47 U.S.C. §§ 535(l)(2)(A)–(B); *see also* 47 C.F.R. §§ 76.55(b)(1)–(2). Accordingly, if an NCE station changes its community of license or shifts its signal contour, it may gain carriage on some cable systems and lose carriage on others. Furthermore, if a Class A station moves for purposes of channel sharing, its subsequent cable carriage rights will depend upon its ability to meet the same requirements applicable to qualified low power stations at its new location, including that (i) it not be located in the same county or other political subdivision (of a State) as a full-power station; (ii) its transmitter be within 35 miles of the cable system's principal headend; and (iii) it deliver a good quality signal to that headend (although, unlike NCE and full power commercial stations, it will have no right to improve the quality of its signal to meet the signal quality threshold). *See* 47 U.S.C. § 534(h)(2)(D) & (F); 47 C.F.R. § 76.55(d)(4) & (6); *see also Central Ohio Ass'n of Christian Broads.*, MB Docket No. 12-366, Memorandum Opinion & Order, 28 FCC Rcd 5271, 5272, para. 4 & n.12 (2013) (citing *Must Carry Order*, 8 FCC Rcd at 2991, para. 104 ("We also reject the suggestion . . . to extend the provisions of Section 614(h)(1)(B)(iii) [pertaining to the right of a full-power commercial station to cure a low quality signal through alternative means, provided it bears the cost], which apply on their face to full power television stations, to LPTV stations.")).

[1982] As explained above, *see* n.1978, each full power commercial television station is assigned to a market or DMA, and § 614(h)(1)(C) of the Communications Act permits the Commission, in response to a written request, to add communities to or subtract communities from a station's television market to better reflect marketplace conditions. *See* 47 U.S.C. § 534(h)(1)(C). The Commission has established a market modification procedure whereby stations or cable operators may file special relief petitions requesting that a station's market be changed. *See* 47 C.F.R. § 76.59; *see also Must Carry Order*, 8 FCC Rcd at 2976–77, paras. 42–47.

[1983] There are a number of nonexclusive statutory factors the Commission considers in deciding whether to grant or deny such market modification requests, and the scope of a station's signal is only one. *See* 47 U.S.C. §§ 534(h)(1)(C)(ii)(I)–(IV). Whether a full power commercial station gains or loses its ability to exercise its carriage rights in particular communities depends on whether a market modification is sought and the application of these factors. We note that such market modifications are not available to NCE or Class A stations.

[1984] We decline to revise Part 76 of our rules regarding MVPD must-carry obligations as suggested by Entravision because any changes to the must-carry regime are beyond the scope of this proceeding. Entravision Comments at 12–13.

[1985] For example, cable operators generally must carry local commercial full power television stations, up to one-third of the aggregate number of usable activated channels of such system. *See* 47 U.S.C. § 534(b)(1)(B). The number of qualifying NCEs they must carry is also limited. *See* 47 U.S.C. § 535(b)(1)–(3) & (e). With respect to low power and Class A stations, however, a cable system with more than 35 channels must carry two low power stations only if there are not enough local commercial television stations to fill the full power channel set asides. *See* 47 U.S.C. § 534(c)(1); 47 C.F.R. § 76.56(b)(3). These cable carriage rules will not change with the advent of
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710. *Potential Impact of Relocating Channel Sharing Stations on Other Rules.* Stations changing their communities of license or signal contours as a result of channel sharing may impact other Commission rules.[1986] Under the Commission's cable network nonduplication rules,[1987] a station that has been contractually granted the exclusive right to distribute certain network programming[1988] in a geographic area is entitled to assert that exclusivity right by preventing the retransmission of that programming by other stations on cable systems serving communities[1989] that fall within a certain distance of its community of license.[1990] Similarly, the syndicated exclusivity rule allows a commercial broadcast station to protect its exclusive distribution of syndicated programming by requiring local cable systems with more than 1,000 subscribers to delete duplicative syndicated programming from cable communities located within 35 miles of the station's community of license.[1991] Exclusivity rights also exist in the satellite context with respect to the retransmission of nationally distributed superstations.[1992] Given the

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channel sharing. Moreover, in light of our decision to allow channel sharing stations to relocate only within their current DMAs, any new carriage obligations resulting from channel sharing will be limited. *See* § IV.B.1.b (Bid Options). The carriage rules applicable to DBS operators will also not change as a result of channel sharing. *See* 47 C.F.R. § 76.66. Given that DBS operators' carriage obligations are limited to market-wide retransmission of television signals broadcast in the same local market ("local-into-local" service), we estimate that movements of stations within their local markets should generally result in no net change in the number of signals carried by satellite systems in a market. *See* 47 U.S.C. § 338(a)(1); 47 C.F.R. § 76.66(a)(6) & (b); *see also Implementation of the Satellite Home Viewer Improvement Act of 1999: Broadcast Signal Carriage Issues*, CS Docket No. 00-96, Report and Order, 16 FCC Rcd 1918, 1934–35, paras. 34–36 (2000) (interpreting § 338 of the Communications Act, 47 U.S.C. § 338(k)(3), and § 122 of the Copyright Act, 17 U.S.C. § 122(j)(2)(A) & (C), such that "local market," as it is used for satellite carriage purposes, includes all counties within a market, as well as the home county of the television station if that county is not physically located in the DMA). In addition, we estimate that, with some stations returning spectrum rights and going off the air entirely, the net effect of the auction and repacking should be an overall reduction in the number of stations MVPDs must carry. Finally, the costs that MVPDs reasonably incur in order to begin carrying new stations in these circumstances will be reimbursable under the Spectrum Act.

[1986] We note that, in some circumstances, a licensee is able to cover its community of license, and/or remain in the same DMA, while moving a transmit site across state lines. If, as the result of a successful channel sharing bid, a licensee changes its state of license, the licensee will follow the license renewal dates for the state in which it was licensed prior to the auction until commencement of the 2020 renewal cycle.

[1987] *See* 47 C.F.R. § 76.92(a).

[1988] "Network program" is defined as "any program delivered simultaneously to more than one broadcast station regional or national, commercial or noncommercial." 47 C.F.R. § 76.5(m). It is not necessary that the program be delivered by a "television network."

[1989] Cable systems are comprised of one or more "community units" that correspond to separate and discrete communities or municipal entities. *See* 47 C.F.R. § 76.5(dd).

[1990] The "geographic zone" in which a station can assert network nonduplication rights is set in a station's network-affiliation agreement, but its size is limited by the rules depending on the station's market. *See* Note to 47 C.F.R. § 76.92 For a station in one of the Top 100 television markets, the zone of protection may not exceed 35 miles from the reference point of its community of license. *See id.* (citing 47 C.F.R. § 73.658(m)); *see also* 47 C.F.R. § 76.51 (listing the major or top 100 television markets). For this purpose, the rules provide a list of the reference points for each community. *See* 47 C.F.R. § 76.53. Where such reference points are not available for a community, the location of the main post office of the community is used. *See id.* The zone of protection for a smaller market television station extends 55 miles from its community reference point. *See* Note to 47 C.F.R. § 76.92.

[1991] 47 C.F.R. § 76.101; *see also* Note to 47 C.F.R. § 76.101 (citing 47 C.F.R. § 73.658(m)). Unlike the network nonduplication rules, there is no difference in the zone of protection between smaller and larger market stations under the syndicated exclusivity rules. A syndicated program is defined as "any program sold, licensed, distributed or offered to television station licensees in more than one market within the United States other than as network programming." 47 C.F.R. § 76.5(ii).

[1992] *See, e.g.*, 47 C.F.R. §§ 76.122, 76.123. Due to the technical differences between how cable and satellite transmit programming to communities, the zones of protection for satellite are defined in terms of zip codes. DBS operators (continued….)

possibility that full power commercial stations may change their communities of license as a result of channel sharing, it is likely that where such stations may assert their network nonduplication and syndicated exclusivity zones of protection will change.[1993]

711. Moreover, commercial broadcast stations that vary their signal strength or change their locations as a result of channel sharing may modify their status as "significantly viewed" in certain counties or communities under sections 76.5(i) and 76.54 of our rules.[1994] Our significantly viewed rules permit a station that demonstrates significant viewership in certain communities[1995] to be carried in those communities as a "local" station for purposes of calculating the statutory copyright fees paid by cable and satellite system operators for carrying it, even outside of its market,[1996] and to be exempt from another station's assertion of its network non-duplication or syndicated exclusivity rights in those communities.[1997] Because significantly viewed status is largely a function of signal availability, once a full power commercial station is permitted to move in order to channel share, or to modify the shape or strength of its over-the-air signal, it will lose its status as "significantly viewed" in those counties and communities it can no longer reach with its over-the-air signal, and it will have to apply for such status in counties or communities it will be able to reach with the new scope of its signal.[1998]

B. 600 MHz Band Technical and Service Rules

712. As discussed above, we are creating a terrestrial wireless broadband service with the repurposed broadcast spectrum from the incentive auction. Below, we adopt technical rules for the 600 MHz Band similar to those in the adjacent Lower 700 MHz Band. We also adopt service rules that

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must provide protection in all relevant zip codes that fall "in whole or in part" within a station's zone of protection. *See* 47 C.F.R. §§ 76.120(e)(1) & (e)(2), 76.122(a), 76.123(a); *see also Implementation of the Satellite Home Viewer Improvement Act of 1999: Application of Network Non-Duplication, Syndicated Exclusivity, and Sports Blackout Rules to Satellite Retransmissions of Broadcast Signals*, CS Docket No. 00-2, Report and Order, 15 FCC Rcd 21688, 21703-05, paras. 28-32 (2000).

[1993] In a Further Notice of Proposed Rulemaking seeking comment on whether to modify or eliminate the network non-duplication and syndicated exclusivity rules, the Commission asked whether it should modify its exclusivity rules in light of the opportunity stations will have to channel share under the Spectrum Act. *See Amendment of the Commission's Rules Related to Retransmission Consent*, MB Docket No. 10-71, Report and Order and Further Notice of Proposed Rulemaking, FCC 14-29, para. 73 (rel. Mar. 31, 2014).

[1994] *See* 47 C.F.R. §§ 76.5(i), 76.54. Section 340(c)(2) of the Communications Act requires that the Commission's website host a current list of all such significantly viewed stations, which consists of the 1972 list as amended over time via additions of stations newly found to be significantly viewed, as well as the removal of stations determined to be no longer significantly viewed in specific communities through case-by-case adjudications. *See* 47 U.S.C. § 340(c)(2); FCC, Significantly Viewed List, http://transition fcc.gov/mb/significantviewedstations112013.pdf (last visited Apr.7, 2014).

[1995] *See* 47 C.F.R. §§ 76.5(i), 76.54(b).

[1996] *See, e.g., Implementation of the Satellite Home Viewer Extension and Reauthorization Act of 2004*, MB Docket No. 05-49, Report and Order, 20 FCC Rcd 17278, 17281, para. 3 (2005).

[1997] *See* 47 C.F.R. §§ 76.92(f) and 76.106(a) (significantly viewed exception to cable network nonduplication and syndicated exclusivity for cable); 47 C.F.R. §§ 76.122(j) and 76.123(k) (significantly viewed exception to satellite network nonduplication and syndicated exclusivity for satellite).

[1998] To assist such applications, stations which have experienced a significant technical upgrade or change to their facilities will continue to be eligible to file a waiver to be treated as "new" stations eligible to use county-wide data pursuant to § 76.54(d) in order to demonstrate their significantly viewed status. *See KSTC-TV, LLC Request for Significantly Viewed Status*, Order on Reconsideration, 25 FCC Rcd 8123, 8124, para. 2 n.4 (2010) (citing 47 C.F.R. § 76.54(d)); *see also Taft Television and Radio Co., Inc.*, Memorandum Opinion and Order, 103 FCC 2d 883, 886, para. 7 (1986); *Calvert TeleCommunications Corp.*, Memorandum Opinion and Order, 63 FCC 2d 1022, 1025-26, para. 5 (1977).

specify the terms under which we license the 600 MHz Band, which are consistent with the fixed and mobile allocation for the band.[1999] Specifically, we adopt a set of service rules that allows for maximum flexibility for wireless carriers to utilize the 600 MHz Band spectrum; determines which license restrictions apply to wireless licenses in this band; sets forth the license term, performance requirements, and license renewal criteria; and establishes secondary market transaction and permanent discontinuance rules for 600 MHz Band wireless licenses. We also affirm that other rule parts that pertain generally to wireless communication services will similarly apply to 600 MHz Band licensees.

1. Technical Rules

713. In the *NPRM*, the Commission proposed to adopt technical rules similar to those in the adjacent Lower 700 MHz Band in an effort to maximize flexible use of the 600 MHz Band while appropriately protecting incumbent operations in the neighboring bands.[2000] As discussed below in greater detail, we adopt primarily the Lower 700 MHz Band technical rules, contained in Part 27 of the Commission's rules, for the 600 MHz Band. The Lower 700 MHz Band technical rules have generally prevented harmful interference in that band,[2001] and given the similar propagation and interference characteristics of the 600 MHz and Lower 700 MHz Bands, and that the services provided in both Bands will likely be similar, we anticipate that these technical requirements would also prevent harmful interference in the 600 MHz Band.[2002] In addition, the 600 MHz and Lower 700 MHz Bands are adjacent to each other, and consistent rules across these adjacent bands should speed the deployment of the 600 MHz Band while protecting incumbent licensees in the Lower 700 MHz Band from harmful interference.[2003] Furthermore, commenters generally support this approach.[2004]

a. Out-of-Band Emission Limits

714. *Background*. As explained above, we are licensing the 600 MHz Band spectrum in paired 5+5 megahertz blocks using Partial Economic Area ("PEA") licenses.[2005] Because we plan on licensing multiple spectrum blocks, we must consider how to address interference between adjacent

[1999] *See* § III.E (Allocations).

[2000] *NPRM*, 27 FCC Rcd at 12423-24, para. 185.

[2001] We note that in the Lower 700 MHz Band proceeding, some parties raised concerns about interference between broadcast television and wireless services in the A block of the Lower 700 MHz Band. *700 MHz Interoperability R&O*, 28 FCC Rcd at 15127-28, para. 12. Because we are establishing technically reasonable guard bands between high power broadcast television services and wireless services in the 600 MHz Band, we expect the technical rules we adopt—in conjunction with the guard bands—will serve to protect against harmful interference. *See* § III.A.2.e (Guard Bands). We note that we will provide further guidance in subsequent releases for the rules to protect against inter-service interference between co- and adjacent-channel television operations and wireless services. *See* § III.A.2.d (Market Variation).

[2002] *See* CEA Comments at 26 (the Lower 700 MHz Band rules have generally "worked to avoid harmful interference between broadcast and mobile operations, with the one notable exception being the issue of Channel 51/52 operations; . . . [and the 600 MHz Band has] similar propagation and interference characteristics").

[2003] *See* TIA Comments at 18 (the Lower 700 MHz Band rules "have proven successful in promoting rapid deployment of services in other bands, and . . . should be carried over to the 600 MHz mobile broadband band").

[2004] *See, e.g.*, Nokia Comments at 20 (Nokia "agrees with the Commission's proposal to largely base the new service rules for the 600 MHz Band on those used in the Lower 700 MHz Band."); Qualcomm Comments at 24 ("Qualcomm supports the Commission's general approach of applying the technical rules for the Lower 700 MHz to the 600 MHz Band."). The few areas of disagreement in the 600 MHz Band technical rules are limited to questions stemming from the 600 MHz Band plan design rather than the application of the Lower 700 MHz Band technical rules themselves to 600 MHz operations. *See, e.g.*, § VI.B.1.a (Out-of-Band Emission Limits).

[2005] *See* §§ III.A.2.b (5+5 MHz, Interchangeable Spectrum Blocks), III.A.2.c (Geographic Area Licensing).

blocks within the 600 MHz Band, and between the 600 MHz Band and adjacent bands.[2006] In the *NPRM*, the Commission proposed to apply section 27.53(g) of the Commission's rules to the 600 MHz Band, which includes out-of-band emission ("OOBE") attenuation of $43+10*\log_{10}(P)$ dB and the associated measurement procedure.[2007]

715. *Discussion*. Four interference scenarios exist that relate to OOBE limits: (1) interference to adjacent 600 MHz Block operations; (2) interference to adjacent Lower 700 MHz Band operations; (3) interference to television operations; and (4) interference to channel 37 operations.

716. *Interference to Adjacent 600 MHz Block Operations*. We adopt section 27.53(g) of the Commission's rules, which includes OOBE attenuation of $43+10*\log_{10}(P)$ dB and the associated measurement procedure, to address interference between adjacent blocks within the 600 MHz Band, and between 600 MHz Band spectrum and adjacent bands. This OOBE limit is commonly employed in other commercial wireless services bands and it has generally been found to be adequate in preventing harmful interference to adjacent spectrum blocks operations.[2008] Additionally, it is beneficial to maintain comparable emissions limits among commercial bands with similar services so as not to disadvantage one band over another.[2009]

717. *Interference to Adjacent Lower 700 MHz Band Operations*. The upper end of the 600 MHz Band uplink band is adjacent to the lower portion of the Lower 700 MHz Band,[2010] which is also being used for mobile uplink operations.[2011] As discussed above, the interference environment between these two bands will be similar to interference within either band and the OOBE limits we are adopting will protect adjacent Lower 700 MHz Band because their operations are harmonized.[2012]

718. *Interference to Television Operations*. Under the 600 MHz Band Plan, the lower end of the 600 MHz Band downlink band will likely be adjacent to broadcast television operations, with a guard band between the two services.[2013] Most parties commenting on this issue support the Commission's proposal to adopt the Lower 700 MHz Band OOBE requirements.[2014] However, IEEE 802 and the Wi-Fi Alliance express concern that emissions from 600 MHz Band uplinks may cause interference to nearby television receivers and that the Commission should regulate the OOBE limits of all newly licensed

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[2006] One predominant type of adjacent-band interference is caused by out-of-band emissions of the interfering transmitter that falls directly within the operating channel of the victim receiver in the adjacent-band. Out-of-band emissions interference cannot be filtered out by the victim receiver, and can only be mitigated through appropriate filtering at the transmitter to limit the out-of-band emissions.

[2007] *NPRM*, 27 FCC Rcd at 12424, para. 188.

[2008] *See, e.g.*, *AWS-1 R&O*, 18 FCC Rcd at 25198, para. 91. Section 27.53(m) provides that the Commission has authority to require greater attenuation when OOBE causes harmful interference. *See* 47 C.F.R. § 27.53(m).

[2009] *NPRM*, 27 FCC Rcd at 12424-25, para. 190.

[2010] *See* § III.A.2.a (All-Paired, Down From 51 Band Plan).

[2011] *NPRM*, 27 FCC Rcd at 12424, para. 189.

[2012] *See* § III.A.2.e (Guard Bands).

[2013] *See* § III.A.2.a (All-Paired, Down From 51 Band Plan). We note that in the event that 84 megahertz of broadcast spectrum is repurposed, the 600 MHz Band downlink band will instead be adjacent to channel 37, with a three megahertz guard band. *See* Technical Appendix § III.B.6 (Seven Sets of Paired Blocks (84 megahertz repurposed)).

[2014] *See, e.g.*, Qualcomm Comments at 24 ("agrees with applying current FCC Rule Section 27.53(g) for out-of-band emissions attenuation of 43+10*log10(P) dB and the associated measurement procedure to the 600 MHz Band"). Television is a "one way" service (i.e., the broadcast stations do not receive any signals) so we are not concerned with protecting broadcast transmissions but instead must ensure that TV receivers/sets are able to adequately receive the broadcast transmissions.

devices (e.g., mobile broadband handsets) to ensure that we protect all authorized devices.[2015] Under the 600 MHz Band Plan, mobile uplink operations are not adjacent to television broadcast spectrum and will therefore not interfere with television receivers.[2016]

719. Based on our technical analysis, this OOBE requirement, in conjunction with the guard bands we establish, will prevent harmful interference to television and channel 37 operations.[2017] Accordingly, the proposed OOBE limits for the 600 MHz Band, with a required guard band, will address interference to all television operations.[2018] We note that in the event that a specific incidence of harmful interference occurs, we may impose stricter emissions limits as a remedy.[2019] By applying the same OOBE limits as currently exist between the Lower 700 MHz Band and television stations, 600 MHz Band licensees will provide similar protection as exists today.

720. *Interference to Channel 37 Operations*. Depending on the total amount of spectrum made available for flexible use, we may permit either television stations, and/or 600 MHz Band base stations to operate adjacent to channel 37 operations.[2020] Television stations currently operate adjacent to channel 37 without any guard bands at very high power, with no reported problems, which indicates that the television stations' OOBE and power limits are sufficient to protect channel 37 operations.[2021] Both of these current limits are higher than those adopted for the 600 MHz Band.[2022] The 600 MHz Band OOBE and power limits coupled with three megahertz guard bands will provide as much or more protection to channel 37 operations than they currently receive from television operations. Therefore, these limits are sufficient to protect against harmful interference to existing channel 37 operations.

721. Some commenters argue that we should adopt more stringent emission limits to protect WMTS operations in channel 37. Specifically, they express concern that the reallocation of the 600 MHz Band for fixed and mobile services will result in a large number of mobile devices and/or base stations operating in close proximity of WMTS operations on adjacent channels, which will result in significant interference to WMTS operations.[2023] To address possible interference from mobile devices to WMTS operations, these commenters propose that we apply the spectral mask for TV white space devices[2024] to transmitters operating on channels adjacent to WMTS.[2025] In the alternative, WMTS Coalition suggests we restrict all mobile uplink transmissions to bands well removed from channel 37.[2026] In our Band Plan

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[2015] IEEE 802 Reply at 3; Wi-Fi Alliance Reply at 4.

[2016] *See* Technical Appendix § III.B (Specific Band Plan Scenarios).

[2017] *See* § III.A.2.e (Guard Bands).

[2018] We reiterate that these OOBE limits are the general limits applicable to all 600 MHz licensees. As noted in § III.A.2.d (Market Variation), we plan to adopt inter-service interference rules that will govern operations in impaired license areas.

[2019] 47 C.F.R. § 27.53(m); *Lower 700 MHz R&O*, 17 FCC Rcd at 1069-1070, para. 122.

[2020] Technical Appendix § III.B (Specific Band Plan Scenarios).

[2021] *See NPRM*, 27 FCC Rcd at 12425, para. 191.

[2022] *See* § VI.B.1.b (Power Limits).

[2023] For example, GEHC notes that there are only 74 full-power television stations that transmit on adjacent channels and that "some healthcare facilities have been forced to incorporate aggressive filtering mechanisms and/or implement a de facto guard band within channel 37 to protect WMTS operations from adjacent channel broadcast signals." GEHC Comments at 22.

[2024] 47 C.F.R. § 15.709(c)(4).

[2025] *See, e.g.*, Philips Healthcare Comments at 6; WMTS Coalition Comments at 28 n.43.

[2026] WMTS Coalition Comments at 29.

scenarios, the mobile uplink band will not be adjacent to WMTS operations; as a result, mobile devices should not cause harmful interference to WMTS operations.[2027]

722. To address possible harmful interference from base stations, commenters suggest we either prohibit base stations from operating within a specific range of WMTS systems,[2028] coordinate base station operations with adjacent WMTS systems and limit the maximum allowable field strength of base station emissions,[2029] or consider creating a guard band between channel 37 WMTS operations and wireless broadband operations.[2030] To protect Radio Astronomy facilities from wireless downlinks into Radio Astronomy observations, NAS-CORF proposes OOBE limits below $43+10*\log_{10}(P)$ dB.[2031]

723. We also note that Sony recommends that we clearly define transmission masks for all operations under the new 600 MHz Band, including both television and wireless data, and for both base stations and mobile devices.[2032] The Commission's transmission masks for existing spectrum bands and the associated measurement procedures are clearly defined in its "Emission Limits" rules.[2033]

724. As discussed above, we adopt a three megahertz guard band between 600 MHz base stations and channel 37 services.[2034] Further, we adopt a band plan that has generally large separations between 600 MHz mobile stations and channel 37 services, and require 600 MHz licensees to coordinate with NSF when radio astronomy observatories are near their operations.[2035] Given these considerations, the proposed OOBE limits for the 600 MHz Band will mitigate potential harmful interference to channel 37 operations. If a specific incidence of harmful interference occurs, we may impose stricter emissions limits as a remedy.[2036]

b. Power Limits

725. *Background*. In the *NPRM*, the Commission proposed to apply power limits for the 600 MHz Band that are generally consistent with the Lower 700 MHz Band.[2037] As the Commission noted in the *NPRM*, however, we must modify the Lower 700 MHz Band rules on power limits for purposes of the 600 MHz Band because, unlike the Lower 700 MHz Band, the 600 MHz Band has a predetermined

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[2027] Channel 37 will be adjacent to either the mobile downlink band or broadcast spectrum while the mobile uplink band will be at least 24 megahertz away from channel 37 (in the 144 megahertz scenario), which is more than sufficient spectral separation. *See* Technical Appendix § III.B (Specific Band Plan Scenarios).

[2028] Philips Healthcare suggests that we prohibit wireless base stations from operating within 500 meters of WMTS systems. Philips Healthcare Comments at 5.

[2029] GEHC suggests that wireless broadband licensees coordinate the construction and operation of base stations and obtain the written concurrence of the affected healthcare facility. In addition, GEHC states that the Commission should limit the maximum allowable field strength of Part 27 base station fundamental emissions in channels 36 and 38 to 20 mV/m/MHz (i.e., 86 dBμV/m/MHz), as measured at the perimeter of a registered WMTS facility stations. To mitigate the risk of co-channel interference, GEHC proposes a limit of 10 μV/m/100kHz (i.e., 20 dBμV/m/100kHz) within channel 37. GEHC Comments at 24.

[2030] WMTS Coalition Comments at 29-30.

[2031] NAS-CORF Comments at 10-11.

[2032] Sony Comments at 7.

[2033] For example, the transmission masks for the 700 MHz, AWS and BRS Bands can be found at 47 C.F.R. § 27.53.

[2034] *See* § III.A.2.e (Guard Bands). *See also* Technical Appendix §§ II.E.2 (Potential for Interference between 600 MHz Downlink and WMTS).

[2035] *See* Technical Appendix §§ III.B (Specific Band Plan Scenarios); II.E.3 (Potential for Interference between 600 MHz Downlink and RAS); III.D.1.b.ii (Interference Protections for Incumbent Services).

[2036] 47 C.F.R. § 27.53(m); *see also Lower 700 MHz R&O*, 17 FCC Rcd at 1069-70, para. 122.

[2037] *NPRM*, 27 FCC Rcd at 12425, para. 192.

uplink and downlink band with similar wireless services.[2038] For 600 MHz Band downlink operations, it proposed to limit fixed and base station power for downlink operations in non-rural areas to 1000 watts ERP for emission bandwidths less than 1 MHz and to 1000 watts per 1 MHz ERP for emission bandwidths greater than one megahertz, and to double these limits to 2000 watts or 2000 watts/MHz ERP in rural areas, provided advance notice is given.[2039] In addition, the Commission proposed not to apply the power flux density requirements of section 27.55(b) to the 600 MHz Band because there is no provision for high powered (50 kW) stations within the 600 MHz Band.[2040] In the 600 MHz Band uplink band, the Commission proposed to adopt the same power limit of three watts ERP for both portables and mobiles that apply to the Lower 700 MHz Band and prohibit higher-powered control station operations, which are allowed in the Lower 700 MHz Band.[2041]

726. *Discussion*. Commenters overwhelmingly support our adopting the proposed power limits for the 600 MHz Band.[2042] We adopt these proposed limits, which will help ensure robust service in the 600 MHz Band while also helping to minimize harmful interference into other bands. These power limits are also commonly employed in other commercial wireless services bands and it has generally been found to be adequate in preventing harmful interference to adjacent spectrum blocks operations.[2043]

c. Base Station Antenna Height Restrictions

727. *Background*. In the *NPRM*, the Commission proposed to apply the Lower 700 MHz Band flexible base station antenna height rules to 600 MHz Band base stations.[2044] Part 27 of the Commission's rules does not provide specific antenna height restrictions for the Lower 700 MHz Band. Pursuant to section 27.56, however, all services operating under Part 27 must limit base station antenna heights to elevations that do not present a hazard to air navigation.[2045] Additionally, the limitations of field strength at the geographical boundary of the license also effectively limit antenna heights.[2046] As a result, the Commission proposed not to require unique antenna height limits for 600 MHz Band facilities, concluding that the general height restrictions of Part 27 are sufficient.[2047]

728. *Discussion*. Consistent with the Commission's proposal, specific antenna height restriction for 600 MHz Band base stations are not necessary. As discussed above, the general requirement to not endanger air navigation and the effective height limitations implicitly resulting from our co-channel interference rules obviate the need for specific antenna height restrictions for 600 MHz

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[2038] *Id.* at 12425, para. 192.

[2039] *Id.* at 12425, para. 193. *See also* 47 C.F.R. § 27.50(c)(8)(rule requiring advanced notice).

[2040] The power flux density requirement in the Lower 700 MHz Band is used to limit the signal strengths on the ground near the high-powered stations. *NPRM*, 27 FCC Rcd at 12425, para. 193; 47 C.F.R. § 27.55.

[2041] *NPRM*, 27 FCC Rcd at 12425, para. 194.

[2042] Alcatel-Lucent Comments at 28 (supports the Commission's proposal to apply the Lower 700 MHz Band power limits (but not power flux density limits) to the 600 MHz Band); Harris Broadcast Comments at 27 (the Commission should adopt its proposal to apply power limits no greater than the 700 MHz Band); Verizon Comments at 57 (the Commission's power limit proposals in the *NPRM* are appropriate for 600 MHz Band licenses).

[2043] For example, we set similar power limits in the 700 MHz Bands and the AWS-1 Band. *See* 47 C.F.R. §§ 27.50(c), (d).

[2044] *NPRM*, 27 FCC Rcd at 12426, para. 195; *see also* 47 C.F.R. § 27.50(c).

[2045] *See* 47 C.F.R. § 27.56.

[2046] *See* § VI.B.1.d (Co-Channel Interference Between 600 MHz Band Wireless Broadband Systems). Wireless licenses may also be restricted if regulations are adopted to protect against inter-service interference. *See* § III.A.2.d. (Market Variation).

[2047] *NPRM*, 27 FCC Rcd at 12426, para. 195.

Band licensees. Further, commenters addressing this issue support this proposal.[2048] Thus, we will not require specific antenna height restrictions for 600 MHz Band base stations.

d. Co-Channel Interference Between 600 MHz Band Wireless Broadband Systems

729. *Background*. Co-channel interference rules prevent harmful interference between geographically adjacent licensees operating in the same spectrum. To avoid this interference, we set field strength limits that apply at the geographic edge of the license area.[2049] In the *NPRM*, the Commission proposed to apply the current Lower 700 MHz Band field strength limit to 600 MHz Band operations to prevent interference among 600 MHz Band wireless broadband providers, because of the similarity between these spectrum bands, both in terms of their propagation and interference characteristics.[2050] Because we are licensing the 600 MHz Band spectrum in smaller than nationwide service areas,[2051] we must adopt field strength limits here to prevent interference among 600 MHz Band wireless providers.

730. *Discussion*. We adopt the 700 MHz Band co-channel interference requirements, limiting field strength levels at the edge of a license area to 40 dBμV/m for the 600 MHz Band to protect adjacent wireless broadband systems from one another.[2052] As explained above, the 700 MHz Band requirements are appropriate because of the 700 MHz Band's similar propagation and interference characteristics. Commenters support this approach.[2053] Thus, we adopt the proposed co-channel interference levels and expand section 27.55(a)(2) of the Commission's rules to include the 600 MHz Band.[2054]

e. Interoperability Rule

731. *Background*. In the *NPRM*, the Commission identified interoperability as one of the five key policy goals that would guide the choice of a wireless band plan.[2055] The Commission sought comment on several interoperability considerations including whether to require interoperability by adopting a specific interoperability rule or whether the Commission's band plan proposals sufficiently encouraged and ensured interoperability;[2056] how market variation affects interoperability and the number

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[2048] *See, e.g.*, Alcatel-Lucent Comments at 29 (agrees with the Commission's proposal to apply to new wireless operations in the new 600 MHz Band the flexible antenna height rules currently applied in the Lower 700 MHz Band); Harris Broadcast Comments at 27 (the Commission should adopt its proposal to apply antenna height rules that are no greater than the height specified in the Lower 700 MHz Band rules); Verizon Comments at 58 (supports the application of the Lower 700 MHz Band flexible antenna height rules to the 600 MHz Band).

[2049] *See* 47 C.F.R. § 27.55(a).

[2050] *NPRM*, 27 FCC Rcd at 12426, para. 196.

[2051] *See* § III.A.2.c (Geographic Area Licensing).

[2052] *See* 47 C.F.R. 27.55(a)(2). We note, however, that adjacent licensees can agree on a different field strength. 47 C.F.R. § 27.55(a). As we note above, to accommodate market variation, we may allow wireless broadband systems and television stations to operate on the same channel, which can result in inter-service interference. Rules to address this issue will be adopted in a future Commission release. *See* § III.A.2.d (Market Variation).

[2053] *See, e.g.*, CTIA Comments at 30; TIA Comments at 18 n. 61. *But see* Verizon Comments at 58 (stating that the Commission should adopt a 50 dBμV/m per MHz field strength limit for 600 MHz licensees because this type of measurement is more appropriate for broadband LTE technologies). As discussed in the *H Block Order*, we intend to explore the issue of whether to apply a measurement bandwidth to co-channel boundary limits in future service rules proceedings, once we have a more fulsome record on the issue. *See H Block Report and Order*, 28 FCC Rcd at 9515-16, para. 79.

[2054] 47 C.F.R. § 27.55(a)(2).

[2055] *NPRM*, 27 FCC Rcd at 12401, para. 123.

of band plans that should be supported;[2057] and how to resolve issues related to coexistence of Lower A Block operations and channel 51.[2058]

732. *Discussion.* We adopt an interoperability requirement for the 600 MHz Band. Specifically, we require that user equipment certified to operate in any portion of the 600 MHz Band must be capable of operating throughout the 600 MHz Band.[2059] Although the 600 MHz Band Plan promotes interoperability by creating a single paired band rather than multiple bands, it does not guarantee that interoperability will naturally occur, particularly since, as a technical matter, multiple filters may be needed depending on how much spectrum is repurposed.[2060]

733. Commenters overwhelmingly support the principle of interoperability. Many commenters agree that the Commission should mandate an interoperability requirement[2061] while others suggest that the Commission could encourage interoperability through a carefully organized band plan.[2062] US Cellular proposes that the Commission should "require that: (1) all mobile devices designed to operate on 600 MHz paired spectrum must tune to all 600 MHz paired frequencies; and (2) all 600 MHz networks operating on 600 MHz paired frequencies must permit the use of such devices."[2063] US Cellular also suggests that, in the event that we offer nationwide downlink-only blocks, any interoperability requirement should apply to downlink-only spectrum as well.[2064] Verizon Wireless, however, states that "the Commission should not adopt any interoperability requirement but should instead facilitate interoperability by adopting a well-conceived band plan that minimizes interference issues."[2065] It also raises concerns that mandating interoperability will have a negative impact on investment and reduce the value of auctioned spectrum by increasing device complexity, size and cost.[2066]

734. Historically, the Commission has supported promoting interoperability. Beginning with the licensing of cellular spectrum, the Commission has opined that consumer equipment should be capable of operating over the entire range of cellular spectrum as a means to "ensure full coverage in all

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[2056] *Id.* at 12415, para. 162.

[2057] *Id.* at 12415-16, paras. 163-64.

[2058] *Id.* at 12416, para. 165.

[2059] This requirement does not prescribe or require that all technologies be supported in a 600 MHz Band device, but only that a provider serving the 600 MHz Band must ensure that the devices it provides using its technology of choice must operate across the entire 600 MHz Band.

[2060] *See* Technical Appendix § II.A (Mobile Filter Considerations).

[2061] *See, e.g.*, CCA Reply at 10-12; C Spire Comments at 8-9; DISH Reply at 11-12; KSW Reply at 5; Leap Comments at 7; McBride *Band Plan PN* Comments at 3-4; MetroPCS Comments at 28; NTCA Comments at 2-3; PISC Reply at 15-16; T-Mobile Reply at 50-54 (advocating for an interoperability rule and random assignment procedures, which "reinforces and extends the interoperability requirement that T-Mobile and many other commenters support by providing durable, market-based incentives for manufacturers to create interoperable devices capable of tuning across all paired spectrum following the 600 MHz auction"); Letter from Leighton T. Brown, Counsel for US Cellular, to Marlene Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Jan. 6, 2014) (US Cellular Jan. 6, 2014 *Ex Parte* Letter).

[2062] *See, e.g.*, AT&T Reply at 37-40; CEA Comments at 16; Ericsson Reply at 4; RIM Comments at 12-13; Verizon Reply at 38.

[2063] US Cellular Jan. 6, 2014 *Ex Parte* Letter at 2.

[2064] US Cellular Jan. 6, 2014 *Ex Parte* Letter at 2-3.

[2065] Verizon Reply at 38-40. *See also* AT&T Reply at 37-40.

[2066] Verizon Reply at 39.

markets and compatibility on a nationwide basis."[2067] More recently, a group of small and rural wireless licensees in the Lower 700 MHz Band asserted that the larger wireless carriers had been involved in developing restrictive band classes for 700 MHz mobile equipment, which limited their ability to provide roaming to their customers, delayed the deployment of networks in rural areas, and limited smaller wireless carriers from fully utilizing their spectrum, and urged the Commission to initiate a rulemaking to address interoperability issues in the 700 MHz Band.[2068] Subsequently, the Commission took certain steps to implement an industry solution to provide interoperable service in the Lower 700 MHz Band in an efficient and effective manner to improve choice and quality for consumers of mobile services.[2069] In reviewing the voluntary solution that would resolve the lack of interoperability in this band, the Commission determined that the voluntary solution would serve the public interest by enabling consumers, especially in rural areas, to enjoy the benefits of greater competition and more choices, and by encouraging efficient use of spectrum, investment, job creation, and the development of innovative mobile broadband services and equipment.[2070] Most recently, we adopted an interoperability requirement in the *AWS-3 Order*.[2071]

735. To comply with the interoperability requirement we adopt for the 600 MHz Band, user equipment certified to operate in any portion of the 600 MHz Band must be capable of operating, using the same technology that the licensee has elected to use, throughout the entire 600 MHz Band.[2072] While we adopt a band plan that promotes interoperability by creating a single paired band, the unique nature of

[2067] *Inquiry Into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems*, CC Docket No. 79–318, Report and Order, 86 FCC 2d 469, 482 (1981). The Commission adopted band-wide interoperability requirements for cellular service. *Id*. Although the Commission did not adopt a rule to require band-wide interoperability for PCS, it again stressed the importance of interoperability by acknowledging industry efforts to establish voluntary interoperability standards; concluded that "[t]he availability of interoperability standards will deliver important benefits to consumers and help achieve our objectives of universality, competitive delivery of PCS, that includes the ability of consumers to switch between PCS systems at low cost, and competitive markets for PCS equipment"; and reserved the right to consider "what actions the Commission may take to facilitate the more rapid development of appropriate standards." *Amendment of the Commission's Rules to Establish New Personal Communications Services*, Memorandum Opinion and Order, GEN Docket No. 90-314, 9 FCC Rcd 4957, 5021-22, paras. 163, 165 (1994) (*PCS Order*); *see also Establishment of Rules and Policies for the Digital Audio Radio Service in the 2310-2360 MHz Frequency Band*, Report and Order, IB Docket No. 95-91, GEN Docket No 90-357, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 12 FCC Rcd 5754, 5795-98, paras.102-06 (1997); *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150, Second Report and Order, 22 FCC Rcd 15289, 15419-20, paras. 363-64 (2007).

[2068] *Petition for Rulemaking Regarding the Need for 700 MHz Mobile Equipment to be Capable of Operating on All Paired Commercial 700 MHz Frequency Blocks*, Sept. 29, 2009 at 12. Subsequently, in 2012, the Commission issued a Notice of Proposed Rulemaking "to promote interoperability in the Lower 700 MHz band and to encourage the efficient use of spectrum." *Promoting Interoperability in the 700 MHz Commercial Spectrum*, WT Docket No. 12-69, Notice of Proposed Rulemaking, 27 FCC Rcd 3521 (2012). The Commission sought comment on whether providing interoperable service with the use of a unified LTE band class (to achieve interoperability) would result in harmful interference to customers using service on the Lower 700 MHz B and C Blocks and whether, if harmful interference were likely to exist, it reasonably could be mitigated. The Commission expressed its preference for an industry solution for interoperability, but also recognized that if the industry failed to move in a timely manner toward interoperability, additional regulatory steps might be appropriate to further the public interest, and sought comment on whether the FCC should adopt a device interoperability requirement. *Id.*

[2069] *See 700 MHz Interoperability R&O*, 28 FCC Rcd 15122.

[2070] *See id.*

[2071] *AWS-3 Report and Order* at paras. 225–31 (adopting an interoperability requirement for the paired 1755-1780 MHz and 2155-2180 MHz band); *see* 47 C.F.R. § 27.75 (Basic Interoperability Requirement).

[2072] Accordingly, we amend § 27.75 of the Commission's rules to include the 600 MHz Band.

the incentive auction amplifies the need for certainty and clear rules. Given that we may repurpose more spectrum for flexible use than can be supported by a single filter,[2073] promoting interoperability through our band plan is insufficient to ensure interoperability for this band. Thus, we make clear that our interoperability requirement applies to the entire 600 MHz Band, regardless of how many band classes may be created by standards-setting bodies to cover this spectrum assigned for flexible-use licenses (i.e., devices must support the entire 600 MHz Band, regardless of whether services are provided over one 5+5 megahertz block, or multiple spectrum blocks). The benefits of requiring interoperability to promote rapid deployment of the 600 MHz Band, particularly in rural areas, outweigh any potential costs relating to increased device complexity.

736. The Commission's experience with deployment in the Lower 700 MHz Band highlights the need for clear *ex ante* interoperability rules to promote rapid deployment in the 600 MHz Band, particularly in rural areas. Although Verizon Wireless notes that the Commission chose to defer to voluntary industry initiatives in promoting interoperability in the PCS band, it did so only because "the industry is now working aggressively to complete several voluntary interoperability standards for PCS in a timely manner."[2074] The record reflects no such assurances here. We further note that there may be increased complexity of 600 MHz devices independent of any interoperability requirement depending on the amount of spectrum we can repurpose for 600 MHz Band services. As Verizon readily acknowledges, clearing a large swath of spectrum would inevitably increase device complexity but that repurposing a large amount of spectrum for new wireless use "would be a good 'problem' to have."[2075] Because it is essential to promote rural broadband deployment and ensure that consumers have rapid access to 600 MHz Band services, the public interest will be best served by requiring interoperability in the 600 MHz Band, and therefore adopt an interoperability requirement.

737. The 600 MHz Band Plan we adopt today also ensures that we will clear broadcast television stations from channel 51, which will serve as the top edge of the 600 MHz uplink band.[2076] Commenters strongly support clearing channel 51 of broadcast television operations to minimize interference to 700 MHz A Block operations, and urge us to consider early relocation of channel 51.[2077] Under our 600 MHz Band Plan, pursuant to each of the band plan scenarios we set forth in the Technical Appendix, we will offer the first spectrum block at channel 51.[2078] Further, we note that our decisions today on repacking and reimbursement support early, voluntary relocation of channel 51.[2079]

f. Other Technical Issues

738. In addition to the specific technical issues addressed above, the Commission proposed to apply several Part 27 rules to the 600 MHz Band: equipment authorization, RF safety, frequency stability, antennas structures; air navigation safety, and disturbance of AM broadcast station antenna patterns.[2080] The Commission reasoned that because the 600 MHz Band will be licensed as a Part 27 service, these rules should apply to all licensees, including those who acquire licenses through partitioning or

[2073] *See* Technical Appendix § II.A (Mobile Filter Considerations). *See also* Verizon Reply at 39-40.

[2074] *PCS Order*, 9 FCC Rcd at 5021, para.163.

[2075] Verizon Reply at 39.

[2076] *See* § III.A.2.a (All-Paired, Down From 51 Band Plan).

[2077] *See, e.g.*, CCA Comments at 13-14; Leap Reply at 5-6.

[2078] *See* Technical Appendix § III.B (Specific Band Plan Scenarios).

[2079] *See* § III.B.3.b.(ii) (Channel Substitution Construction Permits) (protects the substitute channel facilities of former channel 51 licensees that relocated from channel 51 pursuant to a voluntary relocation agreement with Lower 700 MHz A Block licensees); § V.C.5.a (Television Station Licensees and MVPDs Eligible for Reimbursement) (allows for reimbursement of any station formerly on channel 51 that must relocate because its channel is reassigned in the repacking process even if it previously relocated from channel 51 pursuant to a private agreement).

[2080] *NPRM*, 27 FCC Rcd at 12427, para. 198; *see also* 47 C.F.R. §§ 27.51, 27.52, 27.54, 27.56, 27.63.

disaggregation.[2081] No commenters oppose this proposal. Accordingly, because we are licensing the 600 MHz Band under our Part 27 regulatory framework[2082] and these rules generally apply to all Part 27 services, we will apply these additional Part 27 rules to 600 MHz Band licensees.[2083]

739. As described above, some broadcasters may remain in the 600 MHz Band in areas close enough in proximity to new 600 MHz licensees that certain wireless licensees may not be able to operate within the entire boundary of their license (i.e., these 600 MHz licensees will hold an "impaired" license).[2084] As explained further above, we will provide further guidance on the obligations of 600 MHz licensees holding impaired licenses, including any additional or modified technical rules that may apply only to licensees in these impaired areas, no later than the release of the *Comment PN*.

2. Service Rules

a. Flexible Use, Regulatory Framework, and Regulatory Status

(i) Flexible Use

740. *Background.* In the *NPRM*, the Commission proposed service rules that would permit wireless licensees to employ the 600 MHz Band for any use permitted by the Table of Allocations contained in Part 2 of the Commission's rules,[2085] subject to the Commission's service rules.[2086] The Commission noted that the Spectrum Act provides that new initial licenses made available through incentive auctions be subject to flexible-use service rules,[2087] and thus, proposed that the 600 MHz Band may be used for any fixed or mobile service that is consistent with the allocations for the Band.[2088] The Commission also noted that Congress earlier recognized the benefits of flexible use by amending the Communications Act to add section 303(y), which provides us with the authority to allocate spectrum for flexible use if certain criteria are met.[2089]

741. *Discussion.* We adopt the Commission's proposal to license the 600 MHz Band under flexible-use service rules, in accordance with the Spectrum Act's direction that new initial licenses for spectrum voluntarily relinquished through incentive auction be subject to flexible-use service rules.[2090] Accordingly, 600 MHz Band licensees may use the licensed, 600 MHz Band spectrum for any use permitted by the Table of Allocations, provided that the licensee complies with the applicable service rules. As CEA notes, allowing flexible use will promote innovation and best enable licensees to resolve any technical issues associated with the new 600 MHz Band.[2091] Other commenters uniformly support

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[2081] *NPRM*, 27 FCC Rcd at 12427, para. 198.

[2082] *See* § VI.B.2.a.ii (Regulatory Framework).

[2083] The Commission recently deleted § 27.63. Rules governing disturbance of AM broadcast station antenna patterns are now contained in Subpart BB of Part 1.

[2084] *See* § III.A.2.d (Market Variation).

[2085] 47 C.F.R. § 2.106.

[2086] *NPRM*, 27 FCC Rcd at 12481, para. 375.

[2087] *Id.*; *see* Spectrum Act § 6402.

[2088] *NPRM*, 27 FCC Rcd at 12481, para. 376.

[2089] *Id.* at para. 375. Section 303(y) provides the Commission with authority to provide for flexibility of use. Balanced Budget Act of 1997, Pub. L. No. 105-33,111 Stat. 251, 268-69 (1997); 47 U.S.C. § 303(y).

[2090] Spectrum Act § 6402.

[2091] CEA Comments at 16, 21.

this approach.[2092] Adopting flexible-use service rules, moreover, is consistent with prior Congressional and Commission actions that promote allocating spectrum for flexible use.[2093]

(ii) Regulatory Framework

742. *Background.* The Spectrum Act provides that new initial licenses for spectrum voluntarily relinquished through incentive auction will be subject to flexible-use service rules.[2094] The Commission proposed to license the 600 MHz Band under the Part 27 rules, and asked commenters to address the associated costs and benefits of doing so.[2095] Part 27 does not prescribe a comprehensive set of licensing and operating rules for services, but instead defines the permissible uses of spectrum and any limitations thereon, and specifies basic licensing requirements.[2096]

743. *Discussion.* In accordance with Congress's direction that new initial licenses made available through incentive auctions be subject to flexible use service rules, we will license the 600 MHz Band under Part 27. We received no comments on this proposal. The Part 27 rules provide a broad and flexible regulatory framework for licensing spectrum, enabling the spectrum to be used for a wide variety of broadband services, thereby promoting innovation and efficient use.

(iii) Regulatory Status

744. *Background.* In the *NPRM*, the Commission proposed to apply the regulatory status provisions of section 27.10 of the Commission's rules to 600 MHz Band licensees.[2097] Specifically, section 27.10 requires license applicants to identify the regulatory status of the services they intend to provide, and permits applicants and licensees to request common carrier status, non-common carrier status, private internal communications status, or a combination of these options, for authorization in a single license (or to switch between them).[2098] The Commission also proposed that if a licensee changes the service or services it offers such that its regulatory status would change, it must notify the Commission within 30 days of the change.[2099]

745. *Discussion.* We adopt the proposal to apply section 27.10 of our rules to the 600 MHz Band. Under this flexible regulatory approach, 600 MHz Band licensees may provide common carrier, non-common carrier, private internal communications or any combination of these services, so long as the provision of service otherwise complies with applicable service rules.[2100] This broad licensing framework is likely to achieve efficiencies in the licensing and administrative process and will provide flexibility to the marketplace, thus encouraging licensees to develop new and innovative services. Moreover, by applying this requirement to 600 MHz Band licensees, they will receive the same regulatory treatment as

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[2092] *See, e.g.,* CTIA Comments at 14 (supporting the allocation of 600 MHz spectrum for flexible use by fixed and mobile services); Verizon Comments at 58-60, Verizon Reply at 50 (supporting the Commission's flexible use proposal). *See also* § VI.B.2.a.ii-iii (Regulatory Framework and Regulatory Status).

[2093] *See, e.g.*, 47 U.S.C. § 303(y); *AWS-4 Report and Order*, 27 FCC Rcd at 16186, para. 220; *H Block Report and Order*, 28 FCC Rcd at 9490-91, paras. 15-16; *AWS-3 Report and Order* at para. 112.

[2094] *See* Spectrum Act § 6402. *See also* § III.A (600 MHz Band Plan).

[2095] *NPRM*, 27 FCC Rcd at 12482, para. 377.

[2096] *Id*.

[2097] *Id.* at para. 378.

[2098] *See* 47 C.F.R. § 27.10; *Part 27 R&O*, 12 FCC Rcd at 10846–48, paras. 119–22.

[2099] *NPRM*, 27 FCC Rcd at 12482, para. 379.

[2100] *See* 47 C.F.R. § 27.10. *See also* FCC Form 601.

other Part 27 licensees subject to this rule.[2101] Although no commenters directly address this issue, commenters do support increased regulatory flexibility generally.[2102] This approach is in the public interest and its benefits outweigh any potential costs.

746. We remind potential applicants that an election to provide service on a common carrier basis requires that the elements of common carriage be present;[2103] otherwise the applicant must choose non-common carrier status.[2104] If a potential licensee is unsure of the nature of its services and whether classification as common carrier is appropriate, it may submit a petition with its application, or at any time, requesting clarification and including service descriptions for that purpose.[2105]

747. Consistent with the Commission's proposal in the *NPRM*,[2106] we adopt for the 600 MHz Band the Part 27 requirement that if a licensee elects to change the service or services it offers such that its regulatory status would change, it must notify the Commission and must do so within 30 days of making the change.[2107] A change in the licensee's regulatory status will not require prior Commission authorization, provided the licensee is in compliance with the foreign ownership requirements of section 310(b) of the Communications Act that apply as a result of the change.[2108] We note, however, that a different time period (other than 30 days) may apply, as determined by the Commission, where the change results in the discontinuance, reduction, or impairment of the existing service.[2109]

b. License Restrictions

(i) Eligibility

748. *Background.* Section 6404 of the Spectrum Act amends section 309(j) to bar the FCC from "prevent[ing] a person from participating in a system of competitive bidding" if such person complies with auction procedures and satisfies specified qualifications criteria.[2110] It also provides, however, that the Commission retains its authority "to adopt and enforce rules of general applicability, including rules concerning spectrum aggregation that promote competition."[2111] In the *NPRM*, the FCC proposed to adopt an open eligibility standard for the 600 MHz Band.[2112] The Commission explained that opening the 600 MHz Band to as wide a range of licensees as possible would encourage efforts to develop new technologies, products, and services, while helping to ensure efficient use of this spectrum.[2113]

[2101] *See, e.g.*, *AWS-4 Report and Order,* 27 FCC Rcd at 16190, para. 231; *H Block Report and Order*, 28 FCC Rcd at 9552, para. 176; *AWS-3 Report and Order* at para. 116.

[2102] *See* § VI.B.2.a.i (Flexible Use).

[2103] *See* 47 U.S.C. § 153(44) ("A telecommunications carrier shall be treated as a common carrier under this Act"); *see also* 47 U.S.C. § 332(c)(1)(A) ("A person engaged in the provision of a service that is a commercial mobile service shall, insofar as such person is so engaged, be treated as a common carrier for purposes of this Act").

[2104] *See Part 27 R&O*, 12 FCC Rcd at 10848, paras. 121-22.

[2105] *See id.* at para. 121.

[2106] *NPRM*, 27 FCC Rcd at 12482, para. 379.

[2107] *See* 47 C.F.R. § 27.10(d). *See also* 47 C.F.R. § 27.66 (directing a licensee to notify the Commission if it elects to change its services such that its regulatory status would change).

[2108] 47 U.S.C. § 310(b); *see* § VI.B.2.b.ii (Foreign Ownership).

[2109] *See* 47 C.F.R. § 27.66.

[2110] Spectrum Act § 6404.

[2111] *Id*.

[2112] *NPRM,* 27 FCC Rcd at 12483, para. 381.

[2113] *Id*.

749. *Discussion*. We adopt the proposed open eligibility standard.[2114] Commenters that support our adoption of open eligibility for the 600 MHz Band do so largely on the basis that large, diverse participation will foster innovation, competition, spectrum reclamation and maximization of spectrum use.[2115] Open eligibility for the 600 MHz Band is consistent with our statutory mandate to promote the development and rapid deployment of new technologies, products, and services; economic opportunity and competition; and the efficient and intensive use of the electromagnetic spectrum.[2116] Therefore, the potential benefits of open eligibility for the 600 MHz Band outweigh any potential costs.

750. Open eligibility is a threshold matter in determining access to spectrum. Our adoption of open eligibility in no way restricts or preempts other statutory requirements that may limit access to spectrum, such as foreign ownership[2117] and character qualifications.[2118]

751. In that regard, we take this opportunity to clarify that adopting open eligibility for the 600 MHz Band is not inconsistent with the spectrum aggregation rules we establish in the *MSH Report and Order*.[2119] Some commenters conflate the open eligibility issue with the issue of whether the Commission should apply a mobile spectrum holdings limit with respect to the 600 MHz auction. For example, in advocating for open eligibility, EOBC asserts that the Commission must first find that there is a significant likelihood of substantial harm before it can establish a mobile spectrum holding limit and argues that "the Commission should avoid imposing any spectrum aggregation constraints on participants' eligibility in any spectrum auction."[2120] Similarly, TIA and Mobile Future suggest that any limit on open eligibility would be inconsistent with the Spectrum Act.[2121] In contrast, KSW and Sprint suggest in their comments that an initial eligibility determination involves issues distinct from the policy considerations related to mobile spectrum holdings limits like the reserved spectrum approach we adopt in the *MSH Report and Order*.[2122] Specifically, KSW and Sprint assert that if the Commission adopts open eligibility it also should constrain the ability of the largest carriers to dominate the 600 MHz auction.[2123]

[2114] *Id*. *See also* Spectrum Act § 6404; 47 U.S.C. § 309(j)(3)(B).

[2115] *See, e.g.,* TIA Comments at 16-17; CEA Comments at 12-16; TechFreedom Reply at 2-4; Mobile Future Reply at 7.

[2116] *See* 47 U.S.C. § 309(j)(3)(A), (B), & D.

[2117] *See id.* § 310.

[2118] *See id.* § 308(b).

[2119] *See MSH Report and Order* at § V.B (600 MHz Band Incentive Auction).

[2120] Letter from Richard J. Bodorff, Counsel for Expanding Opportunities for Broadcasters Coalition, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-268 at 2-3 (filed Mar. 4, 2013); *see also* EOBC Comments, WT Docket No. 12-269, Att. at 15-16 (filed Nov. 4, 2013) (equating an industry-wide spectrum aggregation limitation with an eligibility restriction).

[2121] *See* TIA Comments at 16-17 (stating that an auction design that would limit "bidder eligibility" would violate the Spectrum Act by depressing auction revenue and, for this reason, the Commission "should adopt the Notice's proposal for an open eligibility standard for the forward auction"); Mobile Future Reply at 7 (asserting that the open eligibility standard is consistent with the Spectrum Act's mandates). To the extent that parties argue that a limitation on the amount of mobile spectrum that one mobile wireless provider may aggregate is inconsistent with the prohibition against prevention of participation in a system of competitive bidding contained in § 6404 of the Spectrum Act, or otherwise contravenes any of the overarching objectives of the Spectrum Act, we address those arguments in the context of describing and assessing our legal authority in the *MSH Report and Order* at § V.B (600 MHz Band Incentive Auction).

[2122] KSW Reply at 4 ("Should the Commission determine that its statutorily mandated obligations can best be met by defining initial eligibility broadly, the Commission then must determine how to prevent very broad eligibility to participate from realistically and effectively crushing others' opportunity to compete effectively in the auction – and

(continued….)

752. The Commission's precedent regarding open eligibility for bidding at auction for mobile wireless licenses generally has focused on whether it was necessary to restrict the eligibility of a firmly established regulatory class of entities.[2124] In contrast, our focus in adopting a mobile spectrum holdings limit in the *MSH Report and Order* is on a class of entities that, through their substantial existing holdings of below-1-GHz spectrum and potential acquisition of a significant portion of the 600 MHz Band in a particular geographic area, could hamper competition in the mobile wireless service market. This is a transient, open class of entities – any entity could enter or exit this class based solely on the amount of its below-1-GHz spectrum holdings in a particular geographic area or the geographic scope of its coverage. The Commission previously has recognized this type of distinction, between open eligibility and the CMRS spectrum cap (until its elimination in 2001) or other CMRS spectrum aggregation limits.[2125] Here, although it is not necessary to restrict auction eligibility of a closed class of entities, we do find it necessary to apply a limit on the amount of 600 MHz spectrum that can be acquired at the forward auction by any entity with substantial existing holdings of below-1-GHz spectrum in a particular geographic area, depending upon the geographic scope of its coverage. Though we acknowledge that on occasion the Commission's description of the scope of its open eligibility standard might not have been precise,[2126] we take the opportunity to clarify that mobile spectrum holding limitations are not eligibility restrictions to which the open eligibility standard applies.

753. In addition, even if the mobile spectrum holdings limit we adopt in the *MSH Report and Order* were to be considered a restriction on open eligibility, this limit meets the standard that open eligibility would pose a significant likelihood of substantial harm to competition in specific markets and an eligibility restriction would be effective in eliminating that harm.

754. In sum, we see no record evidence that would persuade us that our approach is inconsistent with our past framework for assessing eligibility matters and, in any event, we clarify our open eligibility approach going forward.

(Continued from previous page)
the Commission's very ability to comply with its governing statute"); Sprint Reply at 11-12 (arguing that open eligibility without limits or set asides could lead to diminish auction participation and revenue).

[2123] *See* KSW Reply at 3; Sprint Reply at 11-12.

[2124] For example, the Commission restricted the eligibility of incumbent local exchange carriers to bid on LMDS licenses, finding that this determination met the standard that eligibility restrictions may be imposed on licenses only when open eligibility would pose a significant likelihood of substantial harm to competition in specific markets and when an eligibility restriction would be effective in eliminating that harm. *See Rulemaking To Amend Parts 1, 2, 21, and 25 of the Commission's Rules To Redesignate the 27.5-29.5 GHz Frequency Band*, CC Docket No. 92-297, *Second Report and Order, Order on Reconsideration, and Fifth Notice of Proposed Rulemaking*, 12 FCC Rcd 12545, 12614-15 at paras. 157-159 (1997).

[2125] *Amendment of the Commission's Rules to Establish Part 27*, Report and Order, 12 FCC Rcd 10785, paras. 80-91 (1997) (separately addressing question of open eligibility for the Wireless Communciations Service from question of whether to extend then existing CMRS spectrum cap to WCS licenses); *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands*, Notice of Proposed Rulemaking and Notice of Inquiry, 27 FCC Rcd 3561, paras. 108-11 (2012) (separate questions regarding open eligibility for AWS-4 licenses and applicability of spectrum aggregation policies to acquisition of AWS-4 licenses).

[2126] For example, in the context of the proposed "Air-to-Ground" rulemaking, where the Commission similarly recognized a distinction between open eligibility and spectrum aggregation limits, the Commission may have contributed to the ambiguity surrounding the definition of open eligibility when it suggested in a footnote that open eligibility is an "unrestricted eligibility approach for licensing spectrum [under which] the Commission does not exclude any potential applicants because of the amount of spectrum they already control, as such exclusions in these instances are deemed to be unnecessary for ensuring competition." *See Expanding Access to Broadband and Encouraging Innovation through Establishment of an Air-to-Ground Mobile Broadband Secondary Service for Passengers Aboard Aircraft in the 14.0-14.5 GHz Band*, GN Docket No. 13-114, Notice of Proposed Rulemaking, 28 FCC Rcd 6765, 6785, paras. 67-68 and n.101 (2013).

(ii) Foreign Ownership

755. *Background.* In the *NPRM*, the Commission observed that sections 310(a) and 310(b) of the Communications Act impose foreign ownership and citizenship requirements that restrict the issuance of licenses to certain applicants.[2127] The Commission proposed to apply section 27.12 of the Commission's rules, which implements section 310, to applicants for wireless communications services licenses in the 600 MHz Band.[2128] With respect to filing applications, the Commission proposed that all applicants provide the same foreign ownership information, which covers both sections 310(a) and 310(b), regardless of whether they propose to provide common carrier or non-common carrier service in the Band.[2129] The Commission sought comment on this proposal, including the associated costs and benefits.[2130]

756. *Discussion.* In order to fulfill our statutory obligations under section 310 of the Communications Act, all 600 MHz Band applicants and licensees shall be subject to the provisions of section 27.12 of the Commission's rules.[2131] All such entities are subject to section 310(a), which prohibits licenses from being "granted to or held by any foreign government or the representative thereof."[2132] In addition, any applicant or licensee that would provide a common carrier, aeronautical en route, or aeronautical fixed service would also be subject to the foreign ownership and citizenship requirements of section 310(b).[2133]

757. No parties comment on the Commission's proposal to require all 600 MHz Band applicants and licensees to provide the same foreign ownership information in their filings, regardless of the type of service the licensee would provide using its authorization. Applicants for this Band should not be subject to different obligations in reporting their foreign ownership based on the type of service authorization requested in the application, and the benefits of a uniform approach outweigh any potential costs. Therefore, we will require all 600 MHz Band applicants and licensees to provide the same foreign ownership information, which covers both sections 310(a) and 310(b), regardless of which wireless communications service they propose to provide in the Band. We expect, however, that we would be unlikely to deny a license to an applicant requesting to provide services exclusively that are not subject to section 310(b), solely because its foreign ownership would disqualify it from receiving a license if the applicant had applied for authority to provide section 310(b) services. However, if any such licensee later desires to provide any services that are subject to the restrictions in section 310(b), we would require that licensee to apply to the Commission for an amended license, and we would consider issues related to foreign ownership at that time.

[2127] *See NPRM*, 27 FCC Rcd at 12482-83, para. 380.

[2128] *See id*. *See also* 47 C.F.R. 27.12 (stating that, except as provided in certain other Part 27 rules, any entity other than those precluded by § 310 is eligible to hold a license).

[2129] *See NPRM*, 27 FCC Rcd at 12483, para. 380.

[2130] *See id*.

[2131] 47 C.F.R. § 27.12. *See also Foreign Ownership Second R&O*, FCC 13-50, 28 FCC Rcd 5741 (modifying the policies and procedures that apply to foreign ownership of common carrier, aeronautical en route, and aeronautical fixed radio station licensees pursuant to §§ 310(b)(3) and 310(b)(4) of the Communications Act). The rules adopted in the *Foreign Ownership Second R&O* became effective August 9, 2013.

[2132] 47 U.S.C. § 310(a).

[2133] *Id.* § 310(b).

c. License Term, Performance Requirements, Renewal Criteria, and Permanent Discontinuance of Operations

(i) License Term

758. *Background*. In the *NPRM*, the Commission proposed a 10-year term for 600 MHz Band wireless licenses. It also proposed that if a license is partitioned or disaggregated, any partitionee or disaggregatee would be authorized to hold its license for the remainder of the partitioner or disaggregator's original license term.[2134] The Commission sought comment on these proposals, including the costs and benefits of adopting them.[2135]

759. *Discussion.* In recognition of the Post-Auction Transition Period that will occur after the completion of the incentive auction, we adopt an initial license term of 12 years for 600 MHz Band licenses, and a term of 10 years for any subsequent license renewals. In addition, in the event that a license is partitioned or disaggregated, any partitionee or disaggregatee will be authorized to hold its license for the remainder of the partitioner or disaggregator's license term, consistent with the existing Part 27 rule.[2136] Accordingly, we modify sections 27.13 and 27.15 of the Commission's rules to reflect these determinations.

760. The Communications Act does not require a specific term for non-broadcast spectrum licenses.[2137] The Commission has typically adopted 10-year license terms for Part 27 services,[2138] but has also found, as in the case of AWS-1 licenses and AWS-3 licenses, a longer initial term to be in the public interest.[2139] Further, commenters generally support at least a 10-year license term.[2140] Given the complexities and timing of clearing broadcast operations in this Band, we agree with US Cellular that a longer initial license term is appropriate.[2141] Consequently, adopting a 12-year initial license term is in the public interest and the associated benefits outweigh any potential costs.

761. A 12-year license initial term will provide wireless licensees with sufficient time to plan and launch operations. As explained in Section V (Post-Incentive Auction Transition), following the incentive auction, broadcast television licensees will have, at most, 39 months to transition off channels that are repurposed for flexible use licenses sold at the forward auction.[2142] While we expect that during that period, 600 MHz Band wireless licensees can plan and begin building operations, they will not have unfettered access to the repurposed spectrum won at the forward auction until broadcast television

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[2134] *NPRM*, 27 FCC Rcd at 12487, paras. 392-93.

[2135] *NPRM*, 27 FCC Rcd at 12487, paras. 392-93. No party commented on the costs or benefits of a 10-year license term, specifically.

[2136] *See* 47 C.F.R. 27.15(c). Verizon and CTIA support the Commission's proposals to adopt the Part 27 partitioning and disaggregation rules, and to permit spectrum leasing. *See* Verizon Comments at 64; CTIA Comments at 37-38; *see also* § VI.B.2.d.ii (Partitioning and Disaggregation).

[2137] The only statutory limit on license terms is eight years for licenses in the broadcast services. *See* 47 U.S.C. § 307(c)(1); *see also* 47 C.F.R. § 73.1020(a).

[2138] *See* 47 C.F.R. § 27.13, describing initial license terms for licensees in 2305-2320 MHz and 2345-2360 MHz Bands (not to exceed 10 years), 698-758 MHz and 776-788 MHz Bands (not to exceed 10 years, generally), 1390-1392 MHz Band (not to exceed 10 years), 1392-1395 MHz and 1432-1435 MHz Bands (not to exceed 10 years), 1670-1675 MHz Band (not to exceed 10 years).

[2139] *See, e.g.*, *AWS-1 R&O*, 18 FCC Rcd at 25190, para. 70 (relocation of government operations warrant 15-year initial license term for licenses issued before 2010, with 10-year terms thereafter); *AWS-3 Report and Order* at para. 131 (transition of government operations warrant 12-year initial license term).

[2140] *See, e.g.*, Verizon Comments at 64; US Cellular Comments at 34-36.

[2141] US Cellular Comments at 34-36.

[2142] *See* § V.C.2 (Construction Schedule and Deadlines).

licensees have ceased operating on those channels.[2143] Extending the Commission's typical license term by two years, to provide an initial license term of 12 years for the 600 MHz Band licenses, is the best way to accommodate the necessary broadcast transition while retaining the proper incentives for 600 MHz Band licensees to rapidly deploy wireless services in the Band.

762. We decline to adopt alternative proposals by US Cellular.[2144] With respect to its proposal for 15-year initial license terms, we observe that the Post-Auction Transition Period begins prior to wireless providers' receiving their licenses.[2145] Therefore, a 12-year initial term adequately compensates for this transition, but a 15-year initial term would be unnecessarily long. With respect to US Cellular's proposal that we adopt a 10-year license term, but do not commence the initial license term until broadcast television licensees have ceased operating on the repurposed spectrum, such a plan would create uncertainty, would be difficult to administer, and would be difficult for licensees and other interested parties to monitor and implement. In addition, because these broadcast television licensees are transitioning off the repurposed spectrum on a rolling basis, we see no need to delay 600 MHz Band licensees' access until all broadcast operations in the 600 MHz Band cease. Moreover, we must issue 600 MHz Band licenses promptly in order to fund the TV Broadcaster Relocation Fund that will be used to compensate relocating broadcast operations. Delaying the start of the initial wireless license term until broadcast operations have been cleared could delay wireless deployment and undermine the regulatory incentives that our policies are intended to foster.

(ii) Performance Requirements

763. *Background*. In the *NPRM*, the Commission proposed to adopt specific, quantifiable performance requirements for the 600 MHz Band to ensure that licensees begin providing service to consumers in a timely manner. It proposed to measure build-out progress using a population-based benchmark within each license area, and sought comment on an alternative geography-based benchmark; it also sought comment on whether it should adopt an interim benchmark, an end-of-term benchmark, and/or multiple benchmarks throughout the license term.[2146] In addition, in the *NPRM* the Commission sought comment on whether performance requirements are necessary for service areas within the Gulf of Mexico.[2147] Along with performance benchmarks, the Commission noted that there must be meaningful and enforceable consequences, or penalties, for failing to meet construction requirements. Toward that end, the Commission also sought comment on a number of different penalties, seeking input on which set of incentives would most effectively ensure timely build-out in this Band.[2148]

764. *Discussion*. We establish performance requirements to promote the productive use of spectrum, to encourage licensees to provide service to customers in a timely manner, and to promote the

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[2143] *See* § V.C.2 (Construction Schedule and Deadlines).

[2144] US Cellular Comments at 34-36; Letter from Leighton T. Brown, Counsel for US Cellular, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 17 (filed Jul. 15, 2013).

[2145] *See* § V.C (Transition Procedures for Television Stations and Reimbursement Procedures for Television Stations and MVPDs). Wireless licensees receive their licenses not at auction completion, but after a period of time following the close of the auction to allow for license applications to be filed, processed, and reviewed to ensure that the applicant meets the applicable qualifications to hold the license.

[2146] *NPRM*, 27 FCC Rcd at 12488, paras. 395, 397.

[2147] *NPRM*, 27 FCC Rcd at 12411-12, para. 150.

[2148] *Id.* at 12489-91, paras. 398-406. In the *NPRM*, the Commission sought comment on implementing a range of penalties for failing to meet both interim and final build-out requirements in the 600 MHz Band, including following the approaches used for other spectrum bands, such as broadband PCS, and upper 700 MHz, and also sought comment on some novel approaches, including a "triggered keep-what-you-use," "use it or lease it," and "use it or share it" approach. *NPRM*, 27 FCC Rcd at 12489-91, paras. 398-406.

provision of innovative services in unserved areas, particularly rural areas.[2149] Over the years, the Commission has tailored performance and construction requirements with an eye to the unique characteristics of individual frequency bands and the types of services expected, among other factors. The performance requirements we adopt for the 600 MHz Band are consistent with those the Commission has adopted for similar spectrum bands,[2150] while taking into account certain exceptional circumstances related to the conduct of the incentive auction, including the timing for the transition of this spectrum from broadcast use to flexible wireless use.[2151] These requirements will ensure that the 600 MHz Band spectrum is put to use expeditiously while providing 600 MHz Band licensees with flexibility to deploy services according to their business plans. Specifically, we adopt the following:

- *600 MHz Band interim build-out requirement*: Within six (6) years of initial license grant, a licensee shall provide reliable signal coverage and offer wireless service to at least forty (40) percent of the population in each of its license areas.
- *600 MHz Band final build-out requirement*: Within twelve (12) years of initial license grant (or at the end of the license term[2152]), a licensee shall provide reliable signal coverage and offer wireless service to at least seventy-five (75) percent of the population in each of its license areas.

765. We also adopt the following penalties for failing to meet the build-out benchmarks:

- *Failure to meet 600 MHz Band interim build-out requirement*: Where a licensee fails to meet the interim build-out requirement in any license area, the final build-out requirement and initial license term for that license shall be accelerated by two years (from 12 to 10).
- *Failure to meet 600 MHz Band final build-out requirement*: Where a licensee fails to meet the final build-out requirement for any license area, its authorization for that license area shall terminate automatically without further Commission action, and the licensee will be unable to regain the license.

766. We explain below the rationale for and public benefits of imposing these performance requirements. Those benefits outweigh any perceived costs of adopting performance benchmarks and penalties for failure to meet those requirements. We also discuss below how we will measure build-out in the Gulf of Mexico.

767. *Population-Based Benchmark, per PEA License Area*. Supported by a number of comments in the record, we adopt the proposal to use objective, population-based interim and final construction benchmarks, which will be measured per license area.[2153] Requiring 600 MHz Band licensees to meet these performance benchmarks will promote rapid deployment of new broadband services to the American public, and at the same time provide licensees with certainty regarding their construction obligations. We agree with CCA and MetroPCS that, for the 600 MHz Band, measuring

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[2149] *See 700 MHz Second R&O*, 22 FCC Rcd at 15348, para. 154.

[2150] *See, e.g., H-Block Report and Order*, 28 FCC Rcd at 19558-66, paras. 195-217; *AWS-4 Report and Order*, 27 FCC Rcd at 16173-82, paras. 187-208; *700 MHz Second R&O*, 22 FCC Rcd at 15348-55, paras. 153-77.

[2151] As noted in the Partitioning and Disaggregation Section, the performance requirements we adopt also apply to disaggregated spectrum or partitioned geographic service areas. *See* § VI.B.2.d.ii (Partitioning and Disaggregation). *See* 47 C.F.R. § 27.15(d) (addressing compliance with construction requirements).

[2152] If a licensee fails to meet the interim benchmark, the final benchmark and initial license term are accelerated by two years– from 12 to 10 years. *See* para. 774 (discussing interim benchmark performance requirement penalties).

[2153] *See*, *e.g.*, Verizon Comments at 65; Verizon Reply at 46-47; MetroPCS Comments at 24; CCA Reply at 14-15; US Cellular Comments at 44-46; US Cellular Reply at 33-34; WGAW Comments at 9; McBride *Band Plan PN* Reply at 7.

build-out by percentage of population served "provides a clear metric that will promote efficient deployment."[2154]

768. We are not persuaded by arguments that our build-out requirements must be geography-based, or include a geographic component, in order to ensure that less densely populated, often rural, communities have timely access to the most advanced mobile broadband services.[2155] We agree that it is important to promote rapid broadband deployment in rural areas. In fact, section 309(j)(4)(B) of the Communications Act requires that the Commission "include performance requirements, such as appropriate deadlines and penalties for performance failures, to ensure prompt delivery of service to rural areas."[2156] Adopting relatively small, PEA service areas, and requiring licensees to meet challenging population-based benchmarks in each individual license area separately, strikes an appropriate balance between providing flexibility to 600 MHz Band licensees to deploy their networks in a cost-effective manner and assertively promoting deployment of service to less densely populated areas. Therefore, we reject commenters' proposals to measure build-out geographically or through a combination of population and geography.[2157] Our decision to require population-based benchmarks in this Band does not foreclose our ability to impose geographic-based benchmarks in other spectrum bands that may warrant different considerations.[2158]

769. Further, we reject Verizon's request that we measure compliance with the interim benchmark in the aggregate, i.e., by summing the population of all of a licensee's authorizations in the 600 MHz Band.[2159] Creating benchmarks on a per-license basis, rather than in the aggregate, is consistent with our build-out requirements in other, similar spectrum bands.[2160] In addition, measuring benchmarks on a per-license basis is consistent with our determination to license service on a geographic basis and

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[2154] CCA Comments at 17; MetroPCS Comments at 24 (arguing that a population-based build-out requirement is a far more accurate measure of useful coverage in a market than a geographic-based requirement). US Cellular argues that geography-based requirements could cause economically irrational behavior because "licensees would be forced to divert capital into areas where it is uneconomic to provide additional services, thereby depriving investment where it would otherwise be more likely to produce benefits." US Cellular Comments at 44. *See also* US Cellular Reply at 34 (stating that geographic-based build-out requirements can force carriers to build systems where no population exists); Verizon Reply at 46-47 (arguing that a geographic-based requirement in rural areas is not necessary).

[2155] *See, e.g.*, CCA Comments at 17 (arguing that the Commission should consider a geographic component to its build-out requirements, particularly in rural areas); CCA Reply at 15; WGAW Comments at 9 (arguing that the Commission should consider how to make sure license holders develop services in rural parts of geographic license areas); C Spire Comments at 9-10. *But see* US Cellular Comments at 17-18 (stating that if the Commission adopts population-based build-out requirements, licensees of large service areas could meet these benchmarks by focusing almost exclusively on urban areas, which would withhold the potential benefits of this new spectrum from rural areas); MetroPCS Comments at 24 (arguing that a population-based build-out requirement "is a far more accurate measure of useful coverage in a market, as opposed to an arbitrary geographic percentage determined by regulatory fiat.").

[2156] 47 U.S.C. § 309(j)(4)(B).

[2157] *See*, *e.g.*, C Spire Reply at 7-8 (proposing that licensees offer service to 35 percent of each geographic license area after four years and 70 percent of each geographic license area after 10 years); CCA Comments at 17 (arguing that the Commission should consider a geographic component to its build-out requirements, particularly in rural areas).

[2158] For example, we observe that the Commission established geographic-based performance requirements for the 700 MHz B Block in light of technical characteristics and the CMA geographic license area size specific to that band. *See 700 MHz Second R&O*, 22 FCC Rcd at 15349, paras. 157-58 (adopting geographic-based benchmarks).

[2159] Verizon Comments at 65.

[2160] *See, e.g., H Block Report and Order*, 28 FCC Rcd at 9558, para. 195; *700 MHz Second R&O*, 22 FCC Rcd at 15348-49, paras. 153-55.

holds a licensee accountable for meeting performance obligations for all of the licenses (including partitioned licenses) that it holds. Thus, a per-license approach allows for more flexibility and certainty. For example, should a licensee partition some of a 600 MHz Band license area, a percentage-based approach would apply to each partitioned license. In contrast, it is not clear how the responsibility for meeting benchmarks for partitioned and disaggregated licenses would be handled under Verizon's proposal.

770. *Interim Benchmark*. Requiring an interim milestone is supported by the record and serves the public interest. A 40 percent build-out per license area benchmark is consistent with the interim benchmarks established in other bands[2161] and similar to various proposals suggested by commenters. Verizon proposes adopting a build-out requirement of 40 percent of the population within four years.[2162] US Cellular suggests we require licensees to meet the interim build-out benchmark by covering 35 percent of the population within five years.[2163] Setting the interim benchmark of 40 percent at six years addresses commenters' concerns over taking into account the broadcast transition.[2164]

771. Several commenters ask that we base our build-out benchmarks on the date that the broadcast repacking is completed and the 600 MHz Band is cleared.[2165] We decline to do so. Instead, the interim build-out benchmark is six years from the grant of the license, which should adequately account for the Post-Auction Transition Period.[2166] Given that no broadcast television licensee will be permitted to operate on its pre-auction channel after the 39-month Post-Auction Transition Period regardless of whether they have completed construction and have begun operating on their new channel,[2167] 600 MHz Band licensees should have sufficient time to deploy their networks to meet the interim benchmark.[2168] Further, setting a date certain that is tied to initial grant of the 600 MHz Band license will provide greater certainty to 600 MHz Band licensees, their investors, and other interested parties. This does not mean, however, that a 600 MHz Band licensee must wait for the entire broadcast transition to be completed; a

[2161] *See, e.g., AWS-3 Report and Order* at para. 135; *H Block Report and Order*, 28 FCC Rcd at 9558, para. 195; *AWS-4 Report and Order,* 27 FCC Rcd at 16174, para. 187; *700 MHz Second R&O*, 22 FCC Rcd 15351, para. 162.

[2162] Verizon Comments at 65 (40 percent interim population benchmark would cover all of a licensee's authorizations in the 600 MHz Band rather than per license). *See also* Capitol Reply at 15-16 (arguing that it would be reasonable for the Commission to require winning bidders to put spectrum to use within four years following the close of the forward auction); *see also* C Spire Comments at 9-10; C Spire Reply at 7-8 (proposing four-year interim benchmark, based on geography); McBride *Band Plan PN* Reply at 7 (arguing that the Commission should maximize the number of small carriers that can win licenses in the auction by creating "start-up and small business build-out requirements based on the population covered by the end of 10 year license").

[2163] US Cellular Comments at 47-48; US Cellular Reply at 35.

[2164] CTIA Comments at 39. *See also* Nokia Comments at 20-21 (arguing that build-out deadlines should be based on the actual date licenses are cleared); Verizon Reply at 47 (arguing that construction deadlines must account for the need for repacked and exiting broadcast television licensees to cease operations in the 600 MHz Band).

[2165] CTIA Comments at 39; Nokia Comments at 20-21; US Cellular Comments at 47; US Cellular Reply at 35.

[2166] *See* § V.C (Transition Procedures for Television Stations and Reimbursement Procedures for Television Stations and MVPDs). *See also AWS-3 Report and Order* at para. 143 (interim build-out benchmark set at six years to accommodate government transition).

[2167] *See* § V.C.2 (Construction Schedule and Deadlines).

[2168] Further, wireless licensees can make use of the spectrum (for testing, etc.) in coordination with broadcast television licensees during the 39-month transition period. *See* § V.C (Transition Procedures for Television Stations and Reimbursement Procedures for Television Stations and MVPDs).

600 MHz Band licensee can begin operating in a specific license area as soon as the broadcast television licensees have ceased operations in that license area.[2169]

772. We disagree with the few commenters that argue that interim construction benchmarks are unnecessary because licensees already have commercial incentives to rapidly deploy their networks.[2170] While such commercial incentives may exist in many market areas, the per-license approach will help to ensure that build-out progresses appropriately in all license areas. Some commenters also assert that benchmarks unfairly favor large carriers and incumbents because they are able to spread the economic construction cost over a greater number of subscribers than smaller carriers and new entrants.[2171] We disagree. The Commission noted in the *NPRM* that the propagation characteristics of the 600 MHz Band should allow for robust coverage at a lower cost than some other comparable bands.[2172] The interim benchmark we adopt in this Order will provide all licensees with an ability to scale networks in a cost efficient manner while also ensuring that the vast majority of the population will have access to wireless broadband services expeditiously.

773. Further, we reject the proposal of commenters who advocate a "substantial service" standard at the end of the license term as the only measurement of performance.[2173] Our purpose is to ensure that timely and robust build-out occurs in this Band, and for the reasons enumerated above, concrete interim and final build-out benchmarks will best facilitate meeting this goal. Further, we note that in recent decisions, the Commission has replaced the substantial service standard with specific interim and final build-out requirements.[2174]

774. *Penalty for Failure to Meet the Interim Benchmark*. As the Commission has done in similar spectrum bands,[2175] where a wireless licensee fails to meet its interim build-out requirement, we accelerate both the time frame to meet the final build-out benchmark and the length of the license term by two years. Several commenters agree that if a licensee fails to meet the interim build-out requirement, we should accelerate the time frame for a licensee's meeting the final build-out requirement,[2176] with some of those same commenters advocating for acceleration of the license term as well.[2177] Because the initial

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[2169] *See* § V.C (Transition Procedures for Television Stations and Reimbursement Procedures for Television Stations and MVPDs).

[2170] *See, e.g.*, MetroPCS Comments at 22 (interim benchmarks are "unnecessary" and "counterproductive" because license holders have a "market imperative to roll out service over a license area as promptly as is commercially reasonable"); *but see* WGAW Comments at 9 (multiple, quantifiable benchmarks ensure adequate build-out).

[2171] MetroPCS Comments at 22-23. *See also* US Cellular Comments at 42-44; US Cellular Reply at 33.

[2172] *NPRM*, 27 FCC Rcd at 12487-88, para. 394 (citing § 6002(b) of the Omnibus Budget Reconciliation Act of 1993, *Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, including Commercial Mobile Services*, WT Docket No. 10-133, Fifteenth Report, 26 FCC Rcd 9664, 9833-37, paras. 292-97 (2011)).

[2173] *See, e.g.*, MetroPCS Comments at 23-24; US Cellular Comments at 40; US Cellular Reply at 32-33.

[2174] *AWS-4 Report and Order*, 27 FCC Rcd at 16173-74, para. 187; *H Block Report and Order*, 28 FCC Rcd at 9558, para. 195; *AWS-3 Report and Order* at paras. 135, 144.

[2175] *See, e.g., 700 MHz Second R&O*, 22 FCC Rcd at 15351, para. 163; *H Block Report and Order*, 28 FCC Rcd at 9558, para. 195; *AWS-3 Report and Order* at para. 136.

[2176] Verizon Comments at 65 (supports two-year acceleration); WGAW Comments at 9-10 (supports reducing the license term for failing to meet the interim benchmark); US Cellular Comments at 50; US Cellular Reply at 36 (supports one-year acceleration).

[2177] *See* Verizon Comments at 65; WGAW Comments at 9-10.

license term is 12 years,[2178] if a licensee fails to meet the interim benchmark, it must complete its final build-out requirement within 10 years, when its license term also expires.

775. *Final Benchmark*. Within 12 years of the initial license grant (or 10 years if the interim benchmark is not met), a licensee shall provide reliable coverage and offer wireless service to at least 75 percent of the population in each of its license areas. Establishing a final build-out benchmark that coincides with the end of the initial license term is consistent with how the Commission has formulated performance requirements in other spectrum bands.[2179] Because we have set the interim benchmark at six years and we have created a 12-year initial license term, Verizon's suggestion that we establish a seven-year final build-out requirement is unduly accelerated and we therefore decline to adopt it.[2180] In addition, the Post-Auction Transition Period renders infeasible Cavell, Mertz's suggestion that a 600 MHz Band wireless licensee be required to construct its new facilities within a year-and-a-half.[2181] Under the circumstances, a 12-year construction milestone provides a reasonable timeframe for a licensee to deploy its network and offer widespread service, provided it meets its interim benchmark. Licensees that do not meet the six-year interim benchmark must accelerate their final build out by two years to meet the final benchmark by the end of their shortened, 10-year license term.

776. *Penalty for Failure to Meet the Final Benchmark*. Where a licensee fails to meet the final build-out requirement in any PEA, its authorization for each PEA in which it fails to meet the requirement shall terminate automatically without further Commission action, and the licensee will be prohibited from regaining the license. Automatic license termination with the inability to regain the license is a common remedy for failure to build out Part 27 licenses and is the approach adopted most recently by the Commission in the *AWS-3 Report and Order*.[2182] Terminating only the specific licenses where a licensee fails to meet the final benchmark will not directly affect a licensee's customers in other license areas.[2183] Further, as WGAW points out, cancellation of the license will free up spectrum to an entity that will more likely develop it.[2184] We decline to adopt a "keep-what-you-use" approach or "use it or lease it" or "use it or share it" as penalties for failure to meet construction requirements as some commenters suggest,[2185] because these proposals may encourage less robust build-out by a licensee that decides not to build out to the final benchmark – particularly in rural areas.[2186]

777. As a general matter, we expect that 600 MHz Band licensees will meet the performance requirements because of the serious consequences associated with non-compliance, including automatic

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[2178] *See* § VI.B.2.c.i (License Term).

[2179] *See, e.g.*, *700 MHz Second R&O*, 22 FCC Rcd at 15293, para. 6; *H Block Report and Order*, 28 FCC Rcd at 9558, para. 195; *AWS-3 Report and Order* at para. 135.

[2180] Verizon Comments at 65.

[2181] Cavell, Mertz Comments at 3-4 (arguing that beneficiaries of this new "transition" should be required to be aggressive with their construction).

[2182] *AWS-3 Report and Order* at para. 150. 47 C.F.R. § 27.14(r)(4) (AWS-3 Band). *See also* 47 C.F.R. § 27.14(g)(2) (AWS-4 Band) and 47 C.F.R. § 27.14(h)(2) (H Block).

[2183] *See AWS-4 Report and Order*, 27 FCC Rcd at 16180, para. 202; *H Block Report and Order*, 28 FCC Rcd at 9564, para. 211; *AWS-3 Report and Order* at para. 148.

[2184] *See* WGAW Comments at 10 (arguing that the failure to meet an end of term benchmark should result in the cancellation of a license, making the spectrum available to an entity that will develop it).

[2185] Several commenters support a "keep what you use" approach. Capitol Reply at 15-16; NTCA Comments at 5-6; US Cellular Comments at 50-51; US Cellular Reply at 36-37; Verizon Comments at 65-67. A number of commenters support "use it or share it" as a penalty for failing to reach final benchmarks. IEEE 802 Comments at 4; Neul Comments at 7; Google/Microsoft Comments at 45-46; Google Reply at 16-17; WISPA Reply at 17.

[2186] *See* IEEE 802 Comments at 4 (the "use it or lease it" penalty model would further restrict the ability to provide services in rural and remote areas).

license cancellation. Further, we expect that licensees' deployment will generally exceed the levels set forth in the benchmarks, and that these build-out requirements generally represent a floor – not a ceiling. As for US Cellular's assertion that automatic termination is too punitive,[2187] the Commission has previously explained and we state again that automatic termination is not overly punitive or unfair if robust build-out is to be accomplished. It is noteworthy that the Commission has applied this approach to nearly all geographically-licensed wireless services.[2188] Further, the Commission has rejected the argument, and we do so again here, that an automatic termination penalty would deter capital investment,[2189] observing that the wireless industry has invested billions of dollars and has flourished under this paradigm in other spectrum bands.[2190] For the same reason, an automatic termination penalty will have little effect on auction participation, as suggested by US Cellular.[2191] Finally, we do not agree with US Cellular that automatic termination harms the public because, even if a customer loses service from a provider when it loses spectrum rights for a particular license area,[2192] alternative providers may be available. We also expect that a future licensee may ultimately be able to serve more customers for that license area.[2193]

778. *Compliance Procedures*. Having received no comments on the issue, we adopt the proposal in the *NPRM* to apply to the 600 MHz Band the compliance procedures under section 1.946(d) of the Commission's rules. Specifically, this rule states that licensees must demonstrate compliance with their performance requirements by filing a construction notification within 15 days of the relevant milestone certifying that they have met the applicable performance benchmark.[2194] Additionally, consistent with other Part 27 services,[2195] we require that each construction notification include electronic coverage maps and supporting documentation, which must be truthful and accurate and must not omit material information that is necessary for the Commission to determine compliance with its performance requirements.[2196]

779. We emphasize that electronic coverage maps must accurately depict the boundaries of each license area in the licensee's service territory.[2197] If a licensee does not provide reliable signal

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[2187] *See* US Cellular Reply at 37-38.

[2188] *See AWS-3 Report and Order* at para. 149; *H Block Report and Order*, 28 FCC Rcd at 9564, para. 212*; AWS-4 Report and Order*, 27 FCC Rcd at 16180, para. 204; *2010 WCS Order*, 25 FCC Rcd at 11796, para. 214; *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, WT Docket No. 07-293, IB Docket No. 95-91, Order on Reconsideration, 27 FCC Rcd 13651, 13704, para. 131 (*2012 WCS Order*).

[2189] *See* US Cellular Reply at 37-38.

[2190] *AWS-4 Report and Order*, 27 FCC Rcd at 16180, para. 204 (citing *2010 WCS Order*, 25 FCC Rcd at 11796, para. 214; *2012 WCS Order*, 27 FCC Rcd at 13704, para. 131).

[2191] US Cellular Reply at 38.

[2192] *See* US Cellular Reply at 38.

[2193] *See AWS-4 Report and Order*, 27 FCC Rcd at 16180, para. 204.

[2194] 47 C.F.R. § 1.946(d) ("notification[s] must be filed with Commission within 15 days of the expiration of the applicable construction or coverage period").

[2195] *See AWS-4 Report and Order*, 27 FCC Rcd at 16181, para. 206; *H Block Report and Order*, 28 FCC Rcd at 9565-66, paras. 215-16; *AWS-3 Report and Order* at para. 152.

[2196] *NPRM*, 27 FCC Rcd at 12491, para. 407 (citing 47 C.F.R. § 1.17 (Truthful and accurate statements to the Commission)); 47 C.F.R. § 1.917(c) ("Willful false statements . . . are punishable by fine and imprisonment, 18 U.S.C. 1001, and by appropriate administrative sanctions, including revocation of station license pursuant to 312(a)(1) of the Communications Act of 1934, as amended.").

[2197] *See* 47 C.F.R. § 27.14(p)(7).

coverage to an entire PEA, its map must accurately depict the boundaries of the area or areas within each PEA not being served. Each licensee also must file supporting documentation certifying the type of service it is providing for each PEA within its service territory and the type of technology used to provide such service. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology.

780. The licensee must use the most recently available decennial U.S. Census data at the time of measurement to meet the population-based build-out requirements.[2198] Specifically, a licensee must base its claims of population served on areas no larger than the Census Tract level.[2199] To the extent the Census Tract (or other acceptable identifier) extends beyond the boundaries of a license area, a licensee with authorizations for such areas may only include the population within the Census Tract (or other acceptable identifier) towards meeting the performance requirement of a single, individual license. This requirement tracks the Commission's action requiring broadband service providers to report "snapshots" of broadband service at the Census Tract level twice each year by completing FCC Form 477.[2200]

781. *Performance Requirements of Impaired Licenses*. As discussed above, we plan to offer "impaired" licenses in the forward auction, i.e., licenses that contain impairments, or areas within the license area where a wireless licensee may not be able to provide service because it would interfere with a broadcast television licensee's coverage area, or conversely, those license areas in which a wireless provider may receive harmful interference from remaining television operations in or near the 600 MHz Band.[2201] It is important to apply the same performance requirements to all 600 MHz Band wireless licensees to ensure rapid build-out, but we recognize that licensees holding impaired licenses may not be able to build out their entire license area due to the impairments within a particular geographic service area. Thus, for those licensees, section 27.14 will similarly apply, but a licensee with a geographic service area that includes any impairments may meet the build-out benchmarks by providing reliable signal coverage and offering service to the relevant percentages of population in the service area that is not impaired.[2202] To the extent this applies to a licensee's particular impaired license, at the relevant construction benchmarks, a licensee must provide with its construction notification an explanation of why it cannot serve its entire license area and/or meet its performance requirements within the entire license area. The submission must be truthful and accurate and must not omit material information that is

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[2198] *See id.* § 27.14(h).

[2199] The Census Bureau defines Census Tracts as "small, relatively permanent statistical subdivisions of a county delineated by local participants as part of the U.S. Census Bureau's Participant Statistical Areas Program." The entire United States is covered by census tracts. U.S. Census Bureau, http://www.census.gov/geo/reference/gtc/gtc_ct html (last visited Apr. 9, 2014).

[2200] *See, e.g.*, *Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscribership Data, and Development of Data on Interconnected Voice over Internet Protocol (VoIP) Subscribership*, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691 (2008). Specifically, the Commission modified FCC Form 477 to require (1) wired, terrestrial fixed wireless, and satellite broadband service providers to report the number of broadband connections in service in individual Census Tracts; and (2) mobile wireless broadband service providers to identify those Census Tracts in which they offer service. *See id*. at 6995-99, paras. 10-16.

[2201] The Spectrum Act requires us to "make all reasonable efforts" to preserve the coverage area and population served of broadcast television licensees. *See* Spectrum Act § 6403(b)(2).

[2202] This approach is consistent with the approach the Commission adopted in the 700 MHz proceeding where for purposes of meeting construction requirements, licensees could exclude areas in their service area to which they could not provide service (in that case, to government lands). *See 700 MHz Second R&O*, 22 FCC Rcd at 15350, para. 160.

necessary for the Commission to determine whether the licensee could have reasonably met its performance requirements for its entire license area.

782. *Gulf of Mexico*. Having received no comments on Gulf of Mexico performance requirements, and recognizing that we are licensing wireless service in the Gulf as a specified PEA, we adopt the same coverage requirements as set forth above, with one exception: we will calculate "population" pursuant to the approach taken in *Small Ventures Memorandum Opinion and Order*.[2203] In that order, the Wireless Bureau recognized that using the conventional Census Tract methodology for determining population in the Gulf of Mexico would be infeasible because the Gulf consists of a body of water with non-permanent, mobile residents.[2204] Consistent with that order, we allow a Gulf of Mexico licensee to use all off-shore platforms, including production, manifold, compression, pumping and valving platforms as a proxy for population in the Gulf of Mexico for purposes of meeting build-out obligations.[2205] Thus, in lieu of measuring its build-out obligations based on population, a licensee serving the Gulf of Mexico shall within six years provide reliable signal coverage and offer wireless service to at least 40 percent of all off-shore platforms in its license area and within 12 years (or at the end of the license term[2206]), provide reliable signal coverage and offer wireless service to at least 75 percent of all off-shore platforms in its license area in the Gulf of Mexico. All penalties and other compliance procedures we adopt, excluding those discussing the methodology for meeting population-based build-out requirements, shall apply to a 600 MHz Band licensee with respect to its Gulf of Mexico license.

(iii) Renewal Criteria

783. *Background.* Section 308(b) of the Communications Act authorizes the Commission to require renewal applicants to "set forth such facts as the Commission by regulation may prescribe as to the citizenship, character, and financial, technical, and other qualifications of the applicant to operate the station[,]" as well as "such other information as it may require."[2207] In the *NPRM*, the Commission proposed to adopt license renewal requirements consistent with those adopted in the *700 MHz First Report and Order*.[2208] Under those requirements, renewal applicants must file a "renewal showing," in which they demonstrate that they have been and are continuing to provide service to the public, and are compliant with the Communications Act and with the Commission's rules and policies.[2209]

[2203] *See Small Ventures USA, LP and Cellco Partnership d/b/a Verizon Wireless Request for Waiver and Applications for Assignment of 700 MHz C Block License*, WT Docket No. 12-373, Memorandum Opinion and Order, 28 FCC Rcd 6569, 6572-73, paras. 9-12 (2013) (*Small Ventures Memorandum Opinion and Order*).

[2204] *See Small Ventures Memorandum Opinion and Order,* 28 FCC Rcd at 6572, para. 11; *see also* n.2199 (Census Tract description).

[2205] *See Small Ventures Memorandum Opinion and Order*, 28 FCC Rcd 6569, 6572-73, paras. 9-12.

[2206] If a licensee fails to meet the interim benchmark, the final benchmark and initial license term are accelerated by two years – from 12 to 10 years.

[2207] 47 U.S.C. § 308(b). *See also NPRM*, 27 FCC Rcd at 12492, para. 409.

[2208] *NPRM*, 27 FCC Rcd at 12492-93, paras. 409-12; *700 MHz First Report and Order*, 22 FCC Rcd at 8093-94, paras. 75-77.

[2209] *NPRM*, 27 FCC Rcd at 12492, para. 410. The 700 MHz Band renewal showings include: the level and quality of service provided, whether service was ever interrupted or discontinued, whether service has been provided to rural areas, and any other factors associated with a licensee's level of service to the public. *See 700 MHz First Report and Order*, 22 FCC Rcd at 8093, para. 75. *See also AWS-4 Report and Order*, 27 FCC Rcd at 16202, para. 271; *H Block Report and Order*, 28 FCC Rcd at 9567-68, para. 223; AWS-3 Report and Order at para. 158. The Commission proposed the tribal lands renewal requirement in the *WRS Renewals NPRM and Order* (subsequent to the *700 MHz First Report and Order*), and first adopted it in the *AWS-4 Report and Order*. *Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services*, WT

(continued….)

784. In the *NPRM*, the Commission proposed that 600 MHz Band licensees should be awarded renewal expectancies if they meet their performance obligations and otherwise comply with the Commission's rules and policies and the Communications Act throughout their license term.[2210] The Commission also inquired whether licensees should receive renewal expectancy for subsequent license terms if they continue to provide at least the level of service demonstrated at the final performance benchmark through the end of any subsequent license terms.[2211] Finally, the Commission proposed that, consistent with its 700 MHz licensing paradigm, the Commission would prohibit the filing of competing license renewal applications, and that if a license is not renewed, the associated spectrum would be returned to the Commission for assignment.[2212]

785. *Discussion*. Pursuant to section 308(b) of the Communications Act, we will require 600 MHz Band licensees seeking license renewal to file renewal applications; below, we specify the information that renewal applicants must provide to enable the Commission to assess whether renewal is warranted and in the public interest. In addition, where a license is not renewed, the associated spectrum will be returned to the Commission and made available for assignment. Filing competing applications against license renewal applications is not permitted.

786. We apply to 600 MHz Band licensees the same renewal showing requirements we recently adopted for the AWS-3 Band.[2213] Specifically, a 600 MHz Band licensee's renewal showing must provide a detailed description of its provision of service during the entire license period and discuss: (1) the level and quality of service provided (including the population served, the area served, the number of subscribers, and the services offered); (2) the date service commenced, whether service was ever interrupted, and the duration of any interruption or outage; (3) the extent to which service is provided to rural areas; (4) the extent to which service is provided to qualifying tribal land as defined in section 1.2110(f)(3)(i) of the Commission's rules; and (5) any other factors associated with the level of service to the public. Accordingly, we hereby modify section 27.14 of the Commission's rules to apply these renewal showing criteria to the 600 MHz Band.[2214]

787. The renewal requirements we establish for 600 MHz Band licensees are in the public interest and their benefits outweigh any likely costs. In recent years, the Commission has refined its license renewal policies—beginning with the *700 MHz First Report and Order* in 2007, and most recently in the *AWS-3 Report and Order*.[2215] Through these actions, the Commission established that licensees must demonstrate that they are providing adequate levels of service over the course of their license terms, and here we act consistently with that policy. Consequently, we agree with those commenters who support adopting renewal criteria for the 600 MHz Band that are based on those criteria adopted in the

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Docket No. 10-112, Notice of Proposed Rulemaking and Order, 25 FCC Rcd 6996, 7043, App. A (2010) (*WRS Renewals NPRM and Order*); *AWS-4 Report and Order*, 27 FCC Rcd at 16202, para. 271.

[2210] *NPRM*, 27 FCC Rcd at 12492, para. 411.

[2211] *Id.* at 12492-93, para. 411.

[2212] *Id.* at 12493, para. 412. *See 700 MHz First Report and Order*, 22 FCC Rcd at 8093-94, paras. 76-77; *see also WRS Renewals NPRM and Order,* 25 FCC Rcd at 6998, 7012-14, paras. 3, 40-44. The Commission also sought comment on how a licensee's failure to meet its performance requirements should affect its ability to renew its license. *See* § VI.B.2.c.ii (Performance Requirements).

[2213] *AWS-3 Report and Order* at para. 158.

[2214] Nothing in our decision in this Order prejudges or forecloses the Commission's future consideration of the policies and proposed rules, and related record, for the *WRS Renewals NPRM*, which remains pending. *See WRS Renewals NPRM and Order.* In addition, we emphasize that licensees seeking renewal bear the risk of future changes to our rules.

[2215] *See 700 MHz First Report and Order*, 22 FCC Rcd at 8093-94, paras. 75-77; *AWS-3 Report and Order* at paras. 157-62.

700 MHz First Report and Order[2216] and that were similarly followed in the *AWS-4 Report and Order*, the *H Block Report and Order*, and the *AWS-3 Report and Order*.[2217] These renewal requirements will provide licensees certainty regarding the factors that the Commission will consider during the renewal process, thereby facilitating investment decisions regarding broadband rollout. Further, adopting clear requirements address US Cellular's concern that the renewal process not be unnecessarily burdensome to licensees or that the process not deter investment.[2218]

788. In adopting these criteria, we decline to adopt at this time US Cellular's proposal to categorically provide licensees a renewal expectancy if they meet their performance requirements.[2219] US Cellular claims that renewal expectancies, based solely on performance requirements, would provide certainty to licensees and investors.[2220] As the Commission has consistently stated, performance and renewal showings are distinct; they serve different purposes and, if not met, the Commission may apply different penalties.[2221] A performance showing provides a snapshot in time of the level of a licensee's service, whereas a renewal showing provides information regarding the level and types of service provided over the course of a license term.[2222] Where a licensee meets the applicable performance requirements, but fails to provide continuity of service (by, for example, repeatedly discontinuing operations between required performance showings for periods of less than 180 days), the Commission could find that renewal would be contrary to the public interest.[2223] Where a licensee fails to meet its interim build-out requirement and becomes subject to a two-year acceleration of both its final build-out requirement and its license term, its final performance showing might merely reflect a snapshot in time of compliance with the performance requirements. By contrast, its renewal application must provide a timeline of its provision of service, the percentage of the license-area population covered, and types of service provided over the course of the license term, including any efforts to meet the interim build-out requirement.

789. For subsequent license terms, licensees are likely—absent extraordinary circumstances—to obtain license renewal if they submit satisfactory showings demonstrating that they have maintained or

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[2216] Verizon Comments at 67 (citing *700 MHz First Report and Order*, 22 FCC Rcd at 8093-94, paras. 75-77). *See also* US Cellular Reply at 31-32 (supporting the renewal criteria and policies adopted in the *700 MHz First Report and Order*).

[2217] *See AWS-4 Report and Order*, 27 FCC Rcd at 16202, para. 271; *H Block Report and Order*, 28 FCC Rcd at 9567-68, para. 223; *AWS-3 Report and Order* at para. 158.

[2218] US Cellular Comments at 37-38. *See* US Cellular Reply at 31-32 (characterizing the *700 MHz First Report and Order* as "simply list[ing] a 'variety of factors'" encompassed in the substantial service renewal standard).

[2219] US Cellular Comments at 37-38; US Cellular Reply at 31. *See also* Verizon Comments at 67.

[2220] US Cellular Comments at 37-38. US Cellular asserts that in certain services the Commission "routinely" grants unopposed renewal applications where performance requirements are met. US Cellular Comments at 37-38. *See also* US Cellular Reply at 31. We reiterate that since 2007, the Commission has consistently adopted renewal criteria for wireless radio service licenses that require licensees to show the level and types of service provided over the course of the license term.

[2221] *See AWS-3 Report and Order* at para. 160; *AWS-4 Report and Order*, 27 FCC Rcd at 16202, para. 270; *700 MHz First Report and Order*, 22 FCC Rcd at 8093, para. 75; *WRS Renewals NPRM and Order*, 25 FCC Rcd at 6997-98, 7004-11, paras. 2, 21-35.

[2222] *See, e.g., AWS-3 Report and Order* at para. 160; *700 MHz First Report and Order*, 22 FCC Rcd at 8093, para. 75; *WRS Renewals NPRM and Order*, 25 FCC Rcd at 7004-06, paras. 21-24.

[2223] *See AWS-3 Report and Order* at para. 160.

exceeded the level of coverage and service required at the final build-out benchmark (during the initial license term) and otherwise comply with Commission rules and policies and the Communications Act.[2224]

790. Finally, we reject US Cellular's proposal that we permit competing renewal applications.[2225] Rather, we agree with Verizon that the Commission need not permit competing renewal applications or comparative hearings to evaluate an application for license renewal.[2226] The renewal requirements we adopt in this Order will provide Commission staff with ample information to determine whether license renewal would serve the public interest. The public interest would be ill-served by permitting the filing of potentially time-consuming and costly competing applications.[2227]

(iv) Permanent Discontinuance of Operations

791. *Background.* In the *NPRM*, the Commission asked whether it should apply to 600 MHz Band wireless licensees the rules governing the permanent discontinuance of operations.[2228] Under section 1.955(a)(3), an authorization will automatically terminate, without specific Commission action, if service is "permanently discontinued."[2229] The Commission proposed to define "permanently discontinued" for the 600 MHz Band as a period of 180 consecutive days during which a licensee does not operate and does not serve at least one subscriber that is not affiliated with, controlled by, or related to, the provider.[2230] The Commission also proposed that licensees would not be subject to this requirement until the date of the first performance requirement benchmark (i.e., the interim build-out requirement).[2231]

792. In addition, the Commission proposed that a licensee must notify the Commission within 10 days if it permanently discontinues service, by filing FCC Form 601 or 605 and requesting license cancellation, consistent with section 1.955(a)(3) of the Commission's rules.[2232] The Commission emphasized that even if a licensee fails to file the required form, however, an authorization will automatically terminate without specific Commission action if service is permanently discontinued.[2233] The Commission sought comment on these proposals.[2234]

793. *Discussion.* Section 1.955(a)(3) of the Commission's rules will apply to 600 MHz Band licensees because the benefits of applying this rule outweigh any potential costs of doing so.[2235] Notably, we received no comments on the permanent discontinuance proposals. Therefore, a licensee's 600 MHz

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[2224] *See AWS-3 Report and Order* at para. 161*; accord H Block Report and Order,* 28 FCC Rcd at 9567, para 223 n.695 (citing *AWS-4 Report and Order,* 27 FCC Rcd at 16202, para. 270); *700 MHz First Report and Order,* 22 FCC Rcd at 8093, para. 75.

[2225] US Cellular Comments at 38.

[2226] Verizon Comments at 67.

[2227] As the Commission explained in the *700 MHz First Report and Order*, prohibiting competing applications "protects the public interest without creating incentives for speculators to file 'strike' applications." *700 MHz First Report and Order,* 22 FCC Rcd at 8093, para. 76; *see also AWS-4 Report and Order*, 27 FCC Rcd at 16202, para. 272; *H Block Report and Order,* 28 FCC Rcd at 9568, para. 224; *AWS-3 Report and Order* at para. 162.

[2228] *NPRM*, 27 FCC Rcd at 12493, para. 413.

[2229] 47 C.F.R. § 1.955(a)(3).

[2230] *NPRM*, 27 FCC Rcd at 12493, para. 413.

[2231] *Id*.

[2232] *Id*.

[2233] *Id*.

[2234] *Id*.

[2235] *See* 47 C.F.R. § 1.955(a)(3).

Band authorization will automatically terminate, without specific Commission action, if service is "permanently discontinued."[2236]

794. In accordance with the proposal in the *NPRM*, for providers that identify their regulatory status as common carrier or non-common carrier, we define "permanently discontinued" as a period of 180 consecutive days during which the licensee does not provide service to at least one subscriber that is not affiliated with, controlled by, or related to, the provider in the individual license area (or smaller service area in the case of a partitioned license). We adopt a different approach for wireless licensees that use their licenses for private, internal communications, however, because such licensees generally do not provide service to unaffiliated subscribers.[2237] For such private, internal communications, we define "permanent discontinuance" as a period of 180 consecutive days during which the licensee does not operate.[2238] Finally, as the Commission has previously explained, the operation of so-called channel keepers, e.g., devices that transmit test signals, tones, and/or color bars, do not constitute "operation" under section 1.955(a)(3) or the Commission's other permanent discontinuance rules.[2239]

795. A licensee will not be subject to the discontinuance rules until the date it must meet its interim build-out requirement,[2240] thereby negating the possibility that a licensee will lose its license if it chooses to construct early, but may discontinue operations before the interim build-out benchmark date. The permanent discontinuance rules will apply thereafter, to include any subsequent license renewal term.[2241]

796. This approach is consistent with the discontinuance rules applied to similar wireless services.[2242] Using this approach for the 600 MHz Band also strikes the appropriate balance between affording licensees operational flexibility and ensuring that licensed spectrum is efficiently utilized.

797. Furthermore, in accordance with section 1.955(a)(3) of the Commission's rules, if a licensee permanently discontinues service, the licensee must notify the Commission of the discontinuance

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[2236] *See id*.

[2237] *See H Block Report and Order*, 28 FCC Rcd at 9570-71, para. 230 (citing *WRS Renewals NPRM and Order*, 25 FCC Rcd at 7022, 7047, para. 68, App. A § 1.953).

[2238] In other words, the rule that we adopt for private, internal communications does not include a requirement that the licensee provide service to an unaffiliated subscriber in order to avoid triggering the permanent discontinuance rule. *See H Block Report and Order*, 28 FCC Rcd at 9571, para. 230*,* n.726 (citing *WRS Renewals NPRM and Order*, 25 FCC Rcd at 7022, 7047, para. 68, App. A § 1.953).

[2239] *See Application of San Diego MDS Company*, Memorandum Opinion and Order, 19 FCC Rcd 23120, 23124, para. 10 (2004) ("in order to provide a service a provider would, at a minimum, need a customer or other person to serve") (*San Diego MDS*); *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educations and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, WT Docket Nos. 03-66, 03-67, 02-68, 00-230, MM Docket No. 97-217, IB Docket No. 02-364, ET Docket No. 00-258,Order on Reconsideration and Fifth Memorandum Opinion and Order*,* 21 FCC Rcd 5606, 5731, para. 310 (2006) (*BRS/EBS 3rd MO&O*) (favorably citing *San Diego MDS* when affirming that "transmission of test signals and/or color bars by a BRS/EBS licensee or lessee does not constitute substantial service"); *H Block Report and Order*, 28 FCC Rcd at 9571, para. 233*; AWS-4 Report and Order*, 27 FCC Rcd at 16203, paras. 274-76.

[2240] *See* § VI.B.2.c.ii (Performance Requirements).

[2241] Thus, the permanent discontinuance rules apply as follows: (1) after the interim build-out deadline specified in 47 C.F.R. § 27.14(t) or (2) after the accelerated final build-out deadline (when the licensee fails to meet the interim build-out requirements); and during any subsequent license term.

[2242] *See AWS-3 Report and Order* at paras. 165-66*; H Block Report and Order*, 28 FCC Rcd at 9570-71, para. 230-33*; AWS-4 Report and Order*, 27 FCC Rcd at 16203, para. 274 (adopting substantially similar requirements); *see also WRS Renewals NPRM and Order*, 25 FCC Rcd at 7018, para. 54.

within 10 days by filing FCC Form 601 or 605 and requesting license cancellation.[2243] As explained above, even if the licensee fails to notify the Commission, an authorization will automatically terminate without specific Commission action if service is permanently discontinued.

d. Secondary Markets

(i) Qualifications under Section 6004

798. *Background*. Section 6004 of the Spectrum Act restricts participation in auctions required under the Spectrum Act by "person[s] who [have] been, for reasons of national security, barred by an agency of the Federal Government from . . . participating in an auction, or receiving a grant."[2244] In the *NPRM*, the Commission explained that this section does not address eligibility to acquire licenses on the secondary market.[2245] The Commission sought comment on whether, pursuant to section 6004, it must (or should) similarly restrict eligibility of persons acquiring licenses on the secondary market. If so, the Commission asked whether this restriction is consistent with other provisions of the Communications Act, and what procedures and rules, if any, should apply to persons acquiring licenses on the secondary market.[2246]

799. *Discussion*. In the *H Block Report and Order*, the Commission adopted rule section 27.12(b), which restricts entities from holding licenses if they have been barred by a federal agency for reasons of national security, in accordance with section 6004 of the Spectrum Act.[2247] Because that rule implements a statutory provision that applies to all spectrum bands covered under the Spectrum Act,[2248] section 27.12(b) applies to the 600 MHz Band.[2249] Further, we received no comments opposing or supporting applying section 6004 to secondary market transactions that include 600 MHz Band licenses. Thus, consistent with the purpose of the statute, we require applicants to certify in an application seeking approval of a secondary market transaction involving 600 MHz Band licenses that neither the applicants nor any party to the application are persons barred from participating in an auction under section 6004 of the Spectrum Act.[2250]

[2243] 47 C.F.R. § 1.955(a)(3).

[2244] Specifically, § 6004 of the Spectrum Act restricts "person[s] who [have] been, for reasons of national security, barred by any agency of the Federal Government from bidding on a contract, participating in an auction, or receiving a grant" from participating in the incentive auction (among others). Spectrum Act § 6004.

[2245] *NPRM*, 27 FCC Rcd at 12483, para. 382 (citing Spectrum Act § 6004(c)). Secondary market transactions include transfers and assignments, partitioning, disaggregation, and spectrum leasing.

[2246] *Id*.

[2247] *H Block Report and Order*, 28 FCC Rcd at 9555, para. 187. Specifically, § 27.12(b) states: "[a] person described in 47 U.S.C. § 1404(c) is ineligible to hold a license that is required by 47 U.S.C. Chapter 13 (Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 125 Stat. 156 (2012)) to be assigned by a system of competitive bidding under § 309(j) of the Communications Act, 47 U.S.C. § 309(j)." 47 C.F.R. § 27.12(b). This rule applies to licenses acquired through the secondary market, as well as to new initial licenses acquired at auction. *H Block Report and Order*, 28 FCC Rcd at 9555, para. 187. In the *H Block Report and Order*, the Commission also adopted a revision to the bidding application and certification procedures. *See* 47 C.F.R. § 1.2105(a)(2)(xii).

[2248] *See H Block Report and Order*, 28 FCC Rcd at 9573, para. 238. *See also AWS-3 Report and Order* at para. 125.

[2249] As part of the § 6004 implementation, the Commission instituted a revision to the bidding application and certification procedures, which also applies to the 600 MHz Band. *See* 47 C.F.R. § 1.2105(a)(2)(xii).

[2250] As the Commission explained in the *H Block Report and Order*, "[t]he Commission generally does not allow parties to avoid statutory or regulatory requirements through use of secondary markets. It is reasonable to assume that Congress did not intend to permit persons barred on national security grounds from 'participating in an auction' for certain licenses to acquire those same licenses in such an indirect fashion. In any event, given the policies reflected in § 6004, it is appropriate to exercise our independent authority under § 308(b) of the Communications

(continued….)

(ii) Partitioning and Disaggregation

800. *Background.* In the *NPRM*, the Commission proposed to permit 600 MHz Band licensees to partition geographic markets and disaggregate spectrum under existing Part 27 partitioning and disaggregation rules.[2251] Specifically, it proposed that any entity holding a 600 MHz Band license, including parties to any partitioning or disaggregation arrangement pertaining to a 600 MHz Band license, must independently meet applicable performance and renewal requirements.[2252] The Commission proposed this approach to facilitate efficient spectrum use, while enabling service providers to configure geographic area licenses and spectrum blocks to meet their operational needs.[2253]

801. *Discussion*. We adopt the Part 27 partitioning and disaggregation rules for the 600 MHz Band.[2254] Very few commenters discuss partitioning and disaggregation, but those who do support this approach.[2255] Permitting partitioning and disaggregation is in the public interest, and based on our examination of the record,[2256] the associated benefits would outweigh any potential costs. We agree with Verizon that applying these rules "promotes a robust secondary market in spectrum" and "facilitates acquisition of spectrum rights by smaller carriers who may serve small, targeted markets,"[2257] thus allowing for new entrants and promoting competition. Further, permitting disaggregation and partitioning will help facilitate investment and rapid deployment in the 600 MHz Band, while giving licensees flexibility to use the spectrum to meet changing market demand. As the Commission noted when it first adopted partitioning and disaggregation rules, allowing this type of flexibility can facilitate the efficient use of spectrum, and expedite provision of services in areas that might not otherwise receive service in the near term.[2258]

802. As proposed in the *NPRM*, and consistent with the treatment of other Part 27 services,[2259] a partitionee or disaggregatee will hold its license for the remainder of the partitioner's or disaggregator's license term. In addition, any 600 MHz Band licensee that is a party to a partitioning or disaggregation arrangement (or combination of both) must independently meet the applicable 600 MHz Band technical

(Continued from previous page)
Act to extend such a national security bar to the acquisition of Commission licenses through the secondary market." *H Block Report and Order,* 28 FCC Rcd at 9555, para. 187 (*footnotes omitted*).

[2251] *NPRM*, 27 FCC Rcd at 12485, paras. 385-88. Geographic partitioning refers to the assignment of geographic portions of a license to another licensee along geopolitical or other boundaries. Spectrum disaggregation refers to the assignment of a discrete amount of spectrum under the license to another entity. Disaggregation allows for multiple transmitters in the same geographic area operated by different companies on adjacent frequencies in the same band. *See* 47 C.F.R. § 27.15. A partitionee or disaggregatee is authorized to hold its license for the remainder of the partitioner's or disaggregator's license term. *See* 47 C.F.R. § 27.15(c).

[2252] *NPRM*, 27 FCC Rcd at 12485, para. 387.

[2253] *Id*.

[2254] 47 C.F.R. § 27.15.

[2255] *See, e.g.*, CTIA Comments at 37-38; Verizon Comments at 64.

[2256] *See* CTIA Comments at 37-38; Verizon Comments at 64.

[2257] Verizon Comments at 64.

[2258] *Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Service Licensees*, WT Docket No. 96-148, Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 21831, 21833, para. 1 (1996). The Commission observed previously that allowing rural telephone companies to acquire spectrum through geographic partitioning sped the deployment of broadband services in rural areas because rural telephone companies could rely on existing infrastructure. *Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, PP Docket No. 93-253, Fifth Report and Order, 9 FCC Rcd 5532, para. 150 (1994).

[2259] *See* 47 C.F.R. § 27.15. The Commission most recently adopted this rule for the AWS-3 Band. *See AWS-3 Report and* Order at paras. 168-69. *See also H Block Report and Order*, 28 FCC Rcd at 9573, para. 238.

rules and regulatory requirements, including performance and renewal requirements.[2260] As the Commission has previously observed, this approach should facilitate efficient spectrum usage and prevent licensees from avoiding construction obligations by participating in secondary market transactions, while still providing operators with the flexibility to design their networks according to their operation and business needs.[2261]

(iii) Spectrum Leasing

803. *Background.* In the *NPRM*, the Commission proposed to apply to 600 MHz Band licensees the spectrum leasing policies established in various secondary markets proceedings[2262] in the same manner that those policies and rules apply to other Part 27 services.[2263] Since 2003, these secondary markets policies and rules have enabled licensees to lease some or all of their spectrum usage rights to third party spectrum lessees, who are permitted to provide wireless services consistent with the underlying license authorization.[2264]

804. *Discussion*. We adopt the same spectrum leasing policies and rules that apply to other Part 27 services.[2265] Commenters that discuss spectrum leasing support the proposals made in the *NPRM* and agree that adopting spectrum leasing rules will promote the public interest.[2266] For example, CTIA notes that "the Commission's leasing policies have brought licensees much-needed flexibility in managing their networks, and have enabled innovative service and market entry by new competitors."[2267] Our secondary markets policies are designed to promote more efficient, innovative, and dynamic use of the spectrum, expand the scope of available wireless services and devices, enhance economic opportunities for accessing spectrum, and promote competition among providers.[2268] Likewise, allowing spectrum leasing in the 600 MHz Band will serve these same purposes.[2269] In other Part 27 services

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[2260] *See* 47 C.F.R. § 27.15(d) (addressing compliance with construction requirements); *see also* 47 C.F.R. § 27.14(t) (addressing license build-out and renewal requirements).

[2261] *AWS-4 Report and Order*, 27 FCC Rcd at 16196 para. 253; *WRS Renewals NPRM and Order*, 25 FCC Rcd at 7029, para. 91; *H Block Report and Order*, 28 FCC Rcd at 9573, para 238; *AWS-3 Report and Order* at para.169.

[2262] *See Secondary Markets First R&O*, 18 FCC Rcd 20604; *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd 17503 (2004). The Commission has added more terrestrial services to this spectrum leasing framework, including the AWS-1 Band in 2003 (*AWS-1 R&O*, 18 FCC Rcd 25162), the Broadband Radio Services and Educational Broadband Services in 2004 (*Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, WT Docket Nos. 03-66, 03-67, 02-68, 00-230, MM Docket No. 97-217, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165, 14232-34, paras. 177-81 (2004)), and the AWS-4 Band in 2012 (*AWS-4 Report and Order*, 27 FCC Rcd at 16196-99, paras. 254-59); and the H Block in 2013 (*H Block Report and Order*, 28 FCC Rcd at 9573-75, paras. 239-42).

[2263] *NPRM*, 27 FCC Rcd at 12486, para. 391.

[2264] *Secondary Markets First R&O*, 18 FCC Rcd at 20609-13, 20648-49, paras. 8-9, 12-13, 91-92.

[2265] *See id*. Under these secondary market policies and rules, the service rules and policies applicable to the licensee under its license authorization – including all technical, interference, and operational rules – apply to the spectrum lessee as well. *Secondary Markets First R&O*, 18 FCC Rcd at 20648-49, paras. 91-92; *see* 47 C.F.R. §§ 1.9020(c)-(d), 1.9030 (c)-(d), 1.9035(c)-(d). The rules and procedures for spectrum leasing arrangements are set forth in Part 1, Subpart X. 47 C.F.R §§ 1.9001 *et seq*.

[2266] *See, e.g.*, CTIA Comments at 37-38; Verizon Comments at 10, 64.

[2267] CTIA Comments at 38.

[2268] *See Secondary Markets First R&O*, 18 FCC Rcd at 20607, para. 2.

[2269] *NPRM*, 27 FCC Rcd at 12486, paras. 389-91.

spectrum leasing policies generally follow the same approach as the partitioning and disaggregation policies for the band."[2270] Thus, our decision to permit spectrum leasing in the 600 MHz Band is consistent with our determination to permit partitioning and disaggregation in the 600 MHz Band[2271] and with our existing Part 27 spectrum leasing policies.

e. Other Operating Requirements

805. *Background.* In the *NPRM*, the Commission explained that even though we issue licenses in the 600 MHz Band pursuant to one rule part (Part 27), we may require licensees in this Band to comply with rules contained in other parts of the Commission's rules, depending on the particular services they provide.[2272] The Commission sought comment on whether we need to modify any provisions in existing, service-specific rules to ensure that we cover 600 MHz Band licensees under the necessary Commission rules.[2273] In addition, the Commission sought comment on any rules that would be affected by the proposal to apply elements of the framework of these rule parts, whether separately or in conjunction with other requirements.[2274]

806. *Discussion.* Although we primarily adopt rules for the 600 MHz Band under Part 27 of the Commission's rules, we also require 600 MHz Band licensees to comply with certain other rule parts that pertain generally to wireless communication services. This approach will maintain general consistency among various wireless communications services. We received no comments on the *NPRM* proposal. Section 27.3 of the Commission's rules lists some of the rule parts applicable to wireless communications services licensees.[2275] In addition, other FCC rules may apply to 600 MHz Band licensees, including those that apply only to certain licensees, depending on the specific type of service or services that a particular licensee provides.[2276] Thus, it is appropriate to apply section 27.3, as well as similar rules applicable to wireless communications service licensees, to 600 MHz Band licensees. In so doing, we will maintain consistency among various wireless communications services—including the 600 MHz Band—which will best serve the public interest. For these same reasons, the benefits of this approach outweigh any potential costs.

VII. PROCEDURAL MATTERS

807. *Final Regulatory Flexibility Act Analysis*. Pursuant to the Regulatory Flexibility Act of 1980, as amended,[2277] the Commission's Final Regulatory Flexibility Analysis (FRFA) relating to this Report and Order is attached as Appendix B.

808. *Final Paperwork Reduction Act of 1995 Analysis*. This document contains new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 ("PRA"), Public Law 104-13. It will be submitted to the Office of Management and Budget ("OMB") for review under section 3507(d) of the PRA. OMB, the general public, and other Federal agencies are invited to comment on the new or modified information collection requirements contained in this proceeding. In addition, we note that pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198,

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[2270] *See AWS-3 Report and Order* at para. 171; *see also AWS-4 Report and Order*, 27 FCC Rcd at 16198, para. 258.

[2271] *See* § VI.B.2.d.ii (Partitioning and Disaggregation).

[2272] *NPRM*, 27 FCC Rcd at 12493-94, para. 414.

[2273] *Id.* at 12494, para. 415.

[2274] *Id*.

[2275] 47 C.F.R. § 27.3.

[2276] *See, e.g.*, 47 C.F.R. § Part 9.5 (wireless licensees providing interconnected VoIP services are subject to E911 service requirements); *see generally* Parts 20, 22, 24, 27, and 101 for other obligations that may apply to certain wireless communications services licensees.

[2277] *See* 5 U.S.C. § 604.

see 44 U.S.C. 3506(c)(4), we previously sought specific comment on how the Commission might further reduce the information collection burden for small business concerns with fewer than 25 employees.

809. We have assessed the effects of the policies adopted in this Report and Order with regard to information collection burdens on small business concerns, and find that these policies will benefit many companies with fewer than 25 employees by providing them with options for voluntarily relinquishing broadcast spectrum usage rights or for gaining access to valuable repurposed spectrum. In addition, we have described impacts that might affect small businesses, which includes most businesses with fewer than 25 employees, in the FRFA attached to this Report and Order as Appendix B.

810. *Congressional Review Act*. The Commission will send a copy of this Report and Order to Congress and the Government Accountability Office pursuant to the Congressional Review Act.[2278]

811. *Delegation to Correct Rules*. We delegate authority to the Wireless Telecommunications Bureau, Media Bureau, International Bureau, and Office of Engineering and Technology, as appropriate, to make corrections to the rules set forth in Appendix A as necessary to conform them to the text of this Order. We note that any entity that disagrees with a rule correction made on delegated authority will have the opportunity to file an Application for Review by the full Commission.[2279]

VIII. ORDERING CLAUSES

812. **IT IS ORDERED**, pursuant to the authority found in Sections 1, 4, 301, 303, 307, 308, 309, 310, 316, 319, 325(b), 332, 336(f), 338, 339, 340, 399b, 403, 534, and 535 of the Communications Act of 1934, as amended, and sections 6004, 6402, 6403, 6404, and 6407 of Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 126 Stat. 156, 47 U.S.C. §§ 151, 154, 301, 303, 307, 308, 309, 310, 316, 319, 325(b), 332, 336(f), 338, 339, 340, 399b, 403, 534, 535, 1404, 1452, and 1454, the Report and Order in GN Docket No. 12-268 **IS ADOPTED**.

813. **IT IS FURTHER ORDERED** that the Commission's rules **ARE HEREBY AMENDED** as set forth in Appendix A.

814. **IT IS FURTHER ORDERED** that the rules adopted herein **WILL BECOME EFFECTIVE** 60 days after the date of publication in the *Federal Register*, except for those rules and requirements which contain new or modified information collection requirements that require approval by the OMB under the PRA and **WILL BECOME EFFECTIVE** after the Commission publishes a notice in the *Federal Register* announcing such approval and the relevant effective date.

815. **IT IS FURTHER ORDERED** that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, **SHALL SEND** a copy of this Report and Order in GN Docket No. 12-268, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

816. **IT IS FURTHER ORDERED** that the Commission **SHALL SEND** a copy of this Report and Order in GN Docket No. 12-268 in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. § 801(a)(1)(A).

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

[2278] *See* 5 U.S.C. 801(a)(1)(A).

[2279] *See* 47 U.S.C. § 155(c)(1).

APPENDIX A

Final Rules

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR parts 0, 1, 2, 15, 27, 73, and 74 as follows:

PART 0—COMMISSION ORGANIZATION

1. The authority citation for part 0 continues to read as follows:

Authority: Sec. 5, 48 Stat. 1068, as amended; 47 U.S.C. 155, 225, unless otherwise noted.

2. Section 0.457 is amended by adding paragraph (d)(1)(ix) to read as follows:

§ 0.457 Records not routinely available for public inspection.

* * * * *

(d) * * *

(1) * * *

(ix) Confidential Broadcaster Information, as defined in § 1.2206(d) of this chapter, submitted by a broadcast television licensee in a broadcast television spectrum reverse auction conducted under section 6403 of the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. No. 112-96) (the "Spectrum Act"), or in the application to participate in such a reverse auction, is not routinely available for public inspection until the reassignments and reallocations under section 6403(b)(1)(B) of the Spectrum Act become effective or until two years after public notice that the reverse auction is complete and that no such reassignments and reallocations shall become effective. In the event that reassignments and reallocations under section 6403(b)(1)(B) of the Spectrum Act become effective, Confidential Broadcaster Information pertaining to any unsuccessful reverse auction bid or pertaining to any unsuccessful application to participate in such a reverse auction will not be routinely available for public inspection until two years after the effective date.

* * * * *

PART 1—PRACTICE AND PROCEDURE

3. The authority citation for part 1 is revised to read as follows:

Authority: 15 U.S.C. 79 et seq.; 47 U.S.C. 151, 154(i), 154(j), 155, 157, 225, 227, 303(r), 309, 1403, 1404, 1451, and 1452.

4. Section 1.2101 is revised to read as follows:

§ 1.2101 Purpose.

The provisions of §§ 1.2101 through 1.2114 implement section 309(j) of the Communications Act of 1934, as added by the Omnibus Budget Reconciliation Act of 1993 (Pub. L. 103–66) and subsequent amendments.

§ 1.2102 [Amended]

5. Section 1.2102 is amended by removing paragraph (c).

6. Section 1.2103 is revised to read as follows:

§ 1.2103 Competitive bidding design options.

(a) Public notice of competitive bidding design options. Prior to any competitive bidding for initial licenses, public notice shall be provided of the detailed procedures that may be used to implement auction design options.

(b) Competitive bidding design options. The public notice detailing competitive bidding procedures may establish procedures for collecting bids, assigning winning bids, and determining payments, including without limitation:

(1) Procedures for collecting bids.

(i) Procedures for collecting bids in a single round or in multiple rounds.

(ii) Procedures allowing for bids for specific items, bids for generic items in one or more categories of items, or bids for one or more aggregations of items.

(iii) Procedures allowing for bids that specify a price, indicate demand at a specified price, or provide other information as specified by competitive bidding policies, rules, and procedures.

(iv) Procedures allowing for bids that are contingent on specified conditions, such as other bids being accepted or for packages of licenses being awarded.

(v) Procedures to collect bids in one or more stages, including procedures for transitions between stages.

(vi) Procedures for whether, when, and how bids may be modified during the auction.

(2) Procedures for assigning winning bids.

(i) Procedures that take into account one or more factors in addition to the submitted bid amount, including but not limited to the amount of bids submitted in separate competitive bidding.

(ii) Procedures to assign specific items to bidders following bidding for quantities of generic items.

(iii) Procedures to incorporate public interest considerations into the process for assigning winning bids.

(3) Procedures for determining payments. Procedures to determine the amount of any payments made to or by winning bidders consistent with other auction design choices.

7. Section 1.2104 is amended by revising paragraphs (e) and (j) to read as follows:

§ 1.2104 Competitive bidding mechanisms.

* * * * *

(e) Stopping procedures. Before or during an auction, procedures may be established regarding when bidding will stop for a round, a stage, or an entire auction, in order to terminate the auction within a reasonable time and in accordance with public interest considerations and the goals, statutory requirements, rules, and procedures for the auction, including any reserve price or prices.

* * * * *

(j) Bid apportionment.

(1) Apportioned license bid. The Commission may specify a method for apportioning a bid among portions of the license (i.e., portions of the license's service area or bandwidth, or both) when necessary to compare a bid on the original license or portions thereof with a bid on a corresponding reconfigured license for purposes of the Commission's rules or procedures, such as to calculate a bid withdrawal or default payment obligation in connection with the bid.

(2) Apportioned package bid. The apportioned package bid on a license is an estimate of the price of an individual license included in a package of licenses in an auction with combinatorial (package) bidding. Apportioned package bids shall be determined by the Commission according to a methodology it establishes in advance of each auction with combinatorial bidding. The apportioned package bid on a

license included in a package shall be used in place of the amount of an individual bid on that license when the bid amount is needed to determine the size of a designated entity bidding credit (see § 1.2110(f)(1) and (f)(2)), a new entrant bidding credit (see § 73.5007 of this chapter), a bid withdrawal or default payment obligation (see § 1.2104(g)), a tribal land bidding credit limit (see § 1.2110(f)(3)(iv)), or a size-based bidding credit unjust enrichment payment obligation (see § 1.2111(d), (e)(2), and (e)(3)), or for any other determination required by the Commission's rules or procedures.

8. Section 1.2105 is amended by revising paragraphs (a)(2)(i), (a)(2)(xii), and (c)(6), and adding paragraph (c)(8) to read as follows:

§ 1.2105 Bidding application and certification procedures; prohibition of certain communications.

(a) * * *

(2) * * *

(i) Identification of each license, or category of licenses, on which the applicant wishes to bid.

* * * * *

(xii) For auctions required to be conducted under Title VI of the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. No. 112-96) or in which any spectrum usage rights for which licenses are being assigned were made available under 47 U.S.C. 309(j)(8)(G)(i), certification under penalty of perjury that the applicant and all of the person(s) disclosed under paragraph (a)(2)(ii) of this section are not person(s) who have been, for reasons of national security, barred by any agency of the Federal Government from bidding on a contract, participating in an auction, or receiving a grant. For the purposes of this certification, the term "person" means an individual, partnership, association, joint-stock company, trust, or corporation, and the term "reasons of national security" means matters relating to the national defense and foreign relations of the United States.

* * * * *

(c) * * *

(6) A party that makes or receives a communication prohibited under paragraphs (c)(1) or (c)(8) of this section shall report such communication in writing immediately, and in any case no later than five

business days after the communication occurs. A party's obligation to make such a report continues until the report has been made. Such reports shall be filed as directed in public notices detailing procedures for the bidding that was the subject of the reported communication. If no public notice provides direction, the party making the report shall do so in writing to the Chief of the Auctions and Spectrum Access Division, Wireless Telecommunications Bureau, by the most expeditious means available, including electronic transmission such as email.

* * * * *

(8) Prohibition of certain communications for the broadcast television spectrum incentive auction conducted under section 6403 of the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. No. 112-96).

(i) For the purposes of the prohibition described in paragraphs (c)(8)(ii) and (c)(8)(iii) of this section, the term forward auction applicant is defined the same as the term applicant is defined in paragraph (c)(7) of this section, and the terms full power broadcast television licensee and Class A broadcast television licensee are defined the same as those terms are defined in § 1.2205(a)(1).

(ii) Except as provided in paragraph (c)(8)(iii) of this section, in the broadcast television spectrum incentive auction conducted under section 6403 of the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. No. 112-96), beginning on the short-form application filing deadline for the forward auction and until the results of the incentive auction are announced by public notice, all forward auction applicants are prohibited from communicating directly or indirectly any incentive auction applicant's bids or bidding strategies to any full power or Class A broadcast television licensee.

(iii) The prohibition described in paragraph (c)(8)(ii) of this section does not apply to communications between a forward auction applicant and a full power or Class A broadcast television licensee if a controlling interest, director, officer, or holder of any 10 percent or greater ownership interest in the forward auction applicant, as of the deadline for submitting short-form applications to participate in the forward auction, is also a controlling interest, director, officer, or governing board member of the full

power or Class A broadcast television licensee, as of the deadline for submitting applications to participate in the reverse auction.

NOTE 1 TO PARAGRAPH (c): For the purposes of paragraph (c), "controlling interests" include individuals or entities with positive or negative de jure or de facto control of the licensee. De jure control includes holding 50 percent or more of the voting stock of a corporation or holding a general partnership interest in a partnership. Ownership interests that are held indirectly by any party through one or more intervening corporations may be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, except that if the ownership percentage for an interest in any link in the chain meets or exceeds 50 percent or represents actual control, it may be treated as if it were a 100 percent interest. De facto control is determined on a case-by-case basis. Examples of de facto control include constituting or appointing 50 percent or more of the board of directors or management committee; having authority to appoint, promote, demote, and fire senior executives that control the day-to-day activities of the licensee; or playing an integral role in management decisions.

NOTE 2 TO PARAGRAPH (c): The prohibition described in paragraph (c)(8)(ii) of this section applies to controlling interests, directors, officers, and holders of any 10 percent or greater ownership interest in the forward auction applicant as of the deadline for submitting short-form applications to participate in the forward auction, and any additional such parties at any subsequent point prior to the announcement by public notice of the results of the incentive auction. Thus, if, for example, a forward auction applicant appoints a new officer after the short-form application deadline, that new officer would be subject to the prohibition in paragraph (c)(8)(ii) of this section, but would not be included within the exception described in paragraph (c)(8)(iii).

9. Section 1.2106 is amended by revising paragraph (a) to read as follows:

§ 1.2106 Submission of upfront payments.

(a) Applicants for licenses subject to competitive bidding may be required to submit an upfront payment. In that event, the amount of the upfront payment and the procedures for submitting it will be set forth in a

public notice. Any auction applicant that has previously been in default on any Commission license or has previously been delinquent on any non-tax debt owed to any Federal agency must submit an upfront payment equal to 50 percent more than the amount that otherwise would be required. No interest will be paid on upfront payments.

* * * * *

10. Section 1.2114 is amended by revising paragraph (e) to read as follows:

§ 1.2114 Reporting of eligibility event.

* * * * *

(e) Public notice of application. Applications under this section will be placed on an informational public notice on a weekly basis (see § 1.933(a)).

* * * * *

11. Subpart Q is amended by adding §§ 1.2200 through 1.2209 under the new undesignated center heading "Broadcast Television Spectrum Reverse Auction" to read as follows:

Broadcast Television Spectrum Reverse Auction

§ 1.2200 Definitions.

For purposes of §§ 1.2200 through 1.2209:

(1) Broadcast television licensee. The term broadcast television licensee means the licensee of (A) a full-power television station, or (B) a low-power television station that has been accorded primary status as a Class A television licensee under § 73.6001(a) of this chapter.

(2) Channel sharee. The term channel sharee means a broadcast television licensee that relinquishes all spectrum usage rights with respect to a particular television channel in order to share a television channel with another broadcast television licensee.

(3) Channel sharer. The term channel sharer means a broadcast television licensee that shares its television channel with a channel sharee.

(4) Channel sharing bid. The term channel sharing bid means a bid to relinquish all spectrum usage rights with respect to a particular television channel in order to share a television channel with another broadcast television licensee.

(5) Forward auction. The term forward auction means the portion of an incentive auction of broadcast television spectrum described in section 6403(c) of the Spectrum Act.

(6) High-VHF-to-low-VHF bid. The term high-VHF-to-low-VHF bid means a bid to relinquish all spectrum usage rights with respect to a high very high frequency ("VHF") television channel (channels 7 through 13) in return for receiving spectrum usage rights with respect to a low VHF television channel (channels 2 through 6).

(7) License relinquishment bid. The term license relinquishment bid means a bid to relinquish all spectrum usage rights with respect to a particular television channel without receiving in return any spectrum usage rights with respect to another television channel.

(8) NCE station. The term NCE station means a noncommercial educational television broadcast station as defined in § 73.621 of this chapter.

(9) Reverse auction. The term reverse auction means the portion of an incentive auction of broadcast television spectrum described in section 6403(a) of the Spectrum Act.

(10) Reverse auction bid. The term reverse auction bid includes a license relinquishment bid, a UHF-to-VHF bid, a high-VHF-to-low-VHF bid, a channel sharing bid, and any other reverse auction bids permitted.

(11) Spectrum Act. The term Spectrum Act means Title VI of the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. No. 112-96).

(12) UHF-to-VHF bid. The term UHF-to-VHF bid means a bid to relinquish all spectrum usage rights with respect to an ultra-high frequency ("UHF") television channel in return for receiving spectrum usage rights with respect to a high VHF television channel or a low VHF television channel.

§ 1.2201 Purpose.

The provisions of §§ 1.2200 through 1.2209 implement section 6403 of the Spectrum Act, which requires

the Commission to conduct a reverse auction to determine the amount of compensation that each broadcast television licensee would accept in return for voluntarily relinquishing some or all of its broadcast television spectrum usage rights in order to make spectrum available for assignment through a system of competitive bidding under subparagraph (G) of section 309(j)(8) of the Communications Act of 1934, as added by section 6402 of the Spectrum Act.

§ 1.2202 Competitive bidding design options.

(a) Public notice of competitive bidding design options. Prior to conducting competitive bidding in the reverse auction, public notice shall be provided of the detailed procedures that may be used to implement auction design options.

(b) Competitive bidding design options. The public notice detailing competitive bidding procedures for the reverse auction may establish procedures for collecting bids, assigning winning bids, and determining payments, including without limitation:

(1) Procedures for collecting bids.

(i) Procedures for collecting bids in a single round or in multiple rounds.

(ii) Procedures for collecting bids for multiple reverse auction bid options.

(iii) Procedures allowing for bids that specify a price for a reverse auction bid option, indicate demand at a specified price, or provide other information as specified by competitive bidding policies, rules, and procedures.

(iv) Procedures allowing for bids that are contingent on specified conditions, such as other bids being accepted.

(v) Procedures to collect bids in one or more stages, including procedures for transitions between stages.

(vi) Procedures for whether, when, and how bids may be modified during the auction.

(2) Procedures for assigning winning bids.

(i) Procedures that take into account one or more factors in addition to bid amount, such as population coverage or geographic contour, or other relevant measurable factors.

(ii) Procedures to evaluate the technical feasibility of assigning a winning bid.

(A) Procedures that utilize mathematical computer optimization software, such as integer programming, to evaluate bids and technical feasibility, or that utilize other decision routines, such as sequentially evaluating bids using a ranking based on specified factors.

(B) Procedures that combine computer optimization algorithms with other decision routines.

(iii) Procedures to incorporate public interest considerations into the process for assigning winning bids.

(3) Procedures for determining payments.

(i) Procedures to determine the amount of any incentive payments made to winning bidders consistent with other auction design choices.

(ii) The amount of proceeds shared with a broadcast television licensee will not be less than the amount of the licensee's winning bid in the reverse auction.

§ 1.2203 Competitive bidding mechanisms.

(a) Public notice of competitive bidding procedures. Detailed competitive bidding procedures shall be established by public notice prior to the commencement of the reverse auction, including without limitation:

(1) Sequencing. The sequencing with which the reverse auction and the related forward auction assigning new spectrum licenses will occur.

(2) Reserve price. Reserve prices, either disclosed or undisclosed, so that higher bids for various reverse auction bid options would not win in the reverse auction. Reserve prices may apply individually, in combination, or in the aggregate.

(3) Opening bids and bid increments. Maximum or minimum opening bids, and by announcement before or during the reverse auction, maximum or minimum bid increments in dollar or percentage terms.

(4) Activity rules. Activity rules that require a minimum amount of bidding activity.

(b) Binding obligation. A bid is an unconditional, irrevocable offer by the bidder to fulfill the terms of the bid. The Commission accepts the offer by identifying the bid as winning. A bidder has a binding obligation to fulfill the terms of a winning bid. A winning bidder will relinquish spectrum usage rights pursuant to the terms of any winning bid by the deadline set forth in § 73.3700(b)(4) of this chapter.

(c) Stopping procedures. Before or during the reverse auction, procedures may be established regarding when bidding will stop for a round, a stage, or an entire auction, in order to terminate the auction within a reasonable time and in accordance with public interest considerations and the goals, statutory requirements, rules, and procedures for the auction, including any reserve price or prices.

(d) Auction delay, suspension, or cancellation. By public notice or by announcement during the reverse auction, the auction may be delayed, suspended, or cancelled in the event of a natural disaster, technical obstacle, network disruption, evidence of an auction security breach or unlawful bidding activity, administrative or weather necessity, or for any other reason that affects the fair and efficient conduct of the competitive bidding. The Commission has the authority, at its sole discretion, to resume the competitive bidding starting from the beginning of the current or some previous round or cancel the competitive bidding in its entirety.

§ 1.2204 Applications to participate in competitive bidding.

(a) Public notice of the application process. All applications to participate must be filed electronically. The dates and procedures for submitting applications to participate in the reverse auction shall be announced by public notice.

(b) Applicant. The applicant identified on the application to participate must be the broadcast television licensee that would relinquish spectrum usage rights if it becomes a winning bidder. In the case of a channel sharing bid, the applicant will be the proposed channel sharee.

(c) Information and certifications provided in the application to participate. An applicant may be required to provide the following information in its application to participate in the reverse auction:

(1) The following identifying information:

(i) If the applicant is an individual, the applicant's name and address. If the applicant is a corporation, the name and address of the corporate office and the name and title of an officer or director. If the applicant is a partnership, the name, citizenship, and address of all general partners, and, if a general partner is not a natural person, then the name and title of a responsible person for that partner, as well. If the applicant is a trust, the name and address of the trustee. If the applicant is none of the above, it must identify and

describe itself and its principals or other responsible persons;

(ii) Applicant ownership and other information as set forth in § 1.2112(a); and

(iii) List, in the case of a non-profit entity, the name, address, and citizenship of each member of the governing board and of any educational institution or governmental entity with a controlling interest in the applicant, if applicable.

(2) The identity of the person(s) authorized to take binding action in the bidding on behalf of the applicant.

(3) For each broadcast television license for which the applicant intends to submit reverse auction bids:

(i) The identity of the station and its television channel;

(ii) Whether it is a full-power or Class A television station;

(iii) If the license is for a Class A television station, certification under penalty of perjury that it is and will remain in compliance with the ongoing statutory eligibility requirements to remain a Class A station;

(iv) Whether it is an NCE station and, if so, whether it operates on a reserved or non-reserved channel;

(v) The types of reverse auction bids that the applicant may submit;

(vi) Whether the license for the station is subject to a non-final revocation order, has expired and is subject to a non-final cancellation order, or if for a Class A station is subject to a non-final downgrade order and, if the license is subject to such a proceeding or order, then an acknowledgement that the Commission will place all of its auction proceeds into escrow pending the final outcome of the proceeding or order; and

(vii) Any additional information required to assess the spectrum usage rights offered.

(4) For each broadcast television license for which the applicant intends to submit a license relinquishment bid:

(i) Whether it will control another broadcast station if it becomes a winning bidder and terminates operations; and

(ii) If it will control another broadcast station, an acknowledgement that it will remain subject to any pending license renewal, as well as any enforcement action, against the station offered; or

(iii) If it will not control another broadcast station, an acknowledgement that the Commission will place a share of its auction proceeds into escrow to cover any potential forfeiture costs associated with any pending license renewal or any pending enforcement action against the station offered.

(5) For each broadcast television license for which the applicant intends to submit a channel sharing bid:

(i) The identity of the channel sharer and the television channel the applicant has agreed to share;

(ii) Any required information regarding the channel sharing agreement, including a copy of the executed channel sharing agreement;

(iii) Certification under penalty of perjury that the channel sharing agreement is consistent with all Commission rules and policies, and that the applicant accepts any risk that the implementation of the channel sharing agreement may not be feasible for any reason, including any conflict with requirements for operation on the shared channel;

(iv) Certification under penalty of perjury that its operation from the shared channel facilities will not result in a change to its Designated Market Area;

(v) Certification under penalty of perjury that it can meet the community of license coverage requirement set forth in § 73.625(a) of this chapter from the shared channel facilities or, if not, that the new community of license for its shared channel facilities either meets the same or a higher allotment priority as its current community; or, if no community meets the same or higher allotment priority, provides the next highest priority;

(vi) Certification under penalty of perjury that the proposed channel sharing arrangement will not violate the multiple ownership rules, set forth in § 73.3555 of this chapter, based on facts at the time the application is submitted; and

(vii) Certification by the channel sharer under penalty of perjury with respect to the certifications described in paragraphs (c)(3)(iii), (c)(5)(iii), and (c)(5)(vi) of this section.

(6) Certification under penalty of perjury that the applicant and all of the person(s) disclosed under paragraph (c)(1) of this section are not person(s) who have been, for reasons of national security, barred by any agency of the Federal Government from bidding on a contract, participating in an auction, or

receiving a grant. For the purposes of this certification, the term "person" means an individual, partnership, association, joint-stock company, trust, or corporation, and the term "reasons of national security" means matters relating to the national defense and foreign relations of the United States.

(7) Certification that the applicant agrees that it has sole responsibility for investigating and evaluating all technical and marketplace factors that may have a bearing on the bids it submits in the reverse auction.

(8) Certification that the applicant agrees that the bids it submits in the reverse auction are irrevocable, binding offers by the applicant.

(9) Certification that the individual submitting the application to participate and providing the certifications is authorized to do so on behalf of the applicant, and if such individual is not an officer, director, board member, or controlling interest holder of the applicant, evidence that such individual has the authority to bind the applicant.

(10) Certification that the applicant is in compliance with all statutory and regulatory requirements for participation in the reverse auction, including any requirements with respect to the license(s) identified in the application to participate.

(11) Such additional information as may be required.

(d) Application processing. (1) Any timely submitted application to participate will be reviewed for completeness and compliance with the Commission's rules. No untimely applications to participate shall be reviewed or considered.

(2) Any application to participate that does not contain all of the certifications required pursuant to this section is unacceptable for filing, cannot be corrected subsequent to the application filing deadline, and will be dismissed with prejudice.

(3) Applicants will be provided a limited opportunity to cure specified defects and to resubmit a corrected application to participate. During the resubmission period for curing defects, an application to participate may be amended or modified to cure identified defects or to make minor amendments or modifications. After the resubmission period has ended, an application to participate may be amended or modified to make minor changes or correct minor errors in the application to participate. Minor amendments may be

subject to a deadline specified by public notice. Major amendments cannot be made to an application to participate after the initial filing deadline. Major amendments include, but are not limited to, changes in ownership of the applicant that would constitute an assignment or transfer of control, changes to any of the required certifications, and the addition or removal of licenses identified on the application to participate for which the applicant intends to submit reverse auction bids. Minor amendments include any changes that are not major, such as correcting typographical errors and supplying or correcting information as requested to support the certifications made in the application.

(4) Applicants that fail to correct defects in their applications to participate in a timely manner as specified by public notice will have their applications to participate dismissed with no opportunity for resubmission.

(5) Applicants shall have a continuing obligation to make any amendments or modifications that are necessary to maintain the accuracy and completeness of information furnished in pending applications to participate. Such amendments or modifications shall be made as promptly as possible, and in no case more than five business days after applicants become aware of the need to make any amendment or modification, or five business days after the reportable event occurs, whichever is later. An applicant's obligation to make such amendments or modifications to a pending application to participate continues until they are made.

(e) Notice to qualified and non-qualified applicants. Each applicant will be notified as to whether it is qualified or not qualified to participate in the reverse auction.

§ 1.2205 Prohibition of certain communications.

(a) Definitions.

(1) For the purposes of this section, a full power broadcast television licensee, or a Class A broadcast television licensee, shall include all controlling interests in the licensee, and all officers, directors, and governing board members of the licensee.

(2) For the purposes of this section, the term forward auction applicant is defined the same as the term applicant is defined in § 1.2105(c)(7).

(b) Certain communications prohibited.

(1) Except as provided in paragraph (b)(2) of this section, in the broadcast television spectrum incentive auction conducted under section 6403 of the Spectrum Act, beginning on the deadline for submitting applications to participate in the reverse auction and until the results of the incentive auction are announced by public notice, all full power and Class A broadcast television licensees are prohibited from communicating directly or indirectly any incentive auction applicant's bids or bidding strategies to any other full power or Class A broadcast television licensee or to any forward auction applicant.

(2) The prohibition described in paragraph (b)(1) of this section does not apply to the following:

(i) Communications between full power or Class A broadcast television licensees if they share a common controlling interest, director, officer, or governing board member as of the deadline for submitting applications to participate in the reverse auction;

(ii) Communications between a forward auction applicant and a full power or Class A broadcast television licensee if a controlling interest, director, officer, or holder of any 10 percent or greater ownership interest in the forward auction applicant, as of the deadline for submitting short-form applications to participate in the forward auction, is also a controlling interest, director, officer, or governing board member of the full power or Class A broadcast television licensee, as of the deadline for submitting applications to participate in the reverse auction; and

(iii) Communications regarding reverse auction applicants' (but not forward auction applicants') bids and bidding strategies between parties to a channel sharing agreement executed prior to the deadline for submitting applications to participate in the reverse auction and disclosed on a reverse auction application.

(c) Duty to report potentially prohibited communications. A party that makes or receives a communication prohibited under paragraph (b) of this section shall report such communication in writing immediately, and in any case no later than five business days after the communication occurs. A party's obligation to make such a report continues until the report has been made.

(d) Procedures for reporting potentially prohibited communications. Reports under paragraph (c) of this section shall be filed as directed in public notices detailing procedures for bidding in the incentive auction. If no public notice provides direction, the party making the report shall do so in writing to the Chief of the Auctions and Spectrum Access Division, Wireless Telecommunications Bureau, by the most expeditious means available, including electronic transmission such as email.

(e) Violations. A party who is found to have violated the antitrust laws or the Commission's rules in connection with its participation in the competitive bidding process, in addition to any other applicable sanctions, may be subject to forfeiture of its winning bid incentive payment and revocation of its licenses, where applicable, and may be prohibited from participating in future auctions.

NOTE 1 TO § 1.2205: References to "full power broadcast television licensees" and "Class A broadcast television licensees" are intended to include all broadcast television licensees that are or could become eligible to participate in the reverse auction, including broadcast television licensees that may be parties to a channel sharing agreement.

NOTE 2 TO § 1.2205: For the purposes of this section, "controlling interests" include individuals or entities with positive or negative de jure or de facto control of the licensee. De jure control includes holding 50 percent or more of the voting stock of a corporation or holding a general partnership interest in a partnership. Ownership interests that are held indirectly by any party through one or more intervening corporations may be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, except that if the ownership percentage for an interest in any link in the chain meets or exceeds 50 percent or represents actual control, it may be treated as if it were a 100 percent interest. De facto control is determined on a case-by-case basis. Examples of de facto control include constituting or appointing 50 percent or more of the board of directors or management committee; having authority to appoint, promote, demote, and fire senior executives that control the day-to-day activities of the licensee; or playing an integral role in management decisions.

NOTE 3 TO § 1.2205: The prohibition described in § 1.2205(b)(1) applies to controlling interests, officers, directors, and governing board members of a full power or Class A broadcast television licensee as of the deadline for submitting applications to participate in the reverse auction, and any additional such parties at any subsequent point prior to the announcement by public notice of the results of the incentive auction. Thus, if, for example, a full power or Class A broadcast television licensee appoints a new officer after the application deadline, that new officer would be subject to the prohibition in § 1.2205(b)(1), but would not be included within the exceptions described in §§ 1.2205(b)(2)(i) and (ii).

§ 1.2206 Confidentiality of Commission-held data.

(a) The Commission will take all reasonable steps necessary to protect all Confidential Broadcaster Information for all reverse auction applicants from the time the broadcast television licensee applies to participate in the reverse auction until the reassignments and reallocations under section 6403(b)(1)(B) of the Spectrum Act become effective or until two years after public notice that the reverse auction is complete and that no such reassignments and reallocations shall become effective.

(b) In addition, if reassignments and reallocations under section 6403(b)(1)(B) of the Spectrum Act become effective, the Commission will continue to take all reasonable steps necessary to protect Confidential Broadcaster Information pertaining to any unsuccessful reverse auction bid and pertaining to any unsuccessful application to participate in the reverse auction until two years after the effective date.

(c) Notwithstanding paragraphs (a) and (b) of this section, the Commission may disclose Confidential Broadcaster Information if required to do so by law, such as by court order.

(d) Confidential Broadcaster Information includes the following Commission-held data of a broadcast television licensee participating in the reverse auction:

(1) The name of the applicant licensee;

(2) The licensee's channel number, call sign, facility identification number, and network affiliation; and

(3) Any other information that may reasonably be withheld to protect the identity of the licensee, as determined by the Commission.

§ 1.2207 Two competing participants required.

The Commission may not enter into an agreement for a licensee to relinquish spectrum usage rights in exchange for a share of the proceeds from the related forward auction assigning new spectrum licenses unless at least two competing licensees participate in the reverse auction.

§ 1.2208 Public notice of auction completion and auction results.

Public notice shall be provided when the reverse auction is complete and when the forward auction is complete. With respect to the broadcast television spectrum incentive auction conducted under section 6403 of the Spectrum Act, public notice shall be provided of the results of the reverse auction, forward auction, and repacking, and shall indicate that the reassignments of television channels and reallocations of broadcast television spectrum are effective.

§ 1.2209 Disbursement of incentive payments.

A winning bidder shall submit the necessary financial information to facilitate the disbursement of the winning bidder's incentive payment. Specific procedures for submitting financial information, including applicable deadlines, will be set out by public notice.

12. Section 1.9005 is amended by adding paragraph (kk) to read as follows:

§ 1.9005 Included Services.

* * * * *

(kk) The 600 MHz band (part 27 of this chapter).

PART 2—FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

13. The authority citation for part 2 continues to read as follows:

Authority: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

14. Section 2.106 is amended by revising page 28 as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

456-459 FIXED MOBILE 5.286AA 5.271 5.287 5.288			456-459 5.287 US64 US288	456-460 FIXED LAND MOBILE	Public Mobile (22) Maritime (80) Private Land Mobile (90) MedRadio (95I)
459-460 FIXED MOBILE 5.286AA 5.209 5.271 5.286A 5.286B 5.286C 5.286E	459-460 FIXED MOBILE 5.286AA MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C 5.209	459-460 FIXED MOBILE 5.286AA 5.209 5.271 5.286A 5.286B 5.286C 5.286E	459-460	5.287 US64 US288 NG32 NG112 NG124 NG148	
460-470 FIXED MOBILE 5.286AA Meteorological-satellite (space-to-Earth) 5.287 5.288 5.289 5.290			460-470 Meteorological-satellite (space-to-Earth) 5.287 US73 US209 US288 US289	460-462.5375 FIXED LAND MOBILE US209 US289 NG124	Private Land Mobile (90)
				462.5375-462.7375 LAND MOBILE US289	Personal Radio (95)
				462.7375-467.5375 FIXED LAND MOBILE 5.287 US73 US209 US288 US289 NG124	Maritime (80) Private Land Mobile (90)
				467.5375-467.7375 LAND MOBILE 5.287 US288 US289	Maritime (80) Personal Radio (95)
				467.7375-470 FIXED LAND MOBILE US73 US288 US289 NG124	Maritime (80) Private Land Mobile (90)
470-790 BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.302 5.304 5.306 5.311A 5.312	470-512 BROADCASTING Fixed Mobile 5.292 5.293	470-585 FIXED MOBILE BROADCASTING 5.291 5.298	470-608	470-512 FIXED LAND MOBILE BROADCASTING NG5 NG14 NG66 NG115 NG149	Public Mobile (22) Broadcast Radio (TV)(73) LPTV, TV Translator/Booster (74G) Low Power Auxiliary (74H) Private Land Mobile (90)
	512-608 BROADCASTING 5.297	585-610 FIXED MOBILE BROADCASTING RADIONAVIGATION 5.149 5.305 5.306 5.307		512-608 FIXED MOBILE BROADCASTING NG5 NG14 NG115 NG149	Wireless Communications (27) Broadcast Radio (TV)(73) LPTV, TV Translator/Booster (74G) Low Power Auxiliary (74H)
	608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	610-890 FIXED MOBILE 5.313A 5.317A BROADCASTING	608-614 LAND MOBILE (medical telemetry and medical telecommand) RADIO ASTRONOMY US74 US246		Personal Radio (95)
	614-698 BROADCASTING Fixed Mobile 5.293 5.309 5.311A		614-698	614-698 FIXED MOBILE BROADCASTING NG5 NG14 NG115 NG149	Wireless Communications (27) Broadcast Radio (TV)(73) LPTV, TV Translator/Booster (74G) Low Power Auxiliary (74H)
		5.149 5.305 5.306 5.307 5.311A 5.320			

15. Section 2.1033 is amended by adding paragraph (c)(19)(iii) to read as follows:

§ 2.1033 Application for certification.

(c) * * *

(19) * * *

(iii) 600 MHz band shall include a statement indicating compliance with § 27.75 of this chapter.

* * * * *

PART 15—RADIO FREQUENCY DEVICES

16. The authority citation for part 15 continues to read as follows:

Authority: 47 U.S.C. 154, 302a, 303, 304, 307, 336, 544a, and 549.

17. Section 15.707 is amended by redesignating paragraph (a) as (a)(1) and adding paragraph (a)(2) to read as follows:

§ 15.707 Permissible channels of operation.

(a) (1) * * *

(2) TVBD operations in 600 MHz band. TVBDs may operate on frequencies in the 600 MHz Band as defined in part 27 of this chapter in areas where 600 MHz Band licensees have not commenced operations.

* * * * *

18. Section 15.713 is amended by adding paragraphs (b)(2)(iv) and (h)(10) to read as follows:

§ 15.713 TV bands database.

(b) * * *

(2) * * *

(iv) 600 MHz band operations under part 27 of this chapter in areas where the licensee has commenced operations.

* * * * *

(h) * * *

(10) 600 MHz band operations under part 27 of this chapter in areas where the licensee has commenced

operations.

(i) License area of the 600 MHz band licensee, as defined under part 27 of this chapter;

(ii) Identification of the frequencies on which the part 27 600 MHz wireless licensee has commenced operations;

(iii) Call sign.

PART 27—MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

19. The authority citation for part 27 is revised to read as follows:

Authority: 47 U.S.C. 154, 301, 302a, 303, 307, 309, 332, 336, 337, 1403, 1404, 1451, and 1452, unless otherwise noted.

20. Section 27.1 is amended by adding paragraph (b)(14) to read as follows:

§ 27.1 Basis and purpose.

* * * * *

(b) * * *

(14) Spectrum in the 470-698 MHz UHF band that has been reallocated and redesignated for flexible fixed and mobile use pursuant to section 6403 of the Spectrum Act.

Note to paragraph (b)(14): The specific frequencies and number of channel blocks will be determined in light of further proceedings pursuant to Docket No. 12-268 and the rule will be updated accordingly pursuant to a future public notice.

* * * * *

21. Section 27.4 is amended by adding the definitions "600 MHz service", "Post-auction transition period", and "Spectrum Act" to read as follows:

§ 27.4 Terms and definitions.

600 MHz service. A radiocommunication service licensed pursuant to this part for the frequency bands specified in § 27.5(l).

* * * * *

Post-auction transition period. The 39-month period commencing upon the public release of the Channel Reassignment Public Notice as defined in § 73.3700(a) of this chapter.

* * * * *

Spectrum Act. The term Spectrum Act means Title VI of the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. No. 112-96).

* * * * *

22. Section 27.5 is amended by adding paragraph (l) to read as follows:

§ 27.5 Frequencies.

* * * * *

(l) 600 MHz band. In accordance with the terms and conditions established in Docket No. 12-268, pursuant to section 6403 of the Spectrum Act, paired channel blocks of 5+5 megahertz are available for assignment on a Partial Economic Area basis.

Note to paragraph (l): The specific frequencies and number of channel blocks will be determined in light of further proceedings pursuant to Docket No. 12-268 and the rule will be updated accordingly pursuant to a future public notice.

23. Section 27.6 is amended by adding paragraph (l) to read as follows:

§ 27.6 Service areas.

* * * * *

(l) 600 MHz band. Service areas for the 600 MHz band are based on Partial Economic Areas (PEAs), to be defined by a subsequent public notice. The service areas of PEAs that border the U.S. coastline of the Gulf of Mexico extend 12 nautical miles from the U.S. Gulf coastline. The service area of the Gulf of Mexico PEA that comprises the water area of the Gulf of Mexico extends from 12 nautical miles off the U.S. Gulf coast outward into the Gulf. Maps of the PEAs and the Federal Register notice that established the 416 PEAs are available for public inspection and copying at the Reference Center, Room CY A-257, 445 12th St., SW., Washington, DC 20554. These maps and data are also available on the FCC Web site at: http://www.fcc.gov/oet/info/maps/areas/.

Note to paragraph (l): The specific title, reference number, and date of the public notice will be determined in light of further proceedings pursuant to Docket No. 12-268 and the rule will be updated accordingly.

24. Section 27.11 is amended by adding paragraph (k) to read as follows:

§ 27.11 Initial authorization.

* * * * *

(k) 600 MHz band. Initial authorizations for the 600 MHz band will be based on Partial Economic Areas (PEAs), as specified in § 27.6(l), and, shall be paired channels that each consist of a 5 megahertz channel block in the 600 MHz downlink band, paired with a 5 megahertz channel block in the 600 MHz uplink band.

Note to paragraph (k): The specific frequencies and number of channel blocks will be determined in light of further proceedings pursuant to Docket No. 12-268 and the rule will be updated accordingly pursuant to a future public notice.

25. Section 27.13 is amended by adding paragraph (l) to read as follows:

§ 27.13 License period.

* * * * *

(l) 600 MHz band. Authorizations for the 600 MHz band will have an initial term not to exceed twelve years from the date of issuance and ten years from the date of any subsequent license renewal.

26. Section 27.14 is amended by revising the first sentence of paragraphs (a), (f), (k) and adding paragraph (t) to read as follows:

§ 27.14 Construction requirements; Criteria for renewal.

(a) AWS and WCS licensees, with the exception of WCS licensees holding authorizations for the 600 MHz band, Block A in the 698-704 MHz and 728-734 MHz bands, Block B in the 704-710 MHz and 734-740 MHz bands, Block E in the 722-728 MHz band, Block C, C1 or C2 in the 746-757 MHz and 776-787 MHz bands, Block A in the 2305-2310 MHz and 2350-2355 MHz bands, Block B in the 2310-

2315 MHz and 2355-2360 MHz bands, Block C in the 2315-2320 MHz band, and Block D in the 2345-2350 MHz band, and with the exception of licensees holding AWS authorizations in the 1915-1920 MHz and 1995-2000 MHz bands, the 2000-2020 MHz and 2180-2200 MHz bands, or 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz bands, must, as a performance requirement, make a showing of "substantial service" in their license area within the prescribed license term set forth in § 27.13. * * * * * * * * *

(f) Comparative renewal proceedings do not apply to WCS licensees holding authorizations for the 600 MHz band, 698-746 MHz, 747-762 MHz, and 777-792 MHz bands or licensees holding AWS authorizations for the 1915-1920 MHz and 1995-2000 MHz bands or the 2000-2020 MHz and 2180-2200 MHz bands, or the 1695-1710 MHz, or the 1755-1780 MHz and 2155-2180 MHz bands. * * * * * * * * *

(k) Licensees holding WCS or AWS authorizations in the spectrum blocks enumerated in paragraphs (g), (h), (i), (q), (r), (s) and (t) of this section, including any licensee that obtained its license pursuant to the procedures set forth in paragraph (j) of this section, shall demonstrate compliance with performance requirements by filing a construction notification with the Commission, within 15 days of the expiration of the applicable benchmark, in accordance with the provisions set forth in § 1.946(d) of this chapter. * * *

* * * * *

(t) The following provisions apply to any licensee holding an authorization in the 600 MHz band:

(1) A licensee shall provide reliable signal coverage and offer service within six (6) years from the date of the initial license to at least forty (40) percent of the population in each of its license areas ("Interim Buildout Requirement").

(2) A licensee shall provide reliable signal coverage and offer service within twelve (12) years from the date of the initial license to at least seventy-five (75) percent of the population in each of its license areas ("Final Buildout Requirement").

(3) If a licensee fails to establish that it meets the Interim Buildout Requirement for a particular licensed area, then the Final Buildout Requirement (in this paragraph (t)) and the license term (as set forth in

§ 27.13(l)) for each license area in which it fails to meet the Interim Buildout Requirement shall be accelerated by two (2) years (from twelve (12) to ten (10) years).

(4) If a licensee fails to establish that it meets the Final Buildout Requirement for a particular license area, its authorization for each license area in which it fails to meet the Final Buildout Requirement shall terminate automatically without Commission action, and the licensee will be ineligible to regain it if the Commission makes the license available at a later date.

(5) To demonstrate compliance with these performance requirements, licensees shall use the most recently available decennial U.S. Census Data at the time of measurement and shall base their measurements of population served on areas no larger than the Census Tract level. The population within a specific Census Tract (or other acceptable identifier) will be deemed served by the licensee only if it provides reliable signal coverage to and offers service within the specific Census Tract (or other acceptable identifier). To the extent the Census Tract (or other acceptable identifier) extends beyond the boundaries of a license area, a licensee with authorizations for such areas may include only the population within the Census Tract (or other acceptable identifier) towards meeting the performance requirement of a single, individual license. For the Gulf of Mexico license area, the licensee shall demonstrate compliance with these performance requirements, using off-shore platforms, including production, manifold, compression, pumping and valving platforms as a proxy for population in the Gulf of Mexico.

(6) An applicant for renewal of a license covered by this paragraph (t) must make a renewal showing, independent of its performance requirements, as a condition of each renewal. The showing must include a detailed description of the applicant's provision of service during the entire license period and address:

(i) The level and quality of service provided by the applicant (including the population served, the area served, the number of subscribers, the services offered);

(ii) The date service commenced, whether service was ever interrupted, and the duration of any interruption or outage;

(iii) The extent to which service is provided to rural areas;

(iv) The extent to which service is provided to qualifying tribal land as defined in § 1.2110(f)(3)(i) of this chapter; and

(v) Any other factors associated with the level of service to the public.

27. Section 27.15 is amended by revising the first sentence in paragraph (d)(1)(i); revising paragraph (d)(1)(iii); revising the first sentence in paragraph (d)(2)(i), and revising paragraph (d)(2)(iii) to read as follows:

§ 27.15 Geographic partitioning and spectrum disaggregation.

* * * * *

(d) * * *

(1) * * *

(i) Except for WCS licensees holding authorizations for the 600 MHz band, Block A in the 698-704 MHz and 728-734 MHz bands, Block B in the 704-710 MHz and 734-740 MHz bands, Block E in the 722-728 MHz band, or Blocks C, C1, and C2 in the 746-757 MHz and 776-787 MHz bands; and for licensees holding AWS authorizations in the 1915-1920 MHz and 1995-2000 MHz bands, the 2000-2020 MHz and 2180-2200 MHz bands; or the 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz bands the following rules apply to WCS and AWS licensees holding authorizations for purposes of implementing the construction requirements set forth in § 27.14. * * *

* * * * *

(iii) For licensees holding authorizations for the 600 MHz band, AWS authorizations in the 1915-1920 MHz and 1995-2000 MHz bands, or the 2000-2020 MHz and 2180-2200 MHz bands, or the 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz bands, the following rules apply for purposes of implementing the construction requirements set forth in § 27.14. Each party to a geographic partitioning must individually meet any service-specific performance requirements (i.e., construction and operation requirements). If a partitioner or partitionee fails to meet any service-specific performance requirements on or before the required date, then the consequences for this failure shall be those enumerated in §27.14(q) for 2000-2020 MHz and 2180-2200 MHz licenses, those enumerated in § 27.14(r) for 1915-1920 MHz and 1995-2000 MHz licenses, and those enumerated in § 27.14(s) for 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz licenses, and those enumerated in § 27.14(t) for 600 MHz band licenses.

(2) * * *

(i) Except for WCS licensees holding authorizations for the 600 MHz band, Block A in the 698–704 MHz and 728–734 MHz bands, Block B in the 704–710 MHz and 734–740 MHz bands, Block E in the 722–728 MHz band, or Blocks C, C1, or C2 in the 746–757 MHz and 776–787 MHz bands; and for licensees holding AWS authorizations in the 1915-1920 MHz and 1995-2000 MHz bands, the 2000-2020 MHz and 2180-2200 MHz bands or the 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz bands; the following rules apply to WCS and AWS licensees holding authorizations for purposes of implementing the construction requirements set forth in § 27.14. * * *

* * * * *

(iii) For licensees holding authorizations for the 600 MHz band, AWS authorizations in the 1915-1920 MHz and 1995-2000 MHz bands, or the 2000-2020 MHz and 2180-2200 MHz bands, or the 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz bands, the following rules apply for purposes of implementing the construction requirements set forth in § 27.14. Each party to a spectrum disaggregation must individually meet any service-specific performance requirements (i.e., construction and operation requirements). If a disaggregator or a disaggregatee fails to meet any service-specific performance requirements on or before the required date, then the consequences for this failure shall be those enumerated in § 27.14(q) for 2000-2020 MHz and 2180-2200 MHz licenses, those enumerated in § 27.14(r) for 1915-1920 MHz and 1995-2000 MHz licenses, those enumerated in § 27.14(s) for 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz licenses, and those enumerated in § 27.14(t) for 600 MHz band licenses.

28. Section 27.17 is amended by revising the title and paragraphs (a), (b) and (c) to read as follows:

§ 27.17 Discontinuance of service in the 600 MHz band and the 1695-1710 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2155-2180 MHz, and 2180-2200 MHz bands.

(a) Termination of authorization. A 600 MHz band authorization and an AWS authorization in the 1695-1710 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2155-2180 MHz, and 2180-2200 MHz bands will automatically terminate, without specific Commission action, if the licensee permanently discontinues service either during the initial license term or during any subsequent license term, as follows:

(1) after the interim buildout deadline as specified in § 27.14(r), (s), or (t) as applicable (where the licensee meets the Interim Buildout Requirement), or after the accelerated Final Buildout Requirement (where the licensee failed to meet the Interim Buildout Requirement).

(2) * * *

(b) For licensees with common carrier or non-common carrier regulatory status that hold 600 MHz band authorizations or AWS authorizations in the 1695-1710 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, permanent discontinuance of service is defined as 180 consecutive days during which a licensee does not provide service to at least one subscriber that is not affiliated with, controlled by, or related to the licensee in the individual license area. For licensees with private, internal communications regulatory status that hold 600 MHz band authorizations or AWS authorizations in the 1695-1710 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, permanent discontinuance of service is defined as 180 consecutive days during which a licensee does not operate.

(c) Filing Requirements. A licensee that holds a 600 MHz band authorization or an AWS authorization in the 1695-1710 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, that permanently discontinues service as defined in this section must notify the Commission of the discontinuance within 10 days by filing FCC Form 601 or 605 requesting license cancellation. An authorization will automatically terminate, without specific Commission action, if service is permanently discontinued as defined in this section, even if a licensee fails to file the required form requesting license cancellation.

* * * * *

29. Section 27.19 is added to read as follows:

§ 27.19 Requirements for operation of base and fixed stations in the 600 MHz downlink band in close proximity to Radio Astronomy Observatories.

(a) Licensees must make reasonable efforts to protect the radio astronomy observatory at Green Bank, WV, Arecibo, PR, and those identified in § 15.712(h)(3) of this chapter as part of the Very Long Baseline Array (VLBA) from interference.

(b) 600 MHz band base and fixed stations in the 600 MHz downlink band within 25 kilometers of VLBA observatories are subject to coordination with the National Science Foundation (NSF) prior to commencing operations. The appropriate NSF contact point to initiate coordination is Electromagnetic Spectrum Manager, NSF, Contact Information Redacted, fax Contact Information Redacted, e-mail Contact Information Redacted

(c) Any licensee that intends to operate base and fixed stations in the 600 MHz downlink band in locations near the Radio Astronomy Observatory site located in Green Bank, Pocahontas County, West Virginia, or near the Arecibo Observatory in Puerto Rico, must comply with the provisions in § 1.924 of this chapter.

30. Section 27.50 is amended by revising paragraphs (c) introductory text, (c)(5), (c)(9), (c)(10), and the headings to Tables 1 through 4 to read as follows:

§ 27.50 Power limits and duty cycle.

* * * * *

(c) The following power and antenna height requirements apply to stations transmitting in the 600 MHz band and the 698–746 MHz band:

* * *

(5) Licensees, except for licensees operating in the 600 MHz downlink band, seeking to operate a fixed or base station located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal at an ERP greater than 1000 watts must: * * *

* * * * *

(9) Control and mobile stations in the 698–746 MHz band are limited to 30 watts ERP.

(10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698–746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

* * * * *

Table 1 to § 27.50—Permissible Power and Antenna Heights for Base and Fixed Stations in the 757–758 and 775–776 MHz Bands and for Base and Fixed Stations in the 600 MHz, 698–757 MHz, 758–763

MHz, 776–787 MHz and 788–793 MHz Bands Transmitting a Signal With an Emission Bandwidth of 1 MHz or Less

* * * * *

Table 2 to § 27.50—Permissible Power and Antenna Heights for Base and Fixed Stations in the 600 MHz, 698–757 MHz, 758–763 MHz, 776–787 MHz and 788–793 MHz Bands Transmitting a Signal With an Emission Bandwidth of 1 MHz or Less

* * * * *

Table 3 to § 27.50—Permissible Power and Antenna Heights for Base and Fixed Stations in the 600 MHz, 698–757 MHz, 758–763 MHz, 776–787 MHz and 788–793 MHz Bands Transmitting a Signal With an

Emission Bandwidth Greater than 1 MHz

* * * * *

Table 4 to § 27.50—Permissible Power and Antenna Heights for Base and Fixed Stations in the 600 MHz, 698–757 MHz, 758–763 MHz, 776–787 MHz and 788–793 MHz Bands Transmitting a Signal With an Emission Bandwidth Greater than 1 MHz

* * * * *

31. Section 27.53 is amended by revising paragraph (g) to read as follows:

§ 27.53 Emission limits.

* * * * *

(g) For operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

* * * * *

32. Section 27.55 is amended by revising paragraph (a)(2) to read as follows:

§ 27.55 Power strength limits.

(a) * * *

(2) 600 MHz, 698–758, and 775–787 MHz bands: 40 dBμV/m.

* * * * *

33. Section 27.57 is amended by revising paragraph (b) to read as follows:

§ 27.57 International coordination.

* * * * *

(b) Wireless operations in the 512-608 MHz, 614-763 MHz, 775-793 MHz, and 805-806 MHz bands are subject to current and future international agreements between the United States and Canada and the United States and Mexico. Unless otherwise modified by international treaty, licenses must not cause interference to, and must accept harmful interference from, television broadcast operations in Mexico and Canada, where these services are co-primary in the band.

* * * * *

34. Section 27.75 is amended by revising paragraph (a)(2) to read as follows:

§ 27.75 Basic interoperability requirement.

* * * * *

(a) * * *

(2) Mobile and portable stations that operate on any portion of frequencies in the 600 MHz band must be capable of operating on all frequencies in the 600 MHz band using the same air interfaces that the equipment utilizes on any frequencies in the 600 MHz band.

* * * * *

35. Add new subpart N to part 27 to read as follows:

Subpart N—600 MHz Band

Sec.

§ 27.1300 600 MHz band subject to competitive bidding.

As required by section 6403(c) of the Spectrum Act, applications for 600 MHz band initial licenses are subject to competitive bidding. The general competitive bidding procedures set forth in 47 CFR part 1, subpart Q will apply unless otherwise provided in this subpart.

§ 27.1301 Designated entities in the 600 MHz band.

Eligibility for small business provisions:

(a) Small business. (1) A small business is an entity that, together with its affiliates, its controlling interests, the affiliates of its controlling interests, and the entities with which it has an attributable material relationship, has average gross revenues not exceeding $40 million for the preceding three (3) years.

(2) A very small business is an entity that, together with its affiliates, its controlling interests, the affiliates of its controlling interests, and the entities with which it has an attributable material relationship, has average gross revenues not exceeding $15 million for the preceding three (3) years.

(b) Bidding credits. A winning bidder that qualifies as a small business as defined in this section or a consortium of small businesses may use the bidding credit specified in § 1.2110(f)(2)(iii) of this chapter. A winning bidder that qualifies as a very small business as defined in this section or a consortium of very small businesses may use the bidding credit specified in § 1.2110(f)(2)(ii) of this chapter.

PART 73—RADIO BROADCAST SERVICES

36. The authority citation for part 73 continues to read:

Authority: 47 U.S.C. 154, 303, 334, 336, and 339.

37. Section 73.3700 is revised to read as follows:

§ 73.3700 Post-Incentive Auction Licensing and Operation.

(a) Definitions.

(1) Broadcast television station. For purposes of this section, broadcast television station means full power television stations and Class A television stations.

(2) Channel reassignment public notice. For purposes of this section, Channel Reassignment Public Notice means the public notice to be released upon the completion of the broadcast television spectrum incentive auction conducted under section 6403 of the Spectrum Act specifying the new channel

assignments and technical parameters of any broadcast television stations that are reassigned to new channels.

(3) Channel sharee station. For purposes of this section, channel sharee station means a broadcast television station for which a winning channel sharing bid, as defined in § 1.2200(4) of this chapter, was submitted.

(4) Channel sharer station. For purposes of this section, channel sharer station means a broadcast television station that shares its television channel with a channel sharee.

(5) Channel sharing agreement (CSA). For purposes of this section, channel sharing agreement or CSA means an executed agreement between the licensee of a channel sharee station or stations and the licensee of a channel sharer station governing the use of the shared television channel.

(6) High-VHF-to-Low-VHF station. For purposes of this section, High-VHF-to-Low-VHF station means a broadcast television station for which a winning high-VHF-to-low-VHF bid, as defined in § 1.2200(6) of this chapter, was submitted.

(7) License relinquishment station. For purposes of this section, license relinquishment station means a broadcast television station for which a winning license relinquishment bid, as defined in § 1.2200(7) of this chapter, was submitted.

(8) MVPD. For purposes of this section, MVPD means a person such as, but not limited to, a cable operator, a multichannel multipoint distribution service, a direct broadcast satellite service, or a television receive-only satellite program distributor, who makes available for purchase, by subscribers or customers, multiple channels of video programming as set forth in section 602 of the Communications Act of 1934 (47 U.S.C. 522).

(9) Pre-auction channel. For purposes of this section, pre-auction channel means the channel that is licensed to a broadcast television station on the date that the Channel Reassignment Public Notice is released.

(10) Predetermined cost estimate. For purposes of this section, predetermined cost estimate means the estimated cost of an eligible expense as generally determined by the Media Bureau in a catalog of expenses eligible for reimbursement.

(11) Post-auction channel. For purposes of this section, post-auction channel means the channel specified in the Channel Reassignment Public Notice or a channel authorized by the Media Bureau in a construction permit issued after the date that the Channel Reassignment Public Notice is released under the procedures set forth in paragraph (b) of this section.

(12) Reassigned station. For purposes of this section, a reassigned station means a broadcast television station that is reassigned to a new channel in the Channel Reassignment Public Notice, not including channel sharing stations, UHF-to-VHF stations, or High-VHF-to-Low-VHF stations.

(13) Reimbursement period. For purposes of this section, reimbursement period means the period ending three years after the completion of the forward auction pursuant to section 6403(b)(4)(D) of the Spectrum Act.

(14) Spectrum Act. The term Spectrum Act means Title VI of the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. No. 112-96).

(15) Transitioning station. For purposes of this section, a transitioning station means a:

(i) Reassigned station,

(ii) UHF-to-VHF station,

(iii) High-VHF-to-Low-VHF station,

(iv) License relinquishment station, or

(v) A channel sharee or sharer station.

(16) TV broadcaster relocation fund. For purposes of this section, the TV Broadcaster Relocation Fund means the fund established by section 6403(d)(1) of the Spectrum Act.

(17) UHF-to-VHF station. For purposes of this section, UHF-to-VHF station means a television station for which a winning UHF-to-VHF bid, as defined in § 1.2200(12) of this chapter, was submitted.

(b) Post-auction licensing.

(1) Construction permit applications.

(i) Licensees of reassigned stations, UHF-to-VHF stations, and High-VHF-to-Low-VHF stations must file a minor change application for a construction permit for the channel specified in the Channel Reassignment Public Notice using FCC Form 301, 301-CA, or 340 within three months of the release

date of the Channel Reassignment Public Notice. Licensees that are unable to meet this filing deadline may request a waiver of the deadline no later than 30 days prior to the deadline.

(ii) A licensee of a reassigned station that is reassigned from one channel to a different channel within its existing band will be permitted to propose transmission facilities in its construction permit application that will extend its coverage contour, as defined by the technical parameters specified in the Channel Reassignment Public Notice, if such facilities:

(A) Are necessary to achieve the coverage contour specified in the Channel Reassignment Public Notice or to address loss of coverage area resulting from the new channel assignment;

(B) Will not extend a full power television station's noise limited contour or a Class A television station's protected contour by more than one percent in any direction; and

(C) Will not cause new interference, other than a rounding tolerance of 0.5 percent, to any other broadcast television station.

(iii) The licensee of a UHF-to-VHF station or High-VHF-to-Low-VHF station will be permitted to propose transmission facilities in its construction permit application that will extend its coverage contour, as defined by the technical parameters specified in the Channel Reassignment Public Notice, if the proposed facility will not cause new interference, other than a rounding tolerance of 0.5 percent, to any other broadcast television station.

(iv) The licensee of a reassigned station, a UHF-to-VHF station, or a High-VHF-to-Low-VHF station that, for reasons beyond its control, is unable to construct facilities that meet the technical parameters specified in the Channel Reassignment Public Notice, or the permissible contour coverage variance from those technical parameters specified in paragraph (b)(1)(ii) or (iii) of this section, may request a waiver of the construction permit application deadline specified in paragraph (b)(1)(i) no later than 30 days prior to the deadline. If its waiver request is granted, the licensee will be afforded an opportunity to submit an application for a construction permit pursuant to paragraph (b)(2)(i) or (ii) of this section in a priority filing window to be announced by the Media Bureau by public notice.

(v) Construction permit applications filed pursuant to paragraph (b)(1)(i) of this section will be afforded expedited processing if the application:

(A) Does not seek to expand the coverage area, as defined by the technical parameters specified in the Channel Reassignment Public Notice, in any direction;

(B) Seeks authorization for facilities that are no more than five percent smaller than those specified in the Channel Reassignment Public Notice with respect to predicted population served; and

(C) Is filed within the three-month deadline specified in paragraph (b)(1)(i) of this section.

(vi) Delegation of authority. The Commission delegates authority to the Chief, Media Bureau to establish construction periods for reassigned stations, UHF-to-VHF stations, and High-VHF-to-Low-VHF stations.

(2) Applications for alternate channels and expanded facilities.

(i) Alternate channels. The licensee of a reassigned station, a UHF-to-VHF station, or a High-VHF-to-Low-VHF station will be permitted to file a major change application for a construction permit for an alternate channel on FCC Form 301, 301-CA, or 340 during a filing window to be announced by the Media Bureau by public notice, provided that:

(A) The licensee of a UHF-to-VHF station cannot request an alternate UHF channel;

(B) The licensee of a UHF-to-VHF station that specified the high-VHF band or the low-VHF band in its UHF-to-VHF bid cannot request a VHF channel outside of the assigned band; and

(C) The licensee of a High-VHF-to-Low-VHF station cannot request an alternate high-VHF channel.

(ii) Expanded facilities. The licensee of a reassigned station, a UHF-to-VHF station, or a High-VHF-to-Low-VHF station will be permitted to file a minor change application for a construction permit on FCC Form 301, 301-CA, or 340 during a filing window to be announced by the Media Bureau by public notice, in order to request a change in the technical parameters specified in the Channel Reassignment Public Notice with respect to height above average terrain (HAAT), effective radiated power (ERP), or transmitter location that would be considered a minor change under §§ 73.3572(a)(1),(2) or 74.787(b) of this chapter.

(iii) Delegation of authority. The Commission delegates authority to the Chief, Media Bureau to:

(A) Announce filing opportunities for alternate channels and expanded facilities applications and specifying appropriate processing guidelines, including the standards to qualify for priority filing, cut-off protections, and means to avoid or resolve mutual exclusivity between applications; and

(B) Establish construction periods for permits authorizing alternate channels or expanded facilities.

(3) License applications for channel sharing stations. The licensee of each channel sharee station and channel sharer station must file an application for a license for the shared channel using FCC Form 302-DTV or 302-CA within three months of the date that the channel sharee station licensee receives its incentive payment pursuant to section 6403(a)(1) of the Spectrum Act.

(4) Deadlines to terminate operations on pre-auction channels.

(i) The licensee of a license relinquishment station must comply with the notification and cancellation procedures in § 73.1750 and terminate operations on its pre-auction channel within three months of the date that the licensee receives its incentive payment pursuant to section 6403(a)(1) of the Spectrum Act.

(ii) The licensee of a channel sharee station must comply with the notification and cancellation procedures in § 73.1750 and terminate operations on its pre-auction channel within three months of the date that the licensee receives its incentive payment pursuant to section 6403(a)(1) of the Spectrum Act.

(iii) All reassigned stations, UHF-to-VHF stations, and High-VHF-to-Low-VHF stations must cease operating on their pre-auction channel once such station begins operating on its post-auction channel or by the deadline specified in its construction permit for its post-auction channel, whichever occurs earlier, and in no event later than the end of the post-auction transition period as defined in § 27.4 of this chapter.

(5) Applications for additional time to complete construction.

(i) Delegation of authority. Authority is delegated to the Chief, Media Bureau to grant a single extension of time of up to six months to licensees of reassigned stations, UHF-to-VHF stations, and High-VHF-to-Low-VHF stations to complete construction of their post-auction channel upon demonstration by the licensee that failure to meet the construction deadline is due to circumstances that are either unforeseeable or beyond the licensee's control. Licensees needing additional time beyond such a single extension of time to complete construction shall be subject to the tolling provisions in § 73.3598.

(ii) Circumstances that may justify an extension of the construction deadline of a licensee of a reassigned station, a UHF-to-VHF station, or a High-VHF-to-Low-VHF station include but are not limited to:

(A) Weather-related delays, including a tower location in a weather-sensitive area;

(B) Delays in construction due to the unavailability of equipment or a tower crew;

(C) Tower lease disputes;

(D) Unusual technical challenges, such as the need to construct a top-mounted or side-mounted antenna or the need to coordinate channel changes with another station; and

(E) Delays faced by licensees that must obtain government approvals, such as land use or zoning approvals, or that are subject to competitive bidding requirements prior to purchasing equipment or services.

(iii) A licensee of a reassigned station, UHF-to-VHF station, or High-VHF-to-Low-VHF station may rely on "financial hardship" as a criterion for seeking an extension of time if it is subject to an active bankruptcy or receivership proceeding, provided that the licensee makes an adequate showing that it has filed requests to proceed with construction in the relevant court proceedings. Any other licensee that seeks an extension of time based on financial hardship must demonstrate that, although it is not subject to an active bankruptcy or receivership proceeding, rare and exceptional financial circumstances warrant granting additional time to complete construction.

(iv) Applications for additional time to complete construction must be filed electronically in CDBS using FCC Form 337 no less than 90 days before the expiration of the construction permit.

(c) Consumer education for transitioning stations.

(1) Transitioning stations that operate on a commercial basis will be required to air at least one Public Service Announcement (PSA) and run at least one crawl in every quarter of every day for 30 days prior to the date that the station terminates operations on its pre-auction channel. One of the required PSAs and one of the required crawls must be run during prime time hours (for purposes of this section, between 8:00 pm and 11:00 pm in the Eastern and Pacific time zones, and between 7:00 pm and 10:00 pm in the Mountain and Central time zones) each day.

(2) Transitioning stations that operate on a noncommercial educational (NCE) basis have the option to either:

(i) Comply with the requirements of section (c)(1) of this paragraph; or

(ii) Air 60 seconds per day of on-air consumer education PSAs, in variable timeslots, for 30 days prior to the station's termination of operations on its pre-auction channel.

(3) Transition crawls.

(i) Each crawl must run during programming for no less than 60 consecutive seconds across the bottom or top of the viewing area and be provided in the same language as a majority of the programming carried by the transitioning station.

(ii) Each crawl must include the date that the station will terminate operations on its pre-auction channel; inform viewers of the need to rescan if the station has received a new post-auction channel assignment; and explain how viewers may obtain more information by telephone or online.

(4) Transition PSAs.

(i) Each PSA must have a duration of at least 15 seconds.

(ii) Each PSA must be provided in the same language as a majority of the programming carried by the transitioning station; include the date that the station will terminate operations on its pre-auction channel; inform viewers of the need to rescan if the station has received a new post-auction channel assignment; explain how viewers may obtain more information by telephone or online; and for stations with new post-auction channel assignments, provide instructions to both over-the-air and MVPD viewers regarding how to continue watching the television station; and be closed-captioned.

(5) Licensees of transitioning stations, except for license relinquishment stations, must place a certification of compliance with the requirements in paragraph (c) of this section in their online public file within 30 days after beginning operations on their post-auction channels. Licensees of license relinquishment stations must include the certification in their notification of discontinuation of service pursuant to § 73.1750 of this chapter.

(d) Notice to MVPDs.

(1) Licensees of transitioning stations must provide notice to MVPDs that:

(i) No longer will be required to carry the station because it will cease operations or because of the relocation of a channel sharee station;

(ii) Currently carry and will continue to be obligated to carry a station that will have a new post-auction channel assignment; or

(iii) Will become obligated to carry a station due to the relocation of a channel sharee station.

(2) The notice to MVPDs must be provided in the form of a letter notification and must contain the following information:

(i) Date and time of any channel changes;

(ii) Pre-auction and post-auction channels;

(iii) Modification (if any) to antenna position, location or power levels;

(iv) Stream identification information for channel sharing stations; and

(v) Engineering staff contact information.

(3) Should any of the information in (d)(2) of this section change during the time that the station is transitioning from its pre-auction to its post-auction channel, an amended notification must be sent.

(4) For cable systems, the notification letter must be addressed to the system's official address of record provided in the cable system's most recent filing in the Commission's Cable Operations and Licensing System (COALS) Form 322. For all other MVPDs, the notification letter must be addressed to the official corporate address registered with their State of incorporation.

(5) Notification letters must be sent within the following time frames:

(i) For license relinquishment stations, not less than 30 days prior to terminating operations;

(ii) For channel sharee stations, not less than 30 days prior to terminating operations of the pre-auction channel;

(iii) For channel sharee and channel sharer stations, not less than 30 days prior to initiation of operations on the shared channel; and

(iv) For reassigned stations, UHF-to-VHF stations, and High-VHF-to-Low-VHF stations, not less than 90 days prior to the date on which they will begin operations on their post-auction channel.

(v) If a station's anticipated transition date changes due to an unforeseen delay or change in transition plan, the licensee must send a further notice to affected MVPDs informing them of the new anticipated transition date.

(e) Reimbursement rules.

(1) Entities eligible for reimbursement. The Commission will reimburse relocation costs reasonably incurred only by:

(i) The licensees of full power and Class A broadcast television stations that are reassigned under section 6403(b)(1)(B)(i) of the Spectrum Act, including channel sharer stations that are reassigned to a new channel in the Channel Reassignment Public Notice; and

(ii) MVPDs in order to continue to carry the signal of a full power or Class A broadcast television station that is:

(A) Described in paragraph (1)(i) of this section;

(B) A UHF-to-VHF station;

(C) A High-VHF-to-Low-VHF station; or

(D) A channel sharee station.

(2) Estimated costs.

(i) No later than three months following the release of the Channel Reassignment Public Notice, all broadcast television station licensees and MVPDs that are eligible to receive payment of relocation costs will be required to file an estimated cost form providing an estimate of their reasonably incurred relocation costs.

(ii) Each broadcast television station licensee and MVPD that submits an estimated cost form will be required to certify, inter alia, that:

(A) It believes in good faith that it will reasonably incur all of the estimated costs that it claims as eligible for reimbursement on the estimated cost form;

(B) It will use all money received from the TV Broadcaster Relocation Fund only for expenses it believes in good faith are eligible for reimbursement;

(C) It will comply with all policies and procedures relating to allocations, draw downs, payments, obligations, and expenditures of money from the TV Broadcaster Relocation Fund;

(D) It will maintain detailed records, including receipts, of all costs eligible for reimbursement actually incurred; and

(E) It will file all required documentation of its relocation expenses as instructed by the Media Bureau.

(iii) If a broadcast television station licensee or MVPD seeks reimbursement for new equipment, it must provide a justification as to why it is reasonable under the circumstances to purchase new equipment

rather than modify its corresponding current equipment in order to change channels or to continue to carry the signal of a broadcast television station that changes channels.

(iv) Entities that submit their own cost estimates, as opposed to the predetermined cost estimates provided in the estimated cost form, must submit supporting evidence and certify that the estimate is made in good faith.

(3) Final Allocation Deadline.

(i) Upon completing construction or other reimbursable changes, or by a specific deadline prior to the end of the Reimbursement Period to be established by the Media Bureau, whichever is earlier, all broadcast television station licensees and MVPDs that received an initial allocation from the TV Broadcaster Relocation Fund must provide the Commission with information and documentation, including invoices and receipts, regarding their actual expenses incurred as of a date to be determined by the Media Bureau (the "Final Allocation Deadline").

(ii) If a broadcast television station licensee or MVPD has not yet completed construction or other reimbursable changes by the Final Allocation Deadline, it must provide the Commission with information and documentation regarding any remaining eligible expenses that it expects to reasonably incur.

(4) Final accounting. After completing all construction or reimbursable changes, broadcast television station licensees and MVPDs that have received money from the TV Broadcaster Relocation Fund will be required to submit final expense documentation containing a list of estimated expenses and actual expenses as of a date to be determined by the Media Bureau. Entities that have finished construction and have submitted all actual expense documentation by the Final Allocation Deadline will not be required to file at the final accounting stage.

(5) Progress reports. Broadcast television station licensees and MVPDs that receive payment from the TV Broadcaster Relocation Fund are required to submit progress reports at a date and frequency to be determined by the Media Bureau.

(6) Documentation requirements.

(i) Each broadcast television station licensee and MVPD that receives payment from the TV Broadcaster Relocation Fund is required to retain all relevant documents pertaining to construction or other

reimbursable changes for a period ending not less than 10 years after the date on which it receives final payment from the TV Broadcaster Relocation Fund.

(ii) Each broadcast television station licensee and MVPD that receives payment from the TV Broadcaster Relocation Fund must make available all relevant documentation upon request from the Commission or its contractor.

(7) Delegation of authority. The Commission delegates authority to the Chief, Media Bureau, to adopt the necessary policies and procedures relating to allocations, draw downs, payments, obligations, and expenditures of money from the TV Broadcaster Relocation Fund in order to protect against waste, fraud, and abuse and in the event of bankruptcy, to establish a catalog of expenses eligible for reimbursement and predetermined cost estimates, review the estimated cost forms, issue initial allocations for costs reasonably incurred pursuant to section 6403(b)(4) of the Spectrum Act, set filing deadlines and review information and documentation regarding progress reports, final allocations, and final accountings, and issue final allocations to reimburse for costs reasonably incurred pursuant to section 6403(b)(4) of the Spectrum Act.

(f) Service rule waiver.

(1) Waiver requests.

(i) A broadcast television station licensee described in paragraph (e)(1)(i) of this section may file a request with the Chief, Media Bureau for a waiver of the Commission's service rules pursuant to section 6403(b)(4)(B) of the Spectrum Act during a 30-day window commencing upon the date that the Channel Reassignment Public Notice is released.

(ii) A broadcast television station licensee may request that a waiver be granted on a temporary or permanent basis.

(2) A licensee will have 10 days following a grant of the waiver to notify the Commission whether it accepts the terms of the waiver.

(3) A licensee is required to meet all requirements for receiving payment of relocation costs under section 6403(b)(4) of the Spectrum Act established by the Commission, including the requirements of paragraph (e) of this section, until its waiver request is granted and the licensee accepts the terms of the waiver.

(4) A licensee that is granted and accepts the terms of the waiver or a licensee with a pending waiver application must comply with all filing and notification requirements, construction schedules, and other post-auction transition deadlines set forth in paragraphs (b), (c), and (d) of this section.

(g) Low Power TV and TV translator stations.

(1) Licensees of operating low power TV and TV translator stations that are displaced by a broadcast television station or a wireless service provider or whose channel is reserved as a guard band as a result of the broadcast television spectrum incentive auction conducted under section 6403 of the Spectrum Act shall be permitted to submit an application for displacement relief in a restricted filing window to be announced by the Media Bureau by public notice. Except as otherwise indicated in this section, such applications will be subject to the rules governing displacement applications set forth in §§ 73.3572(a)(4) and 74.787(a)(4) of this chapter.

(2) In addition to other interference protection requirements set forth in the rules, when requesting a new channel in a displacement application, licensees of operating low power TV and TV translator stations will be required to demonstrate that the station would not cause interference to the predicted service of broadcast television stations on:

(i) Pre-auction channels;

(ii) Channels assigned in the Channel Reassignment Public Notice; or

(iii) Alternative channels or expanded facilities broadcast television station licensees have applied for pursuant to paragraph (b)(2) of this section.

(3) Mutually exclusive displacement applications. Licensees of low power TV and TV translator stations that file mutually exclusive displacement applications will be permitted to resolve the mutual exclusivity through an engineering solution or settlement agreement. If no resolution of mutually exclusive displacement applications occurs, a selection priority will be granted to the licensee of a displaced digital replacement translator.

(4) Notification and termination provisions for displaced low power TV and TV translator stations.

(i) A wireless licensee assigned to frequencies in the 600 MHz band under part 27 of this chapter must notify low power TV and TV translator stations of its intent to commence wireless operations and the

likelihood of receiving harmful interference from the low power TV or TV translator station to such operations within the wireless licensee's licensed geographic service area.

(ii) The new wireless licensees must:

(A) Notify the low power TV or TV translator station in the form of a letter, via certified mail, return receipt requested;

(B) Indicate the date the new wireless licensee intends to commence operations in areas where there is a likelihood of receiving harmful interference from the low power TV or TV translator station; and

(C) Send such notification not less than 120 days in advance of the commencement date.

(iii) Low power TV and TV translator stations may continue operating on frequencies in the 600 MHz band assigned to wireless licensees under part 27 of this chapter until the wireless licensee commences operations as indicated in the notification sent pursuant to this paragraph.

(iv) After receiving notification, the low power TV or TV translator licensee must cease operating or reduce power in order to eliminate the potential for harmful interference before the commencement date set forth in the notification.

(v) Low power TV and TV translator stations that are operating on the UHF spectrum that is reserved for guard band channels as a result of the broadcast television incentive auction conducted under section 6403 of the Spectrum Act may continue operating on such channels until the end of the post-auction transition period as defined in § 27.4 of this chapter, unless they receive notification from a new wireless licensee pursuant to the requirements of paragraph (g)(4) of this section that they are likely to cause harmful interference in areas where the wireless licensee intends to commence operations, in which case the requirements of paragraph (g)(4) of this section will apply.

(h) Channel sharing operating rules.

(1) Each broadcast television station licensee that is a party to a CSA shall continue to be licensed and operated separately, have its own call sign, and be separately subject to all of the Commission's obligations, rules, and policies applicable to the television service.

(2) Channel sharing between full power television and Class A television stations.

(i) A CSA may be executed between licensees of full power television stations, between licensees of Class A television stations, and between licensees of full power and Class A television stations.

(ii) A Class A channel sharee station licensee that is a party to a CSA with a full power channel sharer station licensee must comply with the rules of part 73 governing power levels and interference, and must comply in all other respects with the rules and policies applicable to Class A television stations, as set forth in §§ 73.6000 et seq.

(iii) A full power channel sharee station licensee that is a party to a CSA with a Class A channel sharer station licensee must comply with the rules of part 74 of this chapter governing power levels and interference.

(iv) A Class A channel sharee station may qualify only for the cable carriage rights afforded to "qualified low power television stations" in § 76.56(b)(3) of this chapter.

(3) Channel sharing between commercial and noncommercial educational television stations.

(i) A CSA may be executed between commercial and NCE broadcast television station licensees.

(ii) The licensee of an NCE station operating on a reserved channel under § 73.621 that becomes a party to a CSA, either as a channel sharee station or as a channel sharer station, will retain its NCE status and must continue to comply with § 73.621.

(iii) If the licensee of an NCE station operating on a reserved channel under § 73.621 becomes a party to a CSA, either as a channel sharee station or as a channel sharer station, the portion of the shared television channel on which the NCE station operates shall be reserved for NCE-only use.

(iv) The licensee of an NCE station operating on a reserved channel under § 73.621 that becomes a party to a CSA may assign or transfer its shared license only to an entity qualified under § 73.621 as an NCE television licensee.

(v) If the licensee of an NCE station operating on a reserved channel under § 73.621 becomes a party to a CSA and its license is relinquished or terminated, only another entity meeting the eligibility criteria of § 73.621 will be considered for reassignment of the shared license.

(4) Required CSA provisions.

(i) CSAs must contain provisions outlining each licensee's rights and responsibilities regarding:

(A) Access to facilities, including whether each licensee will have unrestrained access to the shared transmission facilities;

(B) Allocation of bandwidth within the shared channel;

(C) Operation, maintenance, repair, and modification of facilities, including a list of all relevant equipment, a description of each party's financial obligations, and any relevant notice provisions; and

(D) Termination or transfer/assignment of rights to the shared licenses, including the ability of a new licensee to assume the existing CSA.

(ii) CSAs must include provisions:

(A) Affirming compliance with the channel sharing requirements in paragraph (h)(4) of this section, the Incentive Auction Report and Order, Docket No. 12-268 (FCC 14-50), and the Channel Sharing Report and Order, 27 FCC Rcd 4616 (2012); and

(B) Requiring that each channel sharing licensee shall retain spectrum usage rights adequate to ensure a sufficient amount of the shared channel capacity to allow it to provide at least one Standard Definition (SD) program stream at all times.

(5) If a channel sharee or channel sharer station's license is terminated, the licensees of the remaining channel sharing station or stations will continue to have rights to their portion(s) of the shared channel. The rights to the terminated portion of the shared channel will revert to the Commission for reassignment. The final award of the rights to the terminated portion of the shared channel will be conditioned on a new channel sharing licensee agreeing to the terms of the existing CSA. If the new channel sharing licensee and the licensees of the remaining channel sharing station or stations agree to renegotiate the terms of the existing CSA, the agreement may be amended, subject to Commission approval. If the negotiations to amend the agreement are unsuccessful, the remaining station or stations will be permitted to continue to operate while the channel remains a shared allocation and subject to reassignment.

(6) If the rights under a CSA are transferred or assigned, the assignee or the transferee must comply with the terms of the CSA. If the transferee or assignee and the licensees of the remaining channel sharing station or stations agree to amend the terms of the existing CSA, the agreement may be amended, subject to Commission approval.

(7) Preservation of carriage rights. A channel sharee station that possessed carriage rights under section 338, 614, or 615 of the Communications Act of 1934 (47 U.S.C. 338; 534; 535) on November 30, 2010, shall have, at its shared location, the carriage rights under such section that would apply to such station at the shared location if it were not sharing a channel.

38. Section 73.6012 is revised to read as follows:

§ 73.6012 Protection of Class A TV, low power TV and TV translator stations.

* * *

The protection of other authorized low power TV and TV translator stations and applications for changes in such stations shall not apply in connection with any application filed by a Class A TV station pursuant to § 73.3700(b)(1).

39. Section 73.6019 is revised to read as follows:

§ 73.6019 Digital Class A TV station protection of low power TV, TV translator, digital low power TV and digital TV translator stations.

* * *

The protection of other authorized low power TV, TV translator, digital low power TV and digital TV translator stations shall not apply in connection with any application filed by a Class A TV station pursuant to § 73.3700(b)(1).

PART 74—EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTIONAL SERVICES

40. The authority citation for part 74 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 307, 309, 336 and 554.

41. Section 74.602 is amended by adding paragraph (h)(5) and (6) to read as follows:

§74.602 Frequency assignment.

* * * * *

(h) * * *

(5) (i) The licensee of a TV STL, TV relay station, or TV translator relay station that operates on frequencies in the 600 MHz band assigned to wireless licensees under part 27 of this chapter must cease

operations on those frequencies no later than the end of the post-auction transition period as defined in § 27.4 of this chapter. The licensee of a TV STL, TV relay station, or TV translator relay station may be required to cease operations on a date earlier than the end of the post-auction transition period if it receives a notification pursuant to paragraph (h)(5)(ii) of this section.

(ii) A wireless licensee assigned to frequencies in the 600 MHz band under part 27 of this chapter must notify the licensee of a TV STL, TV relay station, or TV translator relay station of its intent to commence wireless operations and the likelihood of harmful interference from the TV STL, TV relay station, or TV translator relay station to those operations within the wireless licensee's licensed geographic service area.

(A) The wireless licensee must:

(1) Notify the licensee of the TV STL, TV relay station, or TV translator relay station in the form of a letter, via certified mail, return receipt requested; and

(2) Send such notification not less than 30 days in advance of the approximate date of commencement of such operations.

(B) The licensee of the TV STL, TV relay station, or TV translator relay station must cease the subject operation within 30 days of receiving the notification pursuant to this section.

(iii) By the end of the post-auction transition period, all TV STL, TV relay station and TV translator relay station licensees must modify or cancel their authorizations and vacate the 600 MHz band. Applications for TV STL, TV relay and TV translator relay stations in the 600 MHz band will not be accepted for filing on or after the end date for the post-auction transition period.

(6) The licensee of a TV STL, TV relay station, or TV translator relay station that operates on the UHF spectrum that is reserved for guard band channels as a result of the broadcast television incentive auction conducted under section 6403 of the Middle Class Tax Relief and Job Creation Act of 2012 (Pub. L. No. 112-96) must cease operations on those frequencies no later than the end of the post-auction transition period as defined in § 27.4 of this chapter. The licensee of a TV STL, TV relay station, or TV translator

relay station may be required to cease operations on a date earlier than the end of the post-auction transition period if it receives a notification pursuant to paragraph (h)(5)(ii) of this section.

42. Section 74.802 is amended by revising paragraph (b), and by adding paragraph (f), to read as follows:

§74.802 Frequency assignment.

* * * * *

(b) (1) Operations in the bands allocated for TV broadcasting are limited to locations at least 4 kilometers outside the protected contours of co-channel TV stations as defined below. These contours are calculated using the methodology in §73.684 of this chapter and the R-6602 curves contained in §73.699 of this chapter.

Type of station	Protected contour		
	Channel	Contour (dBu)	Propagation curve
Analog: Class A TV, LPTV, translator and booster	Low VHF (2-6)	47	F(50,50)
	High VHF (7-13)	56	F(50,50)
	UHF (14-51)	64	F(50,50)
Digital: Full service TV, Class A TV, LPTV, translator and booster	Low VHF (2-6)	28	F(50,90)
	High VHF (7-13)	36	F(50,90)
	UHF (14-51)	41	F(50,90)

(2) Low power auxiliary stations may operate closer to co-channel TV broadcast stations than the distances specified in paragraph (b)(1) of this section provided that their operations are coordinated with TV broadcast stations that could be affected by the low power auxiliary station operation. Coordination must be completed prior to operation of the low power auxiliary station.

* * * * *

(f) Operations in 600 MHz band assigned to wireless licensees under part 27 of this chapter. A low power auxiliary station that operates on frequencies in the 600 MHz band assigned to wireless licensees under part 27of this chapter must cease operations on those frequencies no later than the end of the post-auction transition period as defined in § 27.4 of this chapter. During the post-auction transition period, low power auxiliary stations will operate on a secondary basis

to part 27 licensees, *i.e.*, they must not cause and must accept harmful interference to part 27 licensees.

43. Section 74.870 is amended by revising paragraph (i) to read as follows:

§74.870 Wireless video assist devices.

* * * * *

(i) Operations in 600 MHz band assigned to wireless licensees under part 27 of this chapter. A wireless video assist device that operates on frequencies in the 600 MHz band assigned to wireless licensees under part 27of this chapter must cease operations on those frequencies no later than the end of the post-auction transition period as defined in § 27.4 of this chapter. During the post-auction transition period, wireless video assist devices will operate on a secondary basis to part 27 licensees, *i.e.*, they must not cause and must accept harmful interference to part 27 licensees.

APPENDIX B

Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] an Initial Regulatory Flexibility Analysis ("IRFA") was incorporated in the *Notice of Proposed Rule Making* ("*Notice*" or "*NPRM*"). The Commission sought written public comment on the proposals in the *Notice*, including comment on the IRFA. Because we amend the rules in this Order, we have included this Final Regulatory Flexibility Analysis ("FRFA") which conforms to the RFA.[2]

A. Need for, and Objectives of, the Order

2. In 2012, Congress mandated that the Commission conduct an incentive auction of broadcast television spectrum as set forth in the Middle Class Tax Relief and Job Creation Act of 2012 ("Spectrum Act").[3] Congress's passage of the Spectrum Act set the stage for this proceeding and further expanded the Commission's ability to facilitate technological and economic growth. The Spectrum Act authorizes the Commission to conduct incentive auctions in which licensees may voluntarily relinquish their spectrum usage rights in order to permit the assignment by auction of new initial licenses subject to flexible use service rules, in exchange for a portion of the resulting auction proceeds. Section 6403 of the Spectrum Act requires the Commission to conduct an incentive auction of the broadcast television spectrum and includes specific requirements and safeguards for the required auction.[4]

3. The incentive auction will have three major pieces: (1) a "reverse auction" in which full power and Class A broadcast television licensees submit bids to voluntarily relinquish certain broadcast rights in exchange for payments; (2) a reorganization or "repacking" of the broadcast television bands in order to free up a portion of the ultra-high frequency ("UHF") band for other uses; and (3) a "forward auction" of licenses for flexible use of the newly available spectrum.[5]

4. In order to implement this congressional mandate to conduct an incentive auction of broadcast television spectrum, the Order adopts an auction design framework and rules for competitive bidding to govern the reverse auction, and modifies the Commission's general competitive bidding rules in Part 1 in order to conduct the related forward auction for new spectrum licenses. The other major component of the incentive auction, the repacking process, will help to determine which reverse auction bids will be accepted. In addition, consistent with the Commission's typical approach to spectrum license auctions, the adopted rules and Part 1 rule revisions provide a general framework to guide the development of the detailed procedures and deadlines needed to conduct the auction. A public notice process will allow both the Commission and interested parties to focus on and provide input regarding discrete details of the auction design and the auction procedures.

5. In the 600 MHz Band Plan that the Commission adopts, existing channel 37 operations remain allocated for use by radio astronomy and medical telemetry equipment. Depending on the amount of spectrum recovered from the repacking process, the 600 MHz downlink band could be situated on one or both sides of channel 37. For any band plan configurations where wireless downlink blocks are adjacent to channel 37 services, the Commission adopts technically reasonable guard bands between the

[1] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. §§ 601-612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 ("SBREFA"), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[2] *See* 5 U.S.C. § 604.

[3] Pub. L. No. 112-96, §§ 6402, 6403, 126 Stat. 156 (2012).

[4] *See* Spectrum Act § 6403.

[5] *See id.* §§ 6403(a)-(c). *See also id.* §§ 6001(16), (30) (defining "forward auction" and "reverse auction," respectively).

blocks and channel 37. This band plan will allow for maximum flexibility in clearing spectrum while sufficiently protecting incumbent services and new wireless operations.

6. To encourage entry by providers, including small providers, that contemplate offering wireless broadband service on a localized basis, yet at the same time not precluding carriers that plan to provide service on a much larger geographic scale, the Commission will license the 600 MHz Band on the basis of Partial Economic Areas ("PEAs"), a subdivision of Economic Areas ("EAs") created by grouping areas using Metropolitan Statistical Area ("MSA") boundaries, updated with 2010 U.S. Census data for each county. The Commission concludes that licensing on a PEA basis will best promote entry into the market by the broadest range of potential wireless service providers without unduly complicating the auction, thereby promoting competition. Moreover, the Commission concludes that licensing using PEAs throughout the country strikes the appropriate balance and will allow both smaller and larger wireless carriers to obtain licenses that best align with their respective business plans. In addition, because the MSA boundaries may more closely fit many wireless providers' existing footprints—in particular, smaller, non-nationwide providers—adopting this geographic licensing approach should provide a greater opportunity for all wireless providers to acquire spectrum licenses in their service areas.

7. To enable repacking of the broadcast spectrum, it is critical that the Commission determine how to preserve the coverage area and population served of full power and Class A stations as required by the Spectrum Act. Accordingly, the Commission adopts rules on engineering and other technical aspects of the repacking process, in particular Congress's mandate in section 6403(b)(2) of the Spectrum Act that it make all reasonable efforts to preserve the coverage area and population served of full power and Class A television stations in the repacking.

8. The broadcast television spectrum incentive auction and the associated repacking process could impact both the coverage area and the population served of full power and Class A television stations. If a station is assigned to a different channel, its technical facilities must be modified to preserve its coverage area because radio signals propagate differently on different frequencies. These varying propagation characteristics also mean that a new channel assignment may change the areas within a station's noise-limited service area affected by terrain loss. Channel reassignments, and stations going off the air as a result of the reverse auction, also may change the interference relationships between stations, which in turn affect population served. Stations going off the air can eliminate existing interference to the stations that remain on the air. Likewise, new channel assignments generally will eliminate interference that the reassigned stations are now causing or receiving. At the same time, new channel assignments create a potential for new interference between nearby stations on the same channel or an adjacent channel. The Commission adopts a repacking methodology that takes in account all of these impacts in order to carry out Congress's mandate in section 6403(b)(2).

9. The Commission recognizes that low power television ("LPTV") and television translator ("TV translator") stations may be impacted by repacking. These stations are not permitted to participate in the reverse auction. Moreover, these stations have only secondary interference protection rights and will not be protected during repacking. Many of these stations may be displaced from their current operating channel. To ease the burden on these stations, the Commission will allow displaced LPTV and TV translator stations to have the opportunity to submit a displacement application and propose a new operating channel. The Commission also will allow LPTV and TV translator stations to explore engineering solutions or agree on a settlement to resolve mutually exclusive displacement applications. In cases where stations do not resolve mutually exclusive displacement applications, the Commission will grant selection priority to the licensees of any displaced digital replacement translators ("DRTs"), and only after this priority will the Commission use an auction to resolve remaining displacement groups. The Commission also intends to initiate a rulemaking proceeding to consider additional means to mitigate the potential impact of the incentive auction and the repacking process on LPTV and TV translator stations.

10. Following the conclusion of the incentive auction, the transition to the reorganized UHF band will be as rapid as possible without causing unnecessary disruption. Television stations that

voluntarily turn in their licenses or agree to channel share must transition from their pre-auction channels within three months of receiving their reverse auction payments. The time required for stations reassigned to a new channel to modify their facilities will vary, so the Commission will tailor their construction deadlines to their situations. Consistent with Congress's mandate, the Commission establishes procedures to reimburse costs reasonably incurred by stations that are involuntarily reassigned to new channels, as well as by multichannel video programming distributors ("MVPDs") to continue to carry stations reassigned to new channels. Other incumbents must also transition from the repurposed 600 MHz Band, including the guard bands. The Commission establishes procedures and deadlines for the transition of the following services: LPTV and TV translator stations; Broadcast Auxiliary Services ("BAS"); television white space devices; low power auxiliary stations ("LPAS") and unlicensed wireless microphones; and wireless assist video devices.

11. In addition to repurposing UHF spectrum for new licensed uses, the Commission makes a significant amount of spectrum available for unlicensed use, a large portion of it on a nationwide basis. To prevent harmful interference between licensed services, the 600 MHz Band Plan includes a number of guard bands, which the Commission intends to make available for use by unlicensed devices. Moreover, the Commission will allow unlicensed use of channel 37, subject to the development of the appropriate technical parameters to protect the incumbent Wireless Medical Telemetry Service ("WMTS") and Radio Astronomy Service ("RAS") from harmful interference, and allow television white space devices as well as wireless microphones to operate on any unused television channels in a market following the incentive auction. The Commission also intends to designate one unused channel in each area following the repacking process for use by wireless microphones and television white space devices.

12. The Commission also adopts measures to facilitate wireless microphone use of available spectrum in the reorganized UHF band. With regard to the 600 MHz Band, the Commission will allow broadcasters and cable programming networks to operate licensed wireless microphones in a portion of the duplex gap. In addition, the Commission will permit other wireless microphones to operate in the guard bands on an unlicensed basis. The Commission will initiate a proceeding to adopt technical standards to govern these uses. With regard to the remaining television spectrum, while there may no longer be two unused channels for wireless microphones in markets where those channels are currently used for that purpose, the Commission intends to designate one unused channel in each area following the auction for use by wireless microphones and television white space devices. The Commission also revises the rules for co-channel operations in the post-auction television bands to expand the areas where wireless microphones may operate. The Commission will initiate a proceeding in the near future to find additional spectrum for wireless microphone users in other spectrum bands in order to help address their long-term needs.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

13. No commenters directly responded to the IRFA. However, a number of commenters raised concerns about the impact on small businesses of various auction design issues. We have nonetheless addressed these concerns in the FRFA.

C. Description and Estimate of the Number of Small Entities to Which Rules Will Apply

14. The RFA directs the Commission to provide a description of and, where feasible, an estimate of the number of small entities that will be affected by the adopted rules, if adopted.[6] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," small organization," and "small government jurisdiction."[7] In addition, the term "small business" has the same

[6] 5 U.S.C. § 603(b)(3).

[7] *Id*. § 601(6).

meaning as the term "small business concern" under the Small Business Act.[8] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[9]

15. *Television Broadcasting*. This economic census category "comprises establishments primarily engaged in broadcasting images together with sound. These establishments operate television broadcasting studios and facilities for the programming and transmission of programs to the public."[10] The SBA has created the following small business size standard for Television Broadcasting firms: those having $14 million or less in annual receipts.[11] The Commission has estimated the number of licensed commercial television stations to be 1,388.[12] In addition, according to Commission staff review of the BIA Advisory Services, LLC's *Media Access Pro Television Database* on March 28, 2012, about 950 of an estimated 1,300 commercial television stations (or approximately 73 percent) had revenues of $14 million or less.[13] We therefore estimate that the majority of commercial television broadcasters are small entities.

16. We note, however, that in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations must be included.[14] Our estimate, therefore, likely overstates the number of small entities that might be affected by our action because the revenue figure on which it is based does not include or aggregate revenues from affiliated companies. In addition, an element of the definition of "small business" is that the entity not be dominant in its field of operation. We are unable at this time to define or quantify the criteria that would establish whether a specific television station is dominant in its field of operation. Accordingly, the estimate of small businesses to which rules may apply does not exclude any television station from the definition of a small business on this basis and is therefore possibly over-inclusive to that extent.

17. In addition, the Commission has estimated the number of licensed noncommercial educational ("NCE") television stations to be 396.[15] These stations are non-profit, and therefore considered to be small entities.[16]

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[8] *Id*. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. § 601(3).

[9] 15 U.S.C. § 632. Application of the statutory criteria of dominance in its field of operation and independence are sometimes difficult to apply in the context of broadcast television. Accordingly, the Commission's statistical account of television stations may be over-inclusive.

[10] U.S. Census Bureau, *2012 NAICS Definitions: 515120 Television Broadcasting*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=515120&search=2012 (last visited Mar. 6, 2014).

[11] 13 C.F.R. § 121.201 (NAICS code 515120) (updated for inflation in 2010).

[12] *See* FCC News Release, Broadcast Station Totals as of December 31, 2013 (rel. Jan. 8, 2014), http://transition fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.

[13] We recognize that BIA's estimate differs slightly from the FCC total given the information provided above.

[14] "[Business concerns] are affiliates of each other when one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both." 13 C.F.R. § 121.103(a)(1).

[15] *See* FCC News Release, Broadcast Station Totals as of December 31, 2013 (rel. Jan. 8, 2014), http://transition fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.

[16] *See generally* 5 U.S.C. §§ 601(4), (6).

18. There are also 2,414 LPTV stations, including Class A stations, and 4,046 TV translator stations.[17] Given the nature of these services, we will presume that all of these entities qualify as small entities under the above SBA small business size standard.

19. *Cable Television Distribution Services*. Since 2007, these services have been defined within the broad economic census category of Wired Telecommunications Carriers; that category is defined as follows: "This industry comprises establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies."[18] The SBA has developed a small business size standard for this category, which is: all such firms having 1,500 or fewer employees.[19] Census data for 2007 shows that there were 3,188 firms that operated for the duration of that year.[20] Of those, 3,144 had fewer than 1000 employees, and 44 firms had more than 1000 employees. Thus under this category and the associated small business size standard, the majority of such firms can be considered small.

20. *Cable Companies and Systems*. The Commission has also developed its own small business size standards, for the purpose of cable rate regulation. Under the Commission's rules, a "small cable company" is one serving 400,000 or fewer subscribers, nationwide.[21] Industry data indicate that, of approximately 1,100 cable operators nationwide, all but 10 are small under this size standard.[22] In addition, under the Commission's rules, a "small system" is a cable system serving 15,000 or fewer subscribers.[23] Industry data indicate that, of 6,635 systems nationwide, 5,802 systems have fewer than 10,000 subscribers, and an additional 302 systems have 10,000-19,999 subscribers.[24] Thus, under this second size standard, most cable systems are small.

21. *Cable System Operators*. The Communications Act of 1934, as amended, also contains a size standard for small cable system operators, which is "a cable operator that, directly or through an affiliate, serves in the aggregate fewer than 1 percent of all subscribers in the United States and is not affiliated with any entity or entities whose gross annual revenues in the aggregate exceed $250,000,000."[25] The Commission has determined that an operator serving fewer than 677,000

[17] *See* FCC News Release, Broadcast Station Totals as of December 31, 2013 (rel. January 8, 2014), http://transition fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.

[18] U.S. Census Bureau, *2012 NAICS Definitions: 517110 Wired Telecommunications Carriers*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517110&search=2012 (last visited Mar. 3, 2014).

[19] *See* 13 C.F.R. § 121.201 (NAICS code 517110).

[20] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series - Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517110), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.

[21] 47 C.F.R. § 76.901(e). The Commission determined that this size standard equates approximately to a size standard of $100 million or less in annual revenues. *Implementation of Sections of the 1992 Cable Act: Rate Regulation,* MM Docket No. 92-266 and MM Docket No. 93-215, Sixth Report and Order and Eleventh Order on Reconsideration, 10 FCC Rcd 7393, 7408 (1995).

[22] These data are derived from: Industry Data, National Cable & Telecommunications Association, https://www.ncta.com/industry-data (last visited Mar. 6, 2014), and R.R. Bowker, *Broadcasting & Cable Yearbook 2010*, "Top 25 Cable/Satellite Operators," page C-2 (data current as of December, 2008).

[23] 47 C.F.R. § 76.901(c).

[24] Warren Communications News, *Television & Cable Factbook 2008*, "U.S. Cable Systems by Subscriber Size," page F-2 (data current as of Oct. 2007). The data do not include 851 systems for which classifying data were not available.

[25] 47 U.S.C. § 543(m)(2); *see* 47 C.F.R. § 76.901(f) & nn. 1-3.

subscribers shall be deemed a small operator, if its annual revenues, when combined with the total annual revenues of all its affiliates, do not exceed $250 million in the aggregate.[26] Industry data indicate that, of 1,100 cable operators nationwide, all but ten are small under this size standard.[27] We note that the Commission neither requests nor collects information on whether cable system operators are affiliated with entities whose gross annual revenues exceed $250 million,[28] and therefore we are unable to estimate more accurately the number of cable system operators that would qualify as small under this size standard.

22. *Direct Broadcast Satellite ("DBS") Service*. DBS service is a nationally distributed subscription service that delivers video and audio programming via satellite to a small parabolic "dish" antenna at the subscriber's location. DBS, by exception, is now included in the SBA's broad economic census category, Wired Telecommunications Carriers,[29] which was developed for small wireline firms. Under this category, the SBA deems a wireline business to be small if it has 1,500 or fewer employees.[30] To gauge small business prevalence for the DBS service, the Commission relies on data currently available from the U.S. Census for the year 2007. According to that source, there were 3,188 firms that in 2007 were Wired Telecommunications Carriers. Of these, 3,144 operated with less than 1,000 employees, and 44 operated with more than 1,000 employees. However, as to the latter 44 there is no data available that shows how many operated with more than 1,500 employees. Based on this data, the majority of these firms can be considered small.[31] Currently, only two entities provide DBS service, which requires a great investment of capital for operation: DIRECTV and EchoStar Communications Corporation ("EchoStar") (marketed as the DISH Network).[32] Each currently offers subscription services. DIRECTV[33] and EchoStar[34] each report annual revenues that are in excess of the threshold for a small business. Because DBS service requires significant capital, we believe it is unlikely that a small entity as defined by the SBA would have the financial wherewithal to become a DBS service provider.

23. *Cable and Other Subscription Programming*. This industry comprises establishments primarily engaged in operating studios and facilities for the broadcasting of programs on a subscription or fee basis. The broadcast programming is typically narrowcast in nature (e.g., limited format, such as

[26] 47 C.F.R. § 76.901(f); *see FCC Announces New Subscriber Count for the Definition of Small Cable Operator*, DA 01-158, Public Notice, 16 FCC Rcd 2225 (2001).

[27] These data are derived from: R.R. Bowker, *Broadcasting & Cable Yearbook 2006*, "Top 25 Cable/Satellite Operators," pages A-8 & C-2 (data current as of June 30, 2005); Warren Communications News, *Television & Cable Factbook 2006*, "Ownership of Cable Systems in the United States," pages D-1805 to D-1857.

[28] The Commission does receive such information on a case-by-case basis if a cable operator appeals a local franchise authority's finding that the operator does not qualify as a small cable operator pursuant to § 76.901(f) of the Commission's rules. *See* 47 C.F.R. § 76.909(b).

[29] *See* 13 C.F.R. § 121.201 (NAICS code 517110).

[30] *Id*.

[31] *See* U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series - Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517110), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.

[32] *See Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Fifteenth Annual Report, MB Docket No. 12-203, 28 FCC Rcd 10496, 10507, para. 27 (2013) ("*15th Annual Report*").

[33] As of June 2012, DIRECTV is the largest DBS operator and the second largest MVPD, serving an estimated 19.8% of MVPD subscribers nationwide. *See 15th Annual Report*, 28 FCC Rcd at 687, Table B-3.

[34] As of June 2012, DISH Network is the second largest DBS operator and the third largest MVPD, serving an estimated 13.01% of MVPD subscribers nationwide. *Id*. As of June 2006, Dominion served fewer than 500,000 subscribers, which may now be receiving "Sky Angel" service from DISH Network. *See id*. at 581, para. 76.

news, sports, education, or youth-oriented). These establishments produce programming in their own facilities or acquire programming. The programming material is usually delivered to a third party, such as cable systems or direct-to-home satellite systems, for transmission to viewers.[35] The SBA size standard for this industry establishes as small any company in this category which receives annual receipts of $35.5 million or less.[36] Based on U.S. Census data for 2007, in that year 659 establishments operated for the entire year.[37] Of that 659, 197 operated with annual receipts of $10 million a year or more. The remaining 462 establishments operated with annual receipts of less than $10 million. Based on this data, the Commission estimates that the majority of establishments operating in this industry are small.

24. *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing*. The Census Bureau defines this category as follows: "This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment."38 The SBA has developed a small business size standard for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, which is: all such firms having 750 or fewer employees.[39] According to Census Bureau data for 2007, there were a total of 939 establishments in this category that operated for part or all of the entire year. Of this total, 912 had less than 500 employees and 17 had more than 1000 employees.[40] Thus, under that size standard, the majority of firms can be considered small.

25. *Audio and Video Equipment Manufacturing*. The SBA has classified the manufacturing of audio and video equipment under in NAICS Codes classification scheme as an industry in which a manufacturer is small if it has less than 750 employees.41 Data contained in the 2007 U.S. Census indicate that 492 establishments operated in that industry for all or part of that year. In that year, 488 establishments had fewer than 500 employees; and only 1 had more than 1000 employees.[42] Thus, under the applicable size standard, a majority of manufacturers of audio and video equipment may be considered small.

26. *Wireless Telecommunications Carriers (except satellite)*. The Census Bureau defines this category as follows: "This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular phone services,

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[35] U.S. Census Bureau, *2012 NAICS Definitions: 515210 Cable and Other Subscription Programming*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=515210&search=2012 (last visited Mar. 6, 2014).

[36] *See* 13 C.F. R § 121.201 (NAICS code 515210).

[37] See U.S. Census Bureau, Table No. EC0751SSSZ1, *Information: Subject Series - Establishment and Firm Size: Receipts Size of Establishments for the United States: 2007 (NAICS code 515210)*, http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ1.

[38] U.S. Census Bureau, *2012 NAICS Definitions: 334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334220 &search=2012 (last visited Mar. 6, 2014).

[39] 13 C.F.R § 121.201 (NAICS code 334220).

[40] *See* U.S. Census Bureau, Table No. EC0731SG3, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007* (NAICS code 334220), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG3.

[41] 13 CFR § 121.201 (NAICS code 334310).

[42] *See* U.S. Census Bureau, Table No. EC0731SG3, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007* (NAICS code 334310), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG3.

paging services, wireless Internet access, and wireless video services."[43] The appropriate size standard under SBA rules is for the category Wireless Telecommunications Carriers (except Satellite). The size standard for that category is that a business is small if it has 1,500 or fewer employees.[44] For this category, census data for 2007 show that there were 1,383 firms that operated for the entire year.[45] Of this total, 1,368 firms had employment of 999 or fewer employees and 15 had employment of 1000 employees or more.[46] Similarly, according to Commission data, 413 carriers reported that they were engaged in the provision of wireless telephony, including cellular service, PCS, and Specialized Mobile Radio ("SMR") Telephony services.[47] Of these, an estimated 261 have 1,500 or fewer employees and 152 have more than 1,500 employees.[48] Consequently, the Commission estimates that approximately half or more of these firms can be considered small. Thus, using available data, we estimate that the majority of wireless firms can be considered small.

27. *Manufacturers of unlicensed devices.* In the context of this FRFA, manufacturers of Part 15 unlicensed devices that are operated in the UHF-TV band (channels 14-51) for wireless data transfer fall into the category of Radio and Television and Wireless Communications Equipment Manufacturing. The Census Bureau defines this category as follows: "This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment."49 The SBA has developed the small business size standard for this category as firms having 750 or fewer employees.[50] According to Census Bureau data for 2007, there were a total of 939 establishments in this category that operated for the entire year.[51] Of this total, 912 had less than 500 employees and 17 had more than 1000 employees. Thus, under that size standard, the majority of firms can be considered small.

28. *Personal Radio Services/Wireless Medical Telemetry Service ("WMTS").* Personal radio services provide short-range, low power radio for personal communications, radio signaling, and business communications not provided for in other services. The Personal Radio Services include spectrum licensed under Part 95 of our rules.[52] These services include Citizen Band Radio Service ("CB"), General Mobile Radio Service ("GMRS"), Radio Control Radio Service ("R/C"), Family Radio Service ("FRS"), Wireless Medical Telemetry Service ("WMTS"), Medical Implant Communications Service ("MICS"),

[43] U.S. Census Bureau, *2012 NAICS Definitions: 517210 Wireless Telecommunications Carriers (except Satellite)*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517210&search=2012 (last visited Mar. 6, 2014).

[44] 13 C.F.R. § 121.201 (NAICS code 517210).

[45] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series - Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517210), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.

[46] *Id*. Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with 1000 employees or more.

[47] *See Trends in Telephone Service* at Table 5.3.

[48] *See id*.

[49] U.S. Census Bureau, *2012 NAICS Definitions: 334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334220&search=2012 (last visited Mar. 6, 2014).

[50] 13 C.F.R § 121.201 (NAICS code 334220).

[51] U.S. Census Bureau, Table No. EC0731SG3, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007* (NAICS code 334220), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG3.

[52] 47 C.F.R. Part 95.

Low Power Radio Service ("LPRS"), and Multi-Use Radio Service ("MURS").[53] There are a variety of methods used to license the spectrum in these rule parts, from licensing by rule, to conditioning operation on successful completion of a required test, to site-based licensing, to geographic area licensing. Under the RFA, the Commission is required to make a determination of which small entities are directly affected by the rules adopted. Since all such entities are wireless, we apply the definition of Wireless Telecommunications Carriers (except Satellite), pursuant to which a small entity is defined as employing 1,500 or fewer persons.[54] For this category, census data for 2007 show that there were 1,383 firms that operated for the entire year.[55] Of this total, 1,368 firms had employment of 999 or fewer employees and 15 had employment of 1000 employees or more.[56] Thus under this category and the associated small business size standard, the Commission estimates that the majority of personal radio service and WMTS providers are small entities.

29. However, we note that many of the licensees in these services are individuals, and thus are not small entities. In addition, due to the mostly unlicensed and shared nature of the spectrum utilized in many of these services, the Commission lacks direct information upon which to base a more specific estimation of the number of small entities under an SBA definition that might be directly affected by our action.

30. *Radio Astronomy*. The Commission has not developed a definition for radio astronomy. However the SBA has established a category into which Radio Astronomy fits, which is: All Other Telecommunications. This industry "comprises establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems. Establishments providing Internet services or voice over Internet protocol ("VoIP") services via client-supplied telecommunications connections are also included in this industry."[57] The size standard for all establishments engaged in this industry is that annual receipts of $30 million or less establish the firm as small.[58] Based on data in the 2007 U.S. Census, in 2007 there were 2,623 establishments that operated for the entire year in the All Other Telecommunications category.[59] Of those, 145 establishments operated with annual receipts of more than $10 million per year. The remaining 2,478 establishments operated

[53] The Citizens Band Radio Service, General Mobile Radio Service, Radio Control Radio Service, Family Radio Service, Wireless Medical Telemetry Service, Medical Implant Communications Service, Low Power Radio Service, and Multi-Use Radio Service are governed by subpart D, subpart A, subpart C, subpart B, subpart H, subpart I, subpart G, and subpart J, respectively, of part 95 of the Commission's rules. *See generally* 47 C.F.R. Part 95.

[54] 13 C.F.R. § 121.201 (NAICS Code 517210).

[55] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series - Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517210), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.

[56] *Id*. Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with 1000 employees or more.

[57] U.S. Census Bureau, *2012 NAICS Definitions: 517919 All Other Telecommunications*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517919&search=2012 (last visited Mar. 6, 2014).

[58] 13 C.F.R § 121.202 (NAICS Code 517919).

[59] U.S. Census Bureau, Table No. EC0751SSSZ1, *Information: Subject Series - Establishment and Firm Size: Receipts Size of Establishments for the United States: 2007* (NAICS code 517919), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ1.

with annual receipts of less than $10 million per year.[60] Based on this data, the Commission estimates that the majority of establishments in the All Other Telecommunications category are small.

31. *Motion Picture and Video Production.* The Census Bureau defines this category as follows: "This industry comprises establishments primarily engaged in producing, or producing and distributing motion pictures, videos, television programs, or television commercials."[61] The SBA has developed a small business size standard for this category, which is: all such businesses having $30 million dollars or less in annual receipts.[62] Census data for 2007 show that there were 9,478 establishments that operated that year.[63] Of that number, 9,128 had annual receipts of $24,999,999 or less, and 350 had annual receipts ranging from not less than $25,000,000 to $100,000,000 or more.[64] Thus, under this size standard, the majority of such businesses can be considered small entities.

32. *Fixed Microwave Services.* Microwave services include common carrier,[65] private-operational fixed,[66] and broadcast auxiliary radio services.[67] At present, there are approximately 31,549 common carrier fixed licensees and 89,633 private and public safety operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services. Microwave services include common carrier,[68] private-operational fixed,[69] and broadcast auxiliary radio services.[70] They also include the Local Multipoint Distribution Service ("LMDS"),[71] the Digital Electronic Message Service ("DEMS"),[72] and the

[60] *Id*. Available census data do not provide a more precise estimate of the number of establishments that have revenue of $30 million or less; the largest category provided is for firms with revenue of $10 million or more.

[61] U.S. Census Bureau, *2012 NAICS Definitions: 512110 Motion Picture and Video Production*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=512110&search=2012 (last visited Mar. 6, 2014).

[62] 13 C.F.R § 121.201, 2012 NAICS code 512110.

[63] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series - Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 512110), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.

[64] *See id*.

[65] 47 C.F.R. Part 101 *et seq*. (formerly, part 21 of the Commission's Rules) for common carrier fixed microwave services (except MDS).

[66] Persons eligible under Parts 80 and 90 of the Commission's rules can use Private-Operational Fixed Microwave services. *See* 47 C.F.R. Parts 80 and 90. Stations in this service are called operational-fixed to distinguish them from common carrier and public fixed stations. Only the licensee may use the operational-fixed station, and only for communications related to the licensee's commercial, industrial, or safety operations.

[67] Auxiliary Microwave Service is governed by Part 74 and Part 78 of Title 47 of the Commission's Rules. Available to licensees of broadcast stations, cable operators, and to broadcast and cable network entities. Auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter, or between two points such as a main studio and an auxiliary studio. The service also includes TV pickup and CARS pickup, which relay signals from a remote location back to the studio.

[68] *See* 47 C.F.R. Part 101, Subparts C and I.

[69] *See* 47 C.F.R. Part 101, Subparts C and H.

[70] Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. *See* 47 C.F.R. Part 74. Available to licensees of broadcast stations and to broadcast and cable network entities, broadcast auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter or between two points such as a main studio and an auxiliary studio. The service also includes mobile TV pickups, which relay signals from a remote location back to the studio.

[71] *See* 47 C.F.R. Part 101, Subpart L.

[72] *See* 47 C.F.R. Part 101, Subpart G.

24 GHz Service,[73] where licensees can choose between common carrier and non-common carrier status.[74] The Commission has not yet defined a small business with respect to microwave services. For purposes of the RFA, the Commission will use the SBA's definition applicable to Wireless Telecommunications Carriers (except satellite)—i.e., a business is small if it has 1,500 or fewer employees.[75] For this category, census data for 2007 show that there were 1,383 firms that operated for the entire year.[76] Of this total, 1,368 firms had employment of 999 or fewer employees and 15 had employment of 1000 employees or more.[77] Thus under this category and the associated small business size standard, the majority of firms can be considered small. The Commission notes that the number of firms does not necessarily track the number of licensees. The Commission estimates that virtually all of the Fixed Microwave licensees (excluding broadcast auxiliary licensees) would qualify as small entities under the SBA definition.

33. *Broadband Radio Service and Educational Broadband Service.* Broadband Radio Service systems, previously referred to as Multipoint Distribution Service ("MDS") and Multichannel Multipoint Distribution Service ("MMDS") systems, and "wireless cable," transmit video programming to subscribers and provide two-way high speed data operations using the microwave frequencies of the Broadband Radio Service ("BRS") and Educational Broadband Service ("EBS") (previously referred to as the Instructional Television Fixed Service ("ITFS")).[78] In connection with the 1996 BRS auction, the Commission established a small business size standard as an entity that had annual average gross revenues of no more than $40 million in the previous three calendar years.[79] The BRS auctions resulted in 67 successful bidders obtaining licensing opportunities for 493 Basic Trading Areas ("BTAs"). Of the 67 auction winners, 61 met the definition of a small business. BRS also includes licensees of stations authorized prior to the auction. We previously estimated that of the 61 small business BRS auction winners, based on our review of licensing records, 48 remain small business licensees. In addition to the 48 small businesses that hold BTA authorizations, there are approximately 86 incumbent BRS licensees that are considered small entities (18 incumbent BRS licensees do not meet the small business size standard).[80] After adding the number of small business auction licensees to the number of incumbent licensees not already counted, there are currently approximately 133 BRS licensees that are defined as small businesses under either the SBA or the Commission's rules. In 2009, the Commission conducted Auction 86, the sale of 78 licenses in the BRS areas.[81] The Commission established three small business size standards that were used in Auction 86: (i) an entity with attributed average annual gross revenues

[73] *See id.*

[74] *See* 47 C.F.R. §§ 101.533, 101.1017.

[75] 13 C.F.R. § 121.201 (NAICS code 517210).

[76] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series - Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517210), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.

[77] *Id*. Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with 1000 employees or more.

[78] *Amendment of Parts 21 and 74 of the Commission's Rules with Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service and Implementation of Section 309(j) of the Communications Act—Competitive Bidding*, MM Docket No. 94-131, PP Docket No. 93-253, Report and Order, 10 FCC Rcd 9589, 9593, para. 7 (1995).

[79] 47 C.F.R. § 21.961(b)(1) (1996).

[80] 47 U.S.C. § 309(j). Hundreds of stations were licensed to incumbent MDS licensees prior to implementation of Section 309(j) of the Communications Act of 1934, 47 U.S.C. § 309(j). For these pre-auction licenses, the applicable standard is SBA's small business size standard of 1500 or fewer employees.

[81] *Auction of Broadband Radio Service (BRS) Licenses, Scheduled for October 27, 2009, Notice and Filing Requirements, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auction 86*, DA 09-1376, Public Notice, 24 FCC Rcd 8277 (2009).

that exceeded $15 million and do not exceed $40 million for the preceding three years was considered a small business; (ii) an entity with attributed average annual gross revenues that exceeded $3 million and did not exceed $15 million for the preceding three years was considered a very small business; and (iii) an entity with attributed average annual gross revenues that did not exceed $3 million for the preceding three years was considered an entrepreneur.[82] Auction 86 concluded in 2009 with the sale of 61 licenses.[83] Of the 10 winning bidders, two bidders that claimed small business status won four licenses; one bidder that claimed very small business status won three licenses; and two bidders that claimed entrepreneur status won six licenses. We note that, as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service.

34. In addition, the SBA's placement of Cable Television Distribution Services in the category of Wired Telecommunications Carriers is applicable to cable-based educational broadcasting services. Since 2007, Wired Telecommunications Carriers have been defined as follows: "This industry comprises establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies."[84] Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services; wired (cable) audio and video programming distribution; and wired broadband Internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.[85] The SBA has developed a small business size standard for this category, which is: all such firms having 1,500 or fewer employees.[86] Census data for 2007 shows that there were 3,188 firms that operated for the duration of that year.[87] Of those, 3,144 had fewer than 1000 employees, and 44 firms had more than 1000 employees. Thus under this category and the associated small business size standard, the majority of such firms can be considered small. In addition to Census data, the Commission's Universal Licensing System indicates that as of July 2013, there are 2,236 active EBS licenses. The Commission estimates that of these 2,236 licenses, the majority are held by non-profit educational institutions and school districts, which are by statute defined as small businesses.[88]

35. *Radio Broadcasting.* The SBA defines a radio broadcast station as a small business if such station has no more than $35.5 million in annual receipts.[89] Business concerns included in this

[82] *Id.* at 8296.

[83] *Auction of Broadband Radio Service Licenses Closes, Winning Bidders Announced for Auction 86, Down Payments Due November 23, 2009, Final Payments Due December 8, 2009, Ten-Day Petition to Deny Period*, DA 09-2378, Public Notice, 24 FCC Rcd 13572 (2009).

[84] U.S. Census Bureau, *2012 NAICS Definitions: 517110 Wired Telecommunications Carriers*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517110&search=2012 (last visited Mar. 3, 2014).

[85] *Id.*

[86] *See* 13 C.F.R. § 121.201 (NAICS code 517110).

[87] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series - Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517110), http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.

[88] The term "small entity" within SBREFA applies to small organizations (nonprofits) and to small governmental jurisdictions (cities, counties, towns, townships, villages, school districts, and special districts with populations of less than 50,000). 5 U.S.C. §§ 601(4)-(6).

[89] 13 C.F.R § 121.201, 2012 NAICS code 515112.

industry are those "primarily engaged in broadcasting aural programs by radio to the public."[90] According to review of the BIA Publications, Inc. Master Access Radio Analyzer Database as of November 26, 2013, about 11,331 (or about 99.9 percent) of 11,341 commercial radio stations have revenues of $35.5 million or less and thus qualify as small entities under the SBA definition. The Commission notes, however, that, in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations[91] must be included. This estimate, therefore, likely overstates the number of small entities that might be affected, because the revenue figure on which it is based does not include or aggregate revenues from affiliated companies.

36. In addition, an element of the definition of "small business" is that the entity not be dominant in its field of operation. The Commission is unable at this time to define or quantify the criteria that would establish whether a specific radio station is dominant in its field of operation. Accordingly, the estimate of small businesses to which rules may apply does not exclude any radio station from the definition of a small business on this basis and therefore may be over-inclusive to that extent. Also, as noted, an additional element of the definition of "small business" is that the entity must be independently owned and operated. The Commission notes that it is difficult at times to assess these criteria in the context of media entities and the estimates of small businesses to which they apply may be over-inclusive to this extent.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

37. The projected reporting, recordkeeping, and other compliance requirements resulting from the Order will apply to all entities in the same manner. The Commission believes that applying the same rules equally to all entities in this context promotes fairness. The Commission does not believe that the costs and/or administrative burdens associated with the rules will unduly burden small entities. The revisions the Commission adopts should benefit small entities by giving them more information, more flexibility, and more options for gaining access to valuable wireless spectrum. Additionally, the reverse auction should benefit small entities that participate by providing a substantial infusion of income in exchange for spectrum usage rights, which broadcasters can use for new content and services. Similarly, by allowing unlicensed use in certain parts of the repurposed 600 MHz Band, the Commission will provide certainty and allow small entity equipment manufacturers to offer new services.

38. Auction Application Requirements. Similar to previous spectrum license auctions, all applicants wishing to participate in either the reverse or forward auction will be required to file pre-auction applications using the Commission's online electronic auction application system. Winning bidders in the forward auction will be required to file applications using the Commission's Universal Licensing System (ULS). For potential reverse auction bidders, the Commission requires submission of an application establishing their eligibility to participate, including license information and associated spectrum usage rights, certification of various qualifications, and information regarding station ownership. Applicants that are party to a channel sharing agreement must certify compliance with the Commission's media ownership rules, provide a copy of the executed agreement, and make other required certifications. No applications to participate in the reverse auction will be accepted if the applicant has failed to make these certifications by the initial deadline. Applicants will be provided a limited opportunity to cure certain minor defects and to resubmit a corrected application to participate. After the resubmission period has ended, an application to participate may be amended or modified to make minor changes or correct minor errors in the application to participate. Minor amendments may be subject to a deadline specified by public notice. Major amendments cannot be made to an application to participate after the initial filing deadline.

[90] U.S. Census Bureau, *2012 NAICS Definitions: 515112 Radio Broadcasting*, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=515112&search=2012 (last visited Mar. 6, 2014).

[91] *See* n.14.

39. Prohibition on Certain Communications. Participants in both the reverse and the forward auction are required to report any potential violations of the Commission's prohibition on certain communications relating to the auction process. The Order extends existing rules applicable to participants in the forward auction that prohibit certain communications among certain forward auction participants to cover communications between forward auction participants and potential reverse auction applicants. The Order adopts new rules providing that, beginning with the deadline for submitting applications and until the Commission releases the results of the incentive auction, all full power and Class A broadcast television licensees are prohibited from communicating any applicant's bids or bidding strategies to any other full power or Class A broadcast television licensee or to any forward auction applicant. This prohibition extends to controlling interests, directors, officers, and members of a governing board, with exceptions for parties to a disclosed channel sharing agreement and where the parties share common control. This rule requires all violations to be reported immediately, and may subject parties to further investigation by the Commission or the Department of Justice.

40. National Security Certifications. To satisfy section 6004 of the Spectrum Act, reverse auction applicants, forward auction applicants, and forward auction winning bidders must file certifications of their compliance with the national security restrictions as set forth in 47 C.F.R. §§ 1.2204(c)(6) and 1.2105(a), as amended, and 47 C.F.R. § 27.12(b). This requirement extends to transactions in the secondary market: in any secondary market transaction applications involving 600 MHz Band licenses, applicants must certify to the Commission that neither they nor any party to the applications are persons barred from participating in an auction under this provision of the Spectrum Act. As such, in order to comply with this requirement, all reverse auction, forward auction, and secondary market applicants may require legal services to ensure compliance with section 6004 of the Spectrum Act.

41. Repacking. The Commission exercises its discretion to protect certain full power and Class A facilities in addition to those for which the statute mandates protection. The Commission generally limits its discretionary protection to facilities that are licensed by the Pre-Auction Licensing Deadline to be announced by the Media Bureau. Similarly, in order for a broadcaster to be a reverse auction eligible licensee, it must hold a license for the full power or Class A station it wishes to offer at auction on or before the Pre-Auction Licensing Deadline. To ensure a stable, accurate database, and to facilitate the repacking process, all full power and Class A television stations are required to verify and certify to the accuracy of the information contained in the Commission's Consolidated Database System ("CDBS") with respect to their protected facilities. Prior to the start of the incentive auction, the Media Bureau will issue a Public Notice announcing each station's protected facility. All full power and Class A stations will be required to submit a form (to be developed by the Media Bureau) specifying any changes to the information contained in CDBS and certifying to the accuracy of the information in CDBS or provided on the form for their protected facility. Stations affected by the destruction of the World Trade Center may elect which of their facilities to be protected. The deadline for these stations to elect the facility to be protected is the Pre-Auction Licensing Deadline.

42. Broadcast License Modification. Once the reverse and forward auctions are complete and results from the repacking process are announced, full power and Class A stations assigned new channels must file minor change applications for construction permits using FCC Form 301, 301-CA, or 340. Stations have a three-month filing window, as opposed to the shorter standard period, to file these minor change applications or to seek a waiver for additional time. In these initial minor change applications, stations may propose transmission facilities that slightly extend their coverage contour under certain conditions. After the deadline for filing for these initial minor change applications, the Media Bureau will announce a filing window during which stations may propose expanded facilities, which are limited to minor changes, or alternate channel assignments, which will be considered major change applications and subject to the standard requirements. The licensee of each channel sharee station and channel sharer station must file an application for a license for the shared channel using FCC Form 302-DTV or 302-CA within three months of the date that the channel sharee station licensee receives its incentive payment. Compliance with these filing requirements may require stations to obtain legal, and, in the case of a construction permit application, engineering services.

43. Broadcast Transition Deadlines. A winning license relinquishment bidder must comply with the notification and cancellation procedures in 47 C.F.R. § 73.1750 and terminate operations on its pre-auction channel within three months of the date that the licensee receives its incentive payment. The licensee of a channel sharee station must comply with the notification and cancellation procedures in 47 C.F.R. § 73.1750 and terminate operations on its pre-auction channel within three months of the date that the licensee receives its incentive payment. The time allowed for full power and Class A stations reassigned to new channels to modify their facilities will vary. The Media Bureau will establish construction deadlines for such stations. A station reassigned to a new channel must cease operating on its pre-auction channel once such station begins operating on its post-auction channel or by the deadline specified in its construction permit for its post-auction channel, whichever occurs earlier, and in no event later than the end of the post-auction transition period, which is the 39-month period commencing upon the public release of the public notice specifying the new channel assignments and technical parameters of any broadcast television stations that are reassigned to new channels ("Post-Auction Transition Period"). A station may seek a single extension of up to six months of its original construction deadline. The extension request must be filed electronically in CDBS using FCC Form 337 no less than 90 days before the expiration of the construction permit. Licensees needing additional time beyond such a single extension of time to complete construction shall be subject to the tolling provisions in 47 C.F.R. § 73.3598. Stations may request Special Temporary Authority ("STA") to operate with temporary facilities while they complete construction.

44. Consumer Education Outreach. As consumers will need to be informed if stations they view will be changing channels, the Commission will require all Transitioning Stations (i.e., full power and Class A stations moving to new channels or relinquishing their licenses) to air notifications for a minimum of 30 days prior to the date that the station will terminate operations on its pre-auction channel. These notifications will be a mix of PSAs and crawls, and must meet certain duration requirements. Transitioning stations that operate on a noncommercial educational ("NCE") basis have the option to instead air 60 seconds per day of on-air consumer education PSAs, in variable timeslots, for 30 days prior to the station's termination of operations on its pre-auction channel. Licensees of Transitioning Stations, except for license relinquishment stations, must place a certification of compliance with these requirements in their online public file within 30 days after beginning operations on their post-auction channels. License relinquishment stations must include the certification in their notification of discontinuation of service pursuant to 47 C.F.R § 73.1750. Small entities may need legal and engineering services to comply with these requirements.

45. MVPD Notification. The Commission requires Transitioning Stations to provide notice to those MVPDs that: (1) no longer will be required to carry the station because it will cease operations or because of the relocation of a channel sharing sharee station; (2) currently carry and will continue to be obligated to carry a station that will change channels; or (3) will become obligated to carry a station due to a channel sharing relocation. The required notice must be provided in the form of a letter notification and contain the following information: (1) date and time of any channel changes; (2) pre-auction and post-transition channel assignments; (3) modification, if any, to antenna position, location, or power levels; (4) stream identification information for channel sharing stations; and (5) engineering staff contact information. Should any of this information change during the station's transition, an amended notification must be sent. Transitioning Stations must provide notice within the following time frames: (1) for successful license relinquishment bidders, not less than 30 days prior to terminating operations; (2) for channel sharing sharee stations, not less than 30 days prior to terminating operations of the sharee's pre-auction channel; (3) for all channel sharing stations (i.e., both the sharer station and sharee station(s)), not less than 30 days prior to initiation of operations on the sharer channel; and (4) for all other stations transitioning to a new channel, including stations that are assigned to new channels in the repacking process and successful UHF-to-VHF and high-VHF-to-low-VHF bidders, not less than 90 days prior to the date on which they will begin operations on their reassigned channel. In addition, should a station's anticipated transition date change due to an unforeseen delay or change in transition plan, the station must send a further notice to affected MVPDs informing them of the new anticipated transition date.

46. Broadcaster Relocation Reimbursement. The Order adopts a reimbursement process for eligible broadcasters and MVPDs. Within three months of the *Channel Reassignment PN*, eligible broadcasters and MVPDs are required to submit an estimated cost form providing an estimate of reasonably incurred relocation costs as well as required certifications. Upon completing construction or other reimbursable changes, or by a specific deadline prior to the end of the Reimbursement Period to be established by the Media Bureau, whichever is earlier, all broadcast television station licensees and MVPDs that received an initial allocation from the TV Broadcaster Relocation Fund must provide the Commission with information and documentation, including invoices and receipts, regarding their actual expenses incurred as of a date to be determined by the Media Bureau. After completing all construction or reimbursable changes, broadcast television station licensees and MVPDs that have received money from the TV Broadcaster Relocation Fund will be required to submit final expense documentation containing a list of estimated expenses and actual expenses as of a date to be determined by the Media Bureau. Forms will include certifications that must be made by an owner or officer of the company under penalty of perjury under 18 U.S.C. § 1001. Broadcast television station licensees and MVPDs that receive payment from the TV Broadcaster Relocation Fund are required to submit progress reports at a date and frequency to be determined by the Media Bureau. Each broadcast television station licensee and MVPD that receives payment from the TV Broadcaster Relocation Fund is required to retain all relevant documents pertaining to construction or other reimbursable changes for a period ending not less than 10 years after the date on which it receives final payment from the TV Broadcaster Relocation Fund. Further, the Commission or its authorized contractor will conduct audits of, data validations for, and site visits to entities that receive disbursements from the TV Broadcaster Relocation Fund, both during and following the three year Reimbursement Period. All relevant documentation must be provided to the Commission or its authorized contractor upon request. Small entities seeking reimbursement may require legal, engineering, or accounting services in order to comply with these recordkeeping and filing requirements.

47. Service Rule Waiver. Section 6403(b)(4)(B) of the Spectrum Act provides that broadcast licensees can, in lieu of reimbursement of relocation costs, receive a waiver of the Commission's rules to permit flexible use of their spectrum, subject to certain conditions. Such waiver requests will be evaluated on a case-by-case basis by the Media Bureau. Eligible broadcast licensees must file waiver requests during a 30-day window commencing upon the date that the *Channel Reassignment PN* is released. Eligible broadcast licensees will have ten days to notify the Commission whether it accepts the Commission's grant of the waiver. Licensees who accept a granted waiver will not qualify for reimbursement. Until the Commission grants and the licensee accepts the terms of a waiver, the licensee must still meet all requirements for obtaining reimbursement, including filing a timely estimated cost form. A licensee that is granted and accepts the terms of the waiver or a licensee with a pending waiver application must comply will all filing and notification requirements, construction schedules, and other post-auction transition deadlines. Broadcast licensees that intend to file for a waiver may require legal, engineering, or accounting services as well.

48. Displacement of LPTV and TV translator stations and Relinquishment of Broadcast Auxiliary Station ("BAS") Channels. Licensees of operating LPTV and TV translator stations that are displaced by a broadcast television station or a wireless service provider or whose channel is reserved as a guard band are permitted to submit an application for displacement relief in a restricted filing window to be announced by the Media Bureau by public notice. LPTV and TV translator stations, the majority of which are small entities, will be affected by this transition. Stations may require legal or engineering services in order to make the required filings. In addition, TV STL, TV relay station, or TV translator relay station (BAS) licensees in the 600 MHz Band will be required to cease operations or relocate from the 600 MHz Band no later than the end of the Post-Auction Transition Period. BAS licensees may require legal or engineering services in order to make the required filings.

49. Channel Sharing Operating Rules. The Commission requires all Channel Sharing Agreements ("CSAs") to include certain provisions outlining each licensee's rights and responsibilities, as well as other requirements, which must be filed with the station's reverse auction application.

Additionally, all CSAs must include a provision affirming compliance with the requirements in this Order, the *Channel Sharing Report and Order*, and Commission rules. The Commission may review CSA provisions and require modifications to meet these requirements. These provisions are meant to help avoid disputes that could interrupt service and to ensure that each licensee is able to fulfill its independent obligation to comply with all pertinent statutory requirements and Commission rules. Since many broadcasters interested in CSAs may be small businesses, small entities may need legal, engineering, or other technical services to draft a CSA that complies with these contractual requirements.

50. Notification of Commencement of Wireless Operations. A wireless licensee assigned to frequencies in the 600 MHz Band must provide notice to LPTV and TV translator stations of its intent to commence wireless operations, and the likelihood of receiving harmful interference from the LPTV or TV translator station to such operations within the wireless licensee's licensed geographic service area. The new wireless licensees must: (i) notify the LPTV or TV translator station in the form of a letter, via certified mail, return receipt requested; (ii) indicate the date the new wireless licensee intends to commence operations in areas where there is a likelihood of receiving harmful interference from the LPTV or TV translator station; and (iii) send such notification not less than 120 days in advance of the commencement date. A wireless licensee assigned to frequencies in the 600 MHz Band must notify the BAS licensee of its intent to commence wireless operations and the likelihood of harmful interference from the BAS licensee to those operations within the wireless licensee's licensed geographic service area. The wireless licensee must: (i) notify the licensee of the TV STL, TV relay station, or TV translator relay station in the form of a letter, via certified mail, return receipt requested; and (ii) send such notification not less than 30 days in advance of the approximate date of commencement of such operations. 600 MHz Band licensees may require legal and engineering services to comply with these requirements.

51. Wireless Technical and Service Rules. In general, the Commission adopts service rules contained in Part 27 of the Commission's rules. The Commission adopted technical rules for the 600 MHz Band similar to the Lower 700 MHz Band, contained in Part 27 of the Commission's rules, including out-of-band emission ("OOBE") limits, antenna height limits, co-channel interference limits, and slightly modified power limits. In order to promote interoperability across the 600 MHz Band, all user equipment certified for this band must be capable of operating throughout the band. In order to comply with these rules, 600 MHz Band licensees may require engineering and legal services.

52. Coordination with RAS Observatories. Coordination requirements apply prior to the commencement of operation of base and fixed stations in the 600 MHz Band in proximity to certain RAS observatories. 600 MHz Band licensees may require legal and engineering services to comply with this requirement.

53. Performance Requirements. All 600 MHz licensees will be required to file a construction notification and certify that they have met the applicable performance benchmarks.[92] In particular, licensees of the 600 MHz Band must demonstrate that they meet certain build-out requirements at two performance benchmarks. If a licensee fails to meet the interim benchmark, its final benchmark and license term accelerate by two years; failing to meet the final benchmark results in automatic termination of the license. Due to the possibility that some licenses will have impaired areas, while the same build out benchmarks apply, a licensee may meet its requirement by providing coverage to population in non-impaired service areas. Licensees who hold licenses with impaired areas must provide an explanation to the Commission why they cannot serve the entire license area or meet the performance requirement at the relevant construction benchmark. These entities may require legal, engineering, or survey services in order to comply with all reporting, recordkeeping, and other requirements.

54. Other Regulatory Matters. In order to renew a license, 600 MHz licensees will be required to file a license renewal application and make the necessary showings to qualify for renewal of

[92] *See* 47 C.F.R. § 1.946(d).

the license.[93] In addition, a 600 MHz licensee must notify the Commission of certain changes. Specifically, notification is required by licensees if they change their regulatory status,[94] their foreign ownership status,[95] or if they permanently discontinue service.[96] A 600 MHz Band licensee that permanently discontinues service must notify the Commission of the discontinuance within 10 days by filing FCC Form 601 or 605 requesting license cancellation. 600 MHz Band licensees may require legal and engineering services to comply with these requirements.

E. Steps Taken to Minimize the Significant Economic Impact on Small Entities, and Significant Alternatives Considered

55. The RFA requires an agency to describe any significant alternatives that it has considered in developing its approach, which may include the following four alternatives (among others): "(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities."

56. Facilities Protected in the Repacking. The Spectrum Act mandates all reasonable efforts to preserve the "coverage area and population served" of full power and Class A facilities licensed as of the date of the Spectrum Act's enactment. The Commission interprets the Spectrum Act to allow it to afford discretionary protection to several additional categories of facilities. While some commenters suggest that the Commission afford protection to other facilities, including LPTV and TV translator stations, the Commission determines that the Spectrum Act does not mandate such protection, and affording discretionary protection to such stations would not be consistent with the goals of the Spectrum Act. LPTV and TV translator stations are secondary to full power stations, and affording these stations protection would severely limit recovery of spectrum and frustrate the purpose of the Spectrum Act. The Commission understands the potential impact of the incentive auction on LPTV and TV translator stations, among others, and will take steps to mitigate such impact.

57. Reverse Auction Participation. The Commission permits voluntary participation generally to all licensees of commercial and NCE full power and Class A stations, and provides several options for spectrum usage rights that a participant may bid to relinquish. Allowing options such as channel sharing, UHF-to-VHF moves, and high-VHF-to-low-VHF moves will encourage participation by small entities, which may stand to receive substantial proceeds while continuing to broadcast. In addition, the Commission will offer a license relinquishment bid option regardless of whether it may lead to a loss of service. This will allow voluntary participation by all eligible licensees, and remove obstacles that small entities may face in deciding whether to participate.

58. Confidentiality. Information regarding the identity of reverse auction applicants will be protected from disclosure for a period of time. To comport with the Spectrum Act's requirements, the Commission will protect the confidentiality of Commission-held data on broadcast television licensees participating in the reverse auction, regardless of whether their applications are complete and in compliance with the Commission's rules. Confidential information pertaining to unsuccessful bids will continue to be protected until two years after the effective date of spectrum reassignments and

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[93] *See* 47 C.F.R. § 1.949.

[94] *See* 47 C.F.R. § 27.10(d); *see also* 47 C.F.R. § 27.66. A change in a licensee's regulatory status will not require prior Commission authorization, provided the licensee was in compliance with the foreign ownership requirements of Section 310(b) of the Communications Act that would apply as a result of the change. 47 U.S.C. § 310(b).

[95] 47 U.S.C. § 310(b).

[96] The licensee must notify the Commission of the discontinuance within 10 days by filing FCC Form 601 or 605 and requesting license cancellation. 47 C.F.R. § 1.955(a)(3).

reallocations. When the spectrum reassignments and reallocations become effective, the Commission will disclose the identities of the winning bidders and their winning bid amounts. The Commission further amends its FOIA disclosure rules to accommodate the confidentiality rules adopted. While some commenters urge the Commission to protect reverse auction participant identities in perpetuity, the Commission determines that doing so would not be a reasonable step necessary to protect broadcaster data. The Commission determines that adopting the two year confidentiality rule best balances protections for broadcasters with the transparency needed to maintain public trust in the auction process.

59. Forward Auction Participation. To assist small entities in competitive bidding in the forward auction, the Order adopts an open eligibility standard as mandated in section 6404 of the Spectrum Act to further broad participation in the incentive auction.[97] In addition, the same small business size standards that were adopted in the 700 MHz Band were adopted for the 600 MHz Band, as well as bidding credits that are set forth in the standardized schedule in Part 1 of the Commission's rules. Specifically, the Order defines a "small business" as an entity with average annual gross revenues for the preceding three years not exceeding $40 million, and a "very small business" as an entity with average annual gross revenues for the preceding three years not exceeding $15 million. The Commission also provides small businesses with a bidding credit of 15 percent and very small businesses with a bidding credit of 25 percent for the 600 MHz Band. The Commission will initiate a separate proceeding to review its Part 1 designated entity rules. In addition, the Commission adopts PEA geographic license sizes that will encourage entry by providers, including small providers, that contemplate offering wireless broadband service on a localized basis, yet at the same time not precluding carriers that plan to provide service on a much larger geographic scale. While some small and rural wireless carriers urge the Commission to license, wholly or in part, on a CMA basis, the Commission concludes that licensing using PEAs throughout the country strikes the appropriate balance and will allow both smaller and larger wireless carriers to obtain licenses that best align with their respective business plans. Further, licensing markets using a variety of sizes (for example, mixing EAs and CMAs) would conflict with the Commission's goal of offering spectrum blocks as interchangeable as possible in order to speed up the forward auction bidding process.

60. Band Plan Matters. While the Commission will not know which specific 600 MHz Band Plan scenario will be employed until the conclusion of the incentive auction, each scenario includes guard bands to prevent harmful interference between licensed services. Specifically, the guard bands will protect against interference between uplink and downlink wireless services, between wireless services and broadcast television services, and between wireless services and RAS and WMTS services operating on channel 37, if enough spectrum is repurposed. The Commission concludes that these guard bands are technically reasonable, and will help prevent harmful interference to entities of all sizes operating adjacent to repurposed spectrum. Further, by adopting a fully-paired band plan rather than licensing some spectrum blocks as supplemental downlink, smaller carriers and new entrants will be able to obtain much-needed low frequency, paired spectrum.[98]

61. Repacking of the Television Band. The Commission intends to optimize any final channel assignments to minimize relocation costs for eligible broadcasters and MVPDs. The Spectrum Act caps the TV Broadcaster Relocation Fund at $1.75 billion and requires the Commission to make any reimbursements within three years of the completion of the forward auction. Because eligible broadcasters and MVPDs will be eligible for an initial allocation based on estimated costs, they should

[97] In a separate proceeding, the Commission establishes a market-based spectrum reserve for the 600 MHz forward auction and analyzes the impact on small entities in the FRFA accompanying that order. *See Policies Regarding Mobile Spectrum Holdings*, WT Docket No. 12-269, Report and Order, Appendix C (adopted May 15, 2014).

[98] This particular band plan also will help spur deployment by 700 MHz lower A Block licensees, many of whom are small entities, by clearing broadcast television operations out of channel 51. *See Promoting Interoperability in the 700 MHz Commercial Spectrum; Requests for Waiver and Extension of Lower 700 MHz Band Interim Construction Benchmark Deadlines*, WT Docket No. 12-69, Report and Order and Order of Proposed Modification, 28 FCC 15122, 15152, para. 65 (2013).

not have to rely significantly on self-financing or outside financing. Further, delaying the "close" of the forward auction until after reassigned stations file construction permits, as some broadcasters suggest, does not reasonably comport with the statutory mandate.

62. Partitioning, Disaggregation, and Leasing. The Commission concludes that providing flexibility in the secondary markets, by allowing licensees to partition, disaggregate, and/or lease spectrum, helps smaller carriers acquire the specific spectrum rights that they need to serve small, targeted markets. As in other bands, this flexibility can facilitate the efficient use of spectrum, promote competition, and expedite provision of services in areas that might not otherwise receive service in the near term.

F. Federal Rules that Might Duplicate, Overlap, or Conflict with the Rules

63. None.

G. Report to Congress

64. The Commission will send a copy of the Order, including this FRFA, in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act. A copy of the Order and FRFA (or summaries thereof) will also be published in the Federal Register.

H. Report to Small Business Administration

65. The Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, will send a copy of this Order, including this FRFA, to the Chief Counsel for Advocacy of the SBA.

APPENDIX C

TECHNICAL APPENDIX

TABLE OF CONTENTS

I. INTRODUCTION

1. Commenters raise in the record a number of technical topics that relate to the 600 MHz Band Plan. In Part II of this Appendix, we first discuss each technical topic, and then discuss how the 600 MHz Band Plan addresses these technical considerations. For each technical topic, we provide our technical analysis to demonstrate how it supports the conclusions we reach to create the 600 MHz Band Plan, which are based on examining the public record and weighing the costs and benefits of a particular approach. In Part III, we set forth the band plan scenarios and describe the specific parameters for each possible clearing target scenario. This set of clearing target scenarios shows how the 600 MHz Band Plan adopted in the Order will work in practice. We note, however, that we may not offer each of these

clearing targets in the incentive auction, but will provide more details about the incentive auction process in subsequent Public Notices, specifically, the *Comment* and *Procedures PN*s.

2. In the accompanying Order, we make determinations about the 600 MHz Band Plan, and evaluate how certain technical considerations should affect these decisions, based on our analysis of the record. This Appendix provides additional support for the conclusions we reach in the Order.

II. TECHNICAL CONSIDERATIONS

3. Several aspects of the 600 MHz Band Plan, including pass band sizes, guard band sizes, and block locations in the 600 MHz Band are affected by technical considerations, including the technical capabilities of mobile broadband devices, and their interaction with existing services in the band. In particular, both commenters and the Commission in the *NPRM* raise issues about mobile broadband device performance and capabilities, and how these considerations may affect the choice of band plans. In the following discussion, we organize the technical factors affecting the band plan into five categories: (1) mobile filter considerations, (2) mobile antenna considerations, (3) the potential for intermodulation interference, (4) the potential for harmonic interference, and (5) how frequency separation affects the potential for inter-service interference between services in geographic proximity.[1]

4. Mobile filter considerations affect several issues raised in the record: the maximum pass band size, the minimum guard band size, and the likelihood of intermodulation interference. Mobile antenna considerations affect the overall bandwidth of a band plan, and therefore are discussed in the record as affecting both the maximum pass band size and the maximum duplex gap size.[2] The potential for intermodulation interference affects both the minimum size of the duplex gap, and relative placements of television stations and mobile broadband uplink and downlink blocks. The potential for harmonic interference also affects the maximum pass band size. Finally, the effect of frequency separation on the potential for inter-service interference is an important consideration in determining the size of the guard bands. For each of these issues, we provide our technical analysis, which corroborates our decisions in creating the 600 MHz Band Plan.

A. Mobile Filter Considerations

5. *Background*. Most radio communication technologies use filters that pass desired frequencies while attenuating, or reducing the power of, undesired frequencies. Transmit filters pass the desired transmit signal while reducing out-of-band emissions ("OOBE"). Receive filters pass the desired signal to the receiver while attenuating undesired signals at other frequencies. Duplexers are pairs of filters, one transmit and one receive, that function together to reduce the potential for interference between a transmitter and a receiver in the same piece of equipment. In mobile broadband devices, common filter technologies include surface acoustic wave ("SAW") and bulk acoustic wave ("BAW") types.

6. In the *NPRM,* the Commission recognized that current technology limits the size of a Frequency Division Duplex ("FDD") pass band to roughly 4% of the center frequency for a single duplexer, or filter, and a Time Division Duplex ("TDD") pass band to 7.5%.[3] It noted, however, that SAW filters using alternative manufacturing processes with lithium niobate may support an FDD pass

[1] The converse situation of potential inter-service interference between services with geographic separation but reduced or no frequency separation will be discussed in a subsequent Order addressing the issues raised in the *Inter-service Interference PN*. *See Office of Engineering and Technology Seeks to Supplement the Incentive Auction Proceeding Record Regarding Potential Interference Between Broadcast Television and Wireless Services*, GN Docket No. 12-268, Public Notice, 29 FCC Rcd 712 (2014) (*Inter-service Interference PN*).

[2] *See, e.g.*, Qualcomm Reply at 18.

[3] *See Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Notice of Proposed Rulemaking, 27 FCC Rcd 12357, 12417–18, para. 169 (2012) (*NPRM*).

band of 6%.[4] The Commission sought comment on current filter technology, the actual limitations on filters, and why those limitations exist.[5] It also asked commenters to address the potential for future technologies that may support a wider pass band than what typically can be supported currently.[6] Finally, it sought comment on how pass band size relates to the size of the guard bands, including the duplex gap,[7] and proposed guard bands between the new 600 MHz service and incumbent television services. The appropriate size of these guard bands depends in part on the capabilities of mobile filters that will be used in 600 MHz devices, especially the transition bandwidth discussed below.[8]

7. A number of commenters express concerns about intermodulation and harmonic interference, suggesting that to prevent these types of potentially harmful interference it may be necessary to make the duplex gap at least 10 or 11 megahertz, adopt a band plan that does not allow television between uplink and downlink, and limit the size of the uplink pass band.[9] Intermodulation interference and harmonic interference are discussed in detail in the Sections II.C.5 (Intermodulation Interference) and II.D (Harmonic Interference) below. Because the likelihood of these types of interference depends on the degree to which various signals can be attenuated by the mobile device filters, the filter discussion of this Section is also relevant.

8. *Discussion*. We establish reasonable parameters for three key aspects of mobile filters: pass band width, transition band width, and stop band attenuation.[10] These factors affect, respectively, the pass band size, guard band sizes (including the duplex gap), and the likelihood of intermodulation interference. We determine that reasonable values are a maximum pass band size of 25 megahertz, a minimum transition band of seven megahertz, and 25 dB of stop band attenuation. We recognize that these limits may change with continuing technology improvements. We also recognize that while seven megahertz is the minimum transition band size, it may only be achievable with some current technologies. In addition, larger transition bands may be supported more easily and by more filter vendors than smaller transition bands.

9. Although we consider a maximum filter pass band size of 25 megahertz to be reasonable, as discussed in the Order, we agree with commenters who point out that this need not limit the 600 MHz Band Plan pass band size, because multiple duplexers can be used.[11] Therefore, as discussed below and in the Order, we will not limit the pass band size (i.e., the number of paired, licensed blocks we will offer) in the band plan scenarios we adopt for the 600 MHz Band Plan due to mobile filter limitations, and our technical analysis confirms this approach.

10. Pass, stop, and transition bands. A filter generally has three types of frequency regions: (a) a pass band, where frequencies are passed with only a small attenuation (up to a few dB) referred to as insertion loss, (b) stop bands, regions that the filter rejects because the attenuation is high, and (c) transition bands between the pass bands and stop bands where the attenuation is variable. For SAW and BAW filters, the stop band attenuation is typically 25 to 30 dB in most regions, and 50 to 60 dB in limited

[4] *NPRM*, 27 FCC Rcd at 12417–18, para. 169.

[5] *NPRM*, 27 FCC Rcd at 12418, para. 170.

[6] *NPRM*, 27 FCC Rcd at 12418, para. 171.

[7] *NPRM*, 27 FCC Rcd at 12418, para. 171.

[8] *See, e.g.*, Motorola Comments at 12–13; Intel Reply Comments at 18–19; Qualcomm Comments at 5 n.7.

[9] *See* Technical Appendix § II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)).

[10] We define these terms in this Section.

[11] T-Mobile Reply at 20–23.

areas where the rejection requirement is the highest.[12] The transition band may often have significant attenuation, but the level depends on the temperature of the SAW/BAW filter, variations in the manufacturing process, and other factors, so it is generally not specified.[13] This region typically would have too much attenuation to be considered in the pass band, but too little attenuation to be considered in the stop band.

11. An example of these regions is given in Figure 1, which shows the typical layout of a mobile device receive filter for an FDD band with a narrow duplex gap, such as PCS.[14] In this case, the downlink band, which consists of the user equipment ("UE") receive frequencies, is the pass band. The stop band generally provides 25 to 30 dB of attenuation, but in the uplink band, which has the greatest potential for interference because UE transmits on those frequencies and can interfere with itself, the stop band attenuation is greater: 50 dB or more. The duplex gap aligns with a transition band between the pass band and the stop band, and the width of it is related to the achievable width for the transition band.

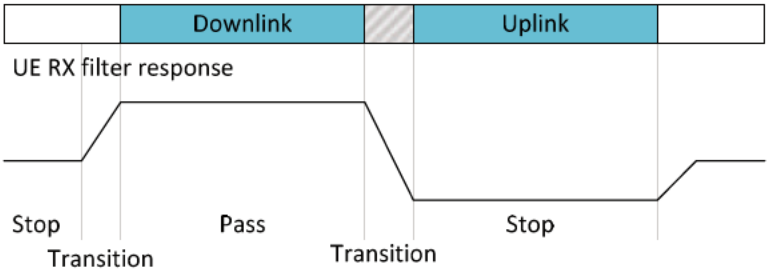
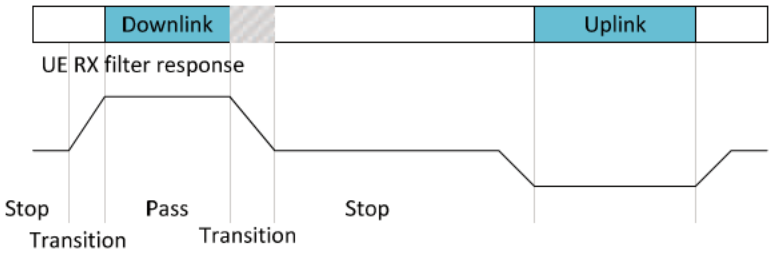


Figure 1. General Depiction of a Narrow Duplex Gap Band Plan

12. As another example, Figure 2 shows a typical device receive filter layout for a band with a wide duplex gap, such as AWS-1. Here, the pass band is again aligned with the downlink band, and the greatest stop band rejection is in the uplink band. However, the duplex gap is now much wider than the transition band, and consists mostly of stop band rejected at 25 to 30 dB. This is an important difference: for a narrow duplex gap there may be little or no rejection of signals in the gap, but in a wide duplex gap plan there is significant rejection in much of the gap. As discussed further below in Section II.C of the Technical Appendix (Intermodulation Interference), commenters raising concerns about television in the duplex gap have generally assumed no rejection of signals in the gap.



[12] *See, e.g.*, William Mueller, Avago Technologies, *600 MHz Band Plan Workshop Transcript* at 65–66. *See also* Letter from Dean R. Brenner, Senior Vice President, Government Affairs for Qualcomm, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 9 (filed Feb. 19, 2014) (attenuations of 24 to 36 dB) (Qualcomm Feb. 19, 2014 *Ex Parte* Letter).

[13] *See, e.g.*, Letter from Don Brown, Director, IWPC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 8 (filed Nov. 27, 2012) (IWPC Nov. 27, 2012 *Ex Parte* Letter); Letter from Dean R. Brenner, Senior Vice President, Government Affairs for Qualcomm, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 5 (filed Apr. 3, 2014) (Qualcomm Apr. 3, 2014 *Ex Parte* Letter).

[14] This illustration and the following one show the lower half being used for downlink, as in the adopted 600 MHz Band plans, rather than the upper half being used for downlink as is the case in the actual PCS and AWS-1 band plans.

Figure 2. General Depiction of a Wide Duplex Gap Band Plan

13. Achievable attenuation. As mentioned above, Avago states that stop band attenuation is typically 30 dB and at least 25 dB, and can be engineered to be 50 to 60 dB in specific ranges.[15] Similarly, Qualcomm shows attenuations relatively close to the pass band of 24 to 36 dB.[16] In calculating the potential for harmful interference in this Appendix, we make two conservative assumptions, that (1) rejection in the transition band will be 0 dB since that could occur in some portion of the transition band with temperature and manufacturing drift, and (2) rejection in the stop band will be 25 dB. Actual rejection would be greater in most cases.

14. Achievable bandwidth. A key consideration for mobile filters is the achievable size of the pass band and transition bands. In many cases a large pass band is desired so that a large spectrum allocation can be supported with one filter or a small number of filters. On the other hand, generally transition bands should be small, to minimize guard bands and maximize the utility of spectrum. For SAW and BAW filters, the achievable bandwidth generally varies directly with frequency, including manufacturing variation and temperature dependence, which also tend to vary by frequency.[17] Therefore the achievable bandwidths are usually expressed as a percentage of the frequency of operation. For example, a bandwidth of 1% corresponds to about seven megahertz in the 700 MHz Band, but about 19 megahertz in the PCS band. In other words, a seven megahertz bandwidth at 700 MHz and a 19 megahertz bandwidth at 1900 MHz are equally difficult or easy to achieve.

15. SAW and BAW filters are limited in how large the pass band can be.[18] As discussed above, commenters generally agree that it is reasonable to assume a limitation of around 4% of the center frequency, or about 25 megahertz for the 600 MHz Band.[19] However, some commenters note that larger numbers can be achieved in some cases with alternate technologies and that bandwidth support has improved over time.[20] This limitation does not necessarily limit the amount of licensed spectrum that we can offer in the incentive auction, however. For example, T-Mobile explains how two overlapping filters can be used to achieve the 35 megahertz pass band required by the plan submitted jointly by T-Mobile and Verizon Wireless.[21] In adopting a band plan, we assume that a single filter pass band will be limited to 25 megahertz, but where possible we allow for the possibility that technology may improve over time.

16. Similarly, SAW and BAW filters are also limited in how small a transition band can be.[22] IWPC discusses this issue in detail.[23] First, it states that transition bands under 1.5% are "hard," and

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[15] *See* William Mueller, Avago Technologies, *600 MHz Band Plan Workshop Transcript* at 65–66.

[16] Qualcomm Feb. 19, 2014 *Ex Parte* Letter, Att. at 9.

[17] A larger filter will be shifted down in frequency, and a smaller filter shifted up in frequency. This means small variations in the size of the filter in manufacturing can affect its actual frequency range, as can its expansion and contraction as its temperature changes. *See* William Mueller, Avago Technologies, *600 MHz Band Plan Workshop Transcript* at 254; IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 12–13.

[18] *NPRM*, 27 FCC Rcd at 12417–18, paras. 168–71; IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 14.

[19] *See, e.g.*, AT&T Comments at 18, Exh. A at 8–9, 33–34; Motorola Comments at 12; Qualcomm Comments at 14–15; RIM Comments at 14.

[20] *See, e.g.*, IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 14, 17; William Mueller, Avago Technologies, *600 MHz Band Plan Workshop Transcript* at 156–58.

[21] *See* T-Mobile Reply at 20–23, Exh. A at 20–21; Letter from Kathleen Ham, T-Mobile USA, Inc. and Kathleen Grillo, Verizon, to Ruth Milkman, Chief, Wireless Telecommunications Bureau and Gary Epstein, Chief, Incentive Auction Task Force, FCC GN Docket No. 12-268 (filed Sept. 16, 2013) at Att. (T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter).

[22] *See, e.g.*, Qualcomm Apr. 3, 2014 *Ex Parte* Letter, Att. at 5.

[23] IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 8, 18–24.

transition bands under 1.0% are "challenging," corresponding to about 11 megahertz and seven megahertz for the 600 MHz Band, respectively.[24] IWPC also lists achievable transition bands for several filter vendors for a variety of bands. Looking at the 700 MHz Band, closest to the 600 MHz Band, the supported bandwidths are: 0.73% (five to six megahertz for 700 MHz) for BAW filters from Avago and Triquint, 1.06% (eight megahertz for 700 MHz) for SAW/BAW filters from EPC-TDK, and 1.32% (10 megahertz for 700 MHz) for SAW filters from Murata.[25] In rating these bands, IWPC is considering such factors as filter cost, insertion loss, and size.[26] Commenters vary in the appropriate balance of these factors. For example, some commenters suggest that the IWPC analysis indicates the duplex gap should be set at 1.5%, although Alcatel-Lucent acknowledges some 3GPP bands have smaller duplex gaps.[27] AT&T suggests that based on filter considerations the duplex gap should be at least 1.0% to 1.5%.[28] Google states that making the guard band too small will "require more expensive filters, and therefore result in higher costs for consumers and/or lower auction revenues for the Treasury."[29]

17. We also consider the duplex gaps supported by 3GPP FDD bands.[30] As discussed below,[31] while duplex gap size is affected by other considerations such as the transmitted bandwidth and the duplex spacing,[32] the duplex gap will not be smaller than the achievable transition bandwidth. Table 1 lists 3GPP bands and the duplex gap as a percentage of the frequency of operation.[33]

Band	Uplink	Downlink	Gap MHz	Gap %
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	130	6.67%
2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	20	1.06%
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	20	1.14%
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	355	20.49%
5	824 MHz – 849 MHz	869 MHz – 894 MHz	20	2.39%
6	830 MHz – 840 MHz	875 MHz – 885 MHz	35	4.19%
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	50	1.97%
8	880 MHz – 915 MHz	925 MHz – 960 MHz	10	1.11%
9	1749.9 MHz – 1784.9 MHz	1844.9 MHz – 1879.9 MHz	60	3.39%

[24] IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 19 (for 1.5%), 20–21 (for 1.0%). We consider the higher frequencies in the band and round up to the nearest megahertz to convert 1.0% and 1.5% to seven megahertz and 11 megahertz respectively.

[25] IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 22–24.

[26] IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 15; Alcatel-Lucent Comments at 22.

[27] *See* Alcatel-Lucent Comments at 21–22; T-Mobile Reply Comments, Exh. A at 25–26; Intel Reply at 20.

[28] AT&T Reply, App. A at 20–21. AT&T also suggests an additional margin should be added for temperature and manufacturing variation, but this is not necessary as the IWPC figures already include these effects. *See* IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 12–13.

[29] Google Reply at 4–6.

[30] Commenters also look at the range of duplex gaps in 3GPP bands. *See* AT&T Reply, App. A at 20–21; T-Mobile Reply, Exh. A at 25–26; Motorola Comments at 11.

[31] *See* Technical Appendix § II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)).

[32] Duplex spacing and the duplex gap are defined in Section II.C.2 of the Technical Appendix (User Equipment Self-Intermodulation). For factors affecting the duplex gap, *see 600 MHz Band Plan Workshop Transcript* at 250–255.

[33] See 3GPP TS 36.101 V12.3.0 (*3GPP RF UE Standard*) at 23 (Table 5.5-1), available at http://www.3gpp.org/ftp/Specs/archive/36_series/36.101/36101-c30.zip (last visited Apr. 23, 2014).

10	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	340	19.54%
11	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz	28	1.95%
12	699 MHz – 716 MHz	729 MHz – 746 MHz	13	1.84%
13	777 MHz – 787 MHz	746 MHz – 756 MHz	21	2.80%
14	788 MHz – 798 MHz	758 MHz – 768 MHz	20	2.62%
17	704 MHz – 716 MHz	734 MHz – 746 MHz	18	2.54%
18	815 MHz – 830 MHz	860 MHz – 875 MHz	30	3.65%
19	830 MHz – 845 MHz	875 MHz – 890 MHz	30	3.58%
20	832 MHz – 862 MHz	791 MHz – 821 MHz	11	1.36%
21	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz	33	2.27%
22	3410 MHz – 3490 MHz	3510 MHz – 3590 MHz	20	0.58%
23	2000 MHz – 2020 MHz	2180 MHz – 2200 MHz	160	7.96%
24	1626.5 MHz – 1660.5 MHz	1525 MHz – 1559 MHz	67.5	4.38%
25	1850 MHz – 1915 MHz	1930 MHz – 1995 MHz	15	0.80%
26	814 MHz – 849 MHz	859 MHz – 894 MHz	10	1.20%
27	807 MHz – 824 MHz	852 MHz – 869 MHz	28	3.43%
28	703 MHz – 748 MHz	758 MHz – 803 MHz	10	1.38%
30	2305 MHz – 2315 MHz	2350 MHz – 2360 MHz	35	1.52%
31	452.5 MHz – 457.5 MHz	462.5 MHz – 467.5 MHz	5	1.10%

Table 1. Duplex Gaps of 3GPP Bands

As shown in the table, there are several bands with fairly narrow duplex gaps: the PCS Band is 1.06% without the G block (Band 2), 0.80% with the G block (Band 25). Similarly Band 8 is 1.11%, Band 26 is 1.20%, Band 20 is 1.36%, and the smallest gap is Band 22 at 0.58%.[34]

18. We note that Qualcomm suggests that 24 dB attenuation could be achieved at eight megahertz,[35] and the joint T-Mobile/Verizon band plan proposal has guard bands between television and 600 MHz downlink as small as seven megahertz,[36] which imply that transition bands at least as small as eight and seven megahertz, respectively, are achievable in the 600 MHz Band. DISH states that "[a] guard band size of 6 MHz is more than sufficient to separate wireless service from digital television ('DTV') stations, as demonstrated by the current success of AT&T's 700 MHz deployment, which utilizes a frequency separation of 6 MHz from active Channel 51 broadcast stations."[37]

19. Considering all of these factors, it is reasonable to assume transition bands as small as seven megahertz, about 1%, can be achieved at the 600 MHz Band. This is just within IWPC's "hard" range (1.0% to 1.5%), avoiding the "challenging" (less than 1.0%) range, and well above the 0.73% achievable by BAW filters. In doing so, we are striking a balance between filter characteristics such as size, cost, and performance as evaluated by filter experts, and our goal of efficiently allocating spectrum.[38] On the other hand, we recognize that larger transition bands are preferable where they can be

[34] T-Mobile states that the smallest duplex gap is 1.8%, and Motorola states that the smallest absolute gap for bands below 1 GHz is 10 megahertz. As can be seen however, in the current standard there are smaller duplex gaps. *See* T-Mobile Reply, Exh. A at 25–26; Motorola Comments at 11.

[35] Qualcomm Feb. 19, 2014 *Ex Parte* Letter, Att. at 9.

[36] T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter, Att. at 1.

[37] DISH Reply at 4.

[38] *See* Google/Microsoft Comments, Att. at 3.

reasonably accommodated in the Band Plan. IWPC's "hard" range is between seven and 11 megahertz, and 11 megahertz appears to be achievable by all filter manufacturers and both BAW and SAW filters.

20. Conclusions. In summary, we are considering the following filter characteristics: pass band size may be limited to 25 megahertz, stop band attenuation will be at least 25 dB in general and at least 50 dB in the mobile transmit band, and transition bands must be at least seven megahertz, although larger transition bands can be supported by more vendors and technologies, with 11 megahertz widely supportable. These values are used for the analysis below.

21. Although filter pass band size may be limited to 25 megahertz, we agree with commenters that the band plan can be implemented with multiple filters if necessary, and therefore filter pass band size is not a limit on band plan pass band size, and our technical analysis corroborates our approach.[39] Therefore, as discussed in the Order, we will not limit the pass band size in the band plan scenarios due to these mobile filter limitations.[40] As discussed below in Section III.B of the Technical Appendix (Specific Band Plan Scenarios), we adopt several band plan scenarios corresponding to several possible clearing targets; the pass band sizes in these scenarios range from 10 megahertz to 60 megahertz.

B. Mobile Antenna Considerations

22. *Background*. In the *NPRM*, the Commission proposed the "Down from 51 and 36" band plan in which the uplink band would begin at channel 51 (698 MHz) and expand downward, and the downlink band would begin at channel 36 (608 MHz) and likewise expand downward.[41] A number of commenters express concern that a "split" band plan (i.e., a band plan in which the uplink and downlink bands are widely separated and other licensed services may be located between them) will detrimentally affect antenna design.[42] Specifically, they argue that a large duplex gap would increase the operating bandwidth the mobile antenna would have to cover, and given current antenna design, it is difficult to cover such a large band with a single antenna in smaller smartphones.[43] Qualcomm suggests that we should limit the 600 MHz Band Plan to less than 70 megahertz because antenna bandwidths of 70 megahertz or more may not be feasible in smartphones without using a tunable antenna or multiple antennas.[44] Samsung expresses concern that the "practical bandwidth of the [600 MHz] antenna is expected to be less than 20 MHz (when antenna space is about 0.4cc) due to the size constraints."[45] AT&T raises similar concerns, asserting that there are technical advantages to limiting the amount of paired spectrum to 25+25 megahertz.[46] AT&T argues, however, that "maximizing the amount of paired spectrum by relying on the 35 x 2 MHz approach outweighs the countervailing engineering concerns

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[39] *See* T-Mobile Reply at 20–23, Exh. A at 20; T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter at Att.

[40] *See* § III.A.2.f.i (Pass Band Size and Mobile Filter Considerations); *see also* Intel Reply at 14 n.10 ("These limitations include antenna bandwidth/loss over the greater antenna tuning range, multiple duplexers, additional switches, and 3rd harmonic interference when the uplink bandwidth is expanded."); Technical Appendix §§ II.B (Mobile Antenna Considerations), II.D (Harmonic Interference).

[41] *NPRM*, 27 FCC Rcd at 12402, para. 126. The uplink band is a set of frequencies used for communication from a user device to the network. The downlink band is a set of frequencies used for communication from the network to a user device. Collectively, these are referred to as the "pass bands."

[42] *See, e.g.*, RIM Comments at 8 ("beginning the downlink at 608 MHz will create a very large duplex separation (90 megahertz) that will have an impact on antenna design.").

[43] *See, e.g.*, Intel Reply at 2; T-Mobile Comments at 8–9.

[44] Qualcomm Comments at 6. Other commenters argue that tunable antennas are practical for wide deployment. S*ee, e.g.*, Craig Sparks, Sprint, *600 MHz Band Plan Workshop Transcript* at 120–122.

[45] Samsung *Band Plan PN* Reply at 6.

[46] AT&T Comments at 30–38.

where 84 megahertz of spectrum or more is widely available."[47] Commenters also explain difficulties in implementing additional antennas for the 600 MHz, and discuss how user equipment already supports multiple antennas to support multiple-input multiple-output (MIMO).[48] Ericsson and T-Mobile agree and suggest that although there is some decrease in antenna performance when supporting more paired spectrum, it is better to make more paired spectrum available.[49] Following the 600 MHz Band Plan Workshop, the Wireless Bureau sought comment on various Down from 51 band plans that reduce the total operating bandwidth for a given amount of repurposed spectrum by narrowing the duplex gap (i.e., reducing the space between the uplink and downlink bands).[50]

23. *Discussion*. As discussed in the Order, we adopt the Down from 51 All Paired Band Plan (i.e., the 600 MHz Band Plan).[51] This Band Plan minimizes mobile antenna issues because it reduces the antenna bandwidth to the extent possible. As discussed in the Order based on our analysis of the record, we will not limit the amount of paired spectrum we make available because of mobile antenna concerns, because the performance penalties that result from clearing more than 84 megahertz of spectrum are outweighed by the benefits of making more paired spectrum available for wireless broadband service.[52] Specifically, if we offer a Band Plan scenario with more than 84 megahertz, there is a decrease of 1 or 2 dB in antenna performance. While there is some degradation in antenna performance, it may be offset by the propagation benefits of this low-band spectrum as compared to high-band spectrum, and can be mitigated by using a tunable antenna or other technologies.

24. Minimizing Antenna Bandwidth. In response to the *NPRM*, commenters submit a number of band plans, which vary in the antenna bandwidth needed to implement the particular band plan.[53] We examined the antenna bandwidth of the various band plan proposals under different scenarios to determine how each band plan affects antenna bandwidth. As discussed below and in the Order, the Down from 51 All Paired Plan strikes the proper balance between maximizing paired spectrum and minimizing antenna bandwidth, and our technical analysis corroborates this approach.[54] Below we provide examples of the antenna limits for the various band plans considered and discuss in greater detail how each approach affects antenna bandwidth.

25. Commenters generally concur that with a static antenna design, the antenna must cover the entire band of operation, while with a tunable design the antenna needs to only cover the frequencies

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[47] Letter from Joan Marsh, Vice President, Federal Regulatory for AT&T, to Ruth Milkman, Chief, Wireless Telecommunications Bureau, and Gary Epstein, Chief, Incentive Auction Task Force, FCC, GN Docket No. 12-268 at 2 (filed Oct. 21, 2013) (AT&T Oct. 21, 2013 *Ex Parte* Letter).

[48] AT&T Comments at 31, Exh. A at 24; Qualcomm Comments at 6.

[49] T-Mobile Reply, Exh. A at 14–19 (T-Mobile advocates for a 35+35 megahertz pass band because it will create the most paired spectrum and argues that the losses suffered by the antenna are manageable); Christian Bergljung, Ericsson, *600 MHz Band Plan Workshop Transcript* at 106–109.

[50] *See Wireless Telecommunications Bureau Seeks to Supplement the Record on the 600 MHz Band Plan*, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 7414 (2013) (*Band Plan PN*).

[51] *See* § III.A.2 (Band Plan for the New 600 MHz Band).

[52] *See* § III.A.2.f.ii (Mobile Antenna Considerations). Under the Down from 51 All Paired Band Plan, we provide scenarios to repurpose up to 144 megahertz of spectrum. *See* § III.A.2.a (All-Paired, Down From 51 Band Plan); Technical Appendix § III.B.11 (Twelve Sets of Paired Blocks (144 megahertz repurposed)).

[53] For example, the antenna bandwidth for Qualcomm's proposed FDD band plan is 62 megahertz. Qualcomm Comments at 15. Verizon and T-Mobile propose a band plan in which the antenna bandwidth spans 81 megahertz for the FDD portion. T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter, Att. at 1. Finally, Ericsson proposes a band plan in which the antenna bandwidth plan spans over 110 megahertz. Ericsson Reply at 18.

[54] *See* § III.A.2 (Band Plan for the New 600 MHz Band).

actually being used for communication.[55] This concept is illustrated in Figure 3, which shows the example of 11 licensed blocks in a Down from 51 and 36 configuration requiring 132 megahertz repurposed. In this case, to cover all the uplink and downlink blocks, an antenna would need to span 148 megahertz. However, at any given time, a device will be using only one radio frequency ("RF") carrier. Given a 20 megahertz carrier, as the picture shows, the bandwidth required to use that carrier is 113 megahertz, regardless of where in the band the carrier is. In this case, the needed bandwidth is 148 megahertz with a static antenna, but 113 megahertz with a tunable antenna. The antenna bandwidth required under a static approach spans the bandwidth from the uppermost edge of the first uplink block to the lowermost edge of the last downlink block. The tunable antenna bandwidth needed is the duplex spacing plus the carrier bandwidth.

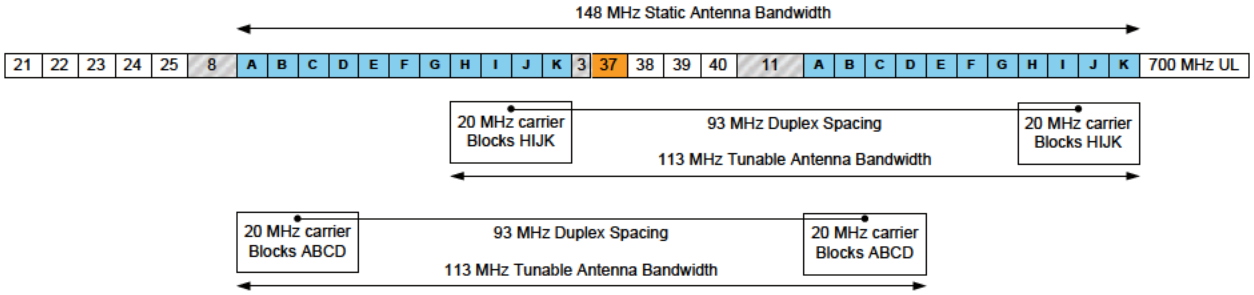

Figure 3. Example of Static Versus Tunable Bandwidth Needed for a 20 MHz RF Carrier

26. Figure 4 below shows some Down from 51 band plans that are similar to certain commenters' proposals.[56] These examples illustrate the antenna bandwidth if we repurpose 84 or 120 megahertz. The downlink-only spectrum, shown in red, is considered a separate band and cannot be used simultaneously with the paired spectrum, shown in blue. With a static approach, the antenna bandwidth for the paired spectrum is from 61 to 81 megahertz depending on the specific scenario. With a dynamic approach, assuming RF carrier bandwidths of up to 20 megahertz, the paired antenna bandwidth drops to 56 to 66 megahertz, and the downlink-only blocks' antenna bandwidth becomes 20 megahertz.

[55] Commenters use this terminology somewhat unclearly. Most current handset antennas in fact cover several bands, with many handsets using a single antenna for all cellular bands supported. The antenna can be "tuned" to the specific band being operated by either switching between different matching networks or using variable components in one or more matching networks. Commenters refer to this as "static," while "tunable" refers to a more dynamic approach where the antenna can be tuned not just to a band of operation, but the specific frequencies being used in the band. *See, e.g.*, Qualcomm Reply at 24–25.

[56] *See* AT&T Comments at 31–32; Verizon Comments at 11; T-Mobile Comments at 10; AT&T Oct. 21, 2013 *Ex Parte* Letter; T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter at Att. In these diagrams, we modified their band proposals to reflect the guard band sizes we are adopting in this Order. *See* § III.A.2.e (Guard Bands).

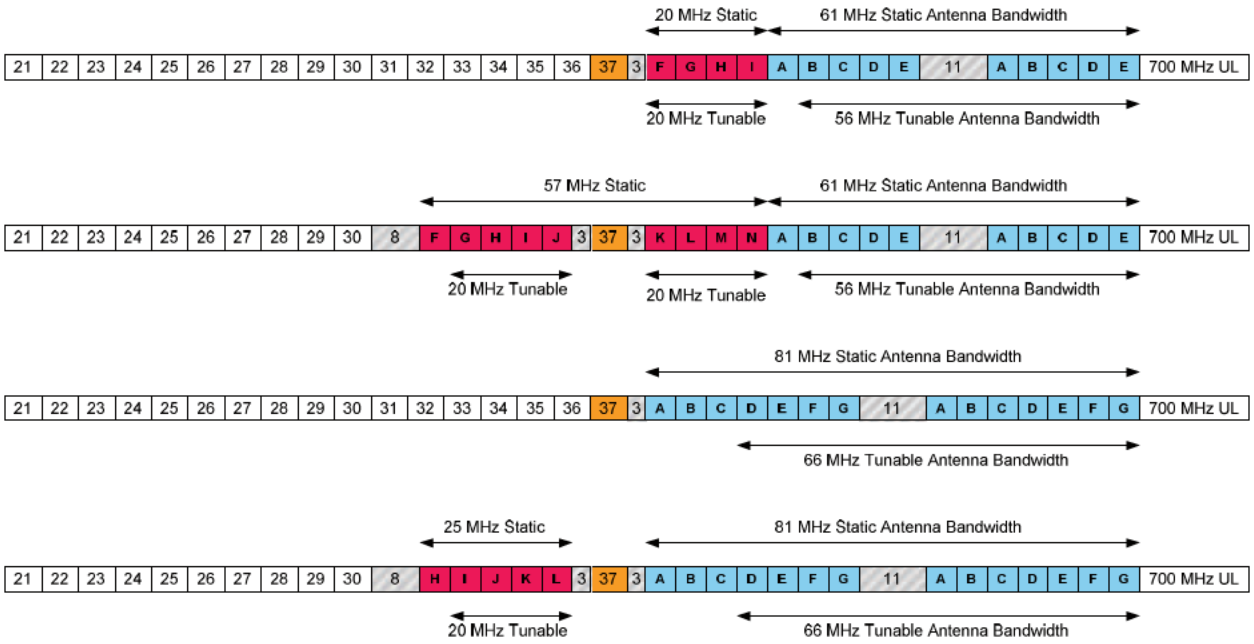

Figure 4. Antenna Bandwidth for Some Down from 51 Band Plan Proposals (Modified)

27. In the 600 MHz Band Plan we adopt (which is a Down from 51 variation), there is a single band of paired spectrum. If we can offer more than 84 megahertz for 600 MHz licenses, the duplex spacing is different for the pairs with downlink blocks below channel 37 than for those above channel 37. Figure 5 below illustrates these points for two clearing targets, 84 megahertz and 126 megahertz.

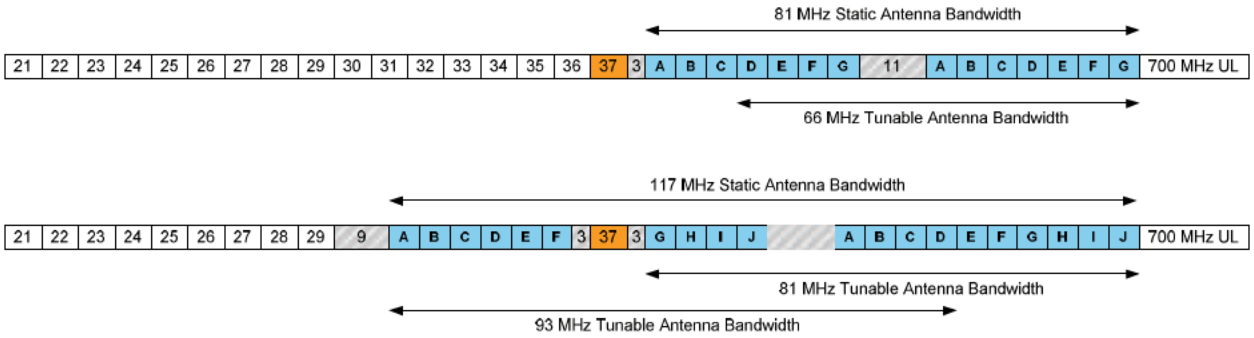

Figure 5. Antenna Bandwidth Examples for 84 Megahertz and 126 Megahertz (Down from 51 Framework)

28. The full set of possible clearing targets (i.e., the band plan scenarios) is discussed below in Section III.B of the Technical Appendix (Specific Band Plan Scenarios). Table 2 summarizes the static and tunable antenna bandwidths required for each specific scenario for the Down from 51 approach. For a static approach, the antenna bandwidth is close to the clearing target. As shown below, the tunable approach significantly reduces the bandwidth.

Licensed Paired Blocks	Repurposed Spectrum	Static Antenna Bandwidth	Tunable Antenna Bandwidth
2	42 MHz	31 MHz	31 MHz
3	48 MHz	41 MHz	41 MHz
4	60 MHz	51 MHz	51 MHz
5	72 MHz	61 MHz	56 MHz
6	78 MHz	71 MHz	61 MHz

7	84 MHz	81 MHz	66 MHz
8	108 MHz	103 MHz	73 MHz
9	114 MHz	113 MHz	88 MHz
10	126 MHz	123 MHz	93 MHz
11	138 MHz	133 MHz	98 MHz
12	144 MHz	143 MHz	103 MHz

Table 2. Down from 51 Antenna Bandwidth

29. The Down from 51 and 36 band plan scenarios have a larger antenna bandwidth than the Down from 51 band plan variants, especially at lower clearing targets, where the required antenna bandwidth is significantly more than the amount of spectrum repurposed. As shown in Figure 6, in a static approach, the 90 megahertz scenario has a 128 megahertz antenna bandwidth,[57] and the 120 megahertz scenario has a 143 megahertz antenna bandwidth. With a tunable approach, the Down from 51 and 36 band plan proposal has the same antenna bandwidth for all clearing targets that support at least 20+20 megahertz: 113 megahertz. This is because this framework has the same duplex spacing for all plans, i.e., the frequency spacing between each uplink and downlink block that is paired (for example, from the A uplink block to the A downlink block) is always 93 megahertz.

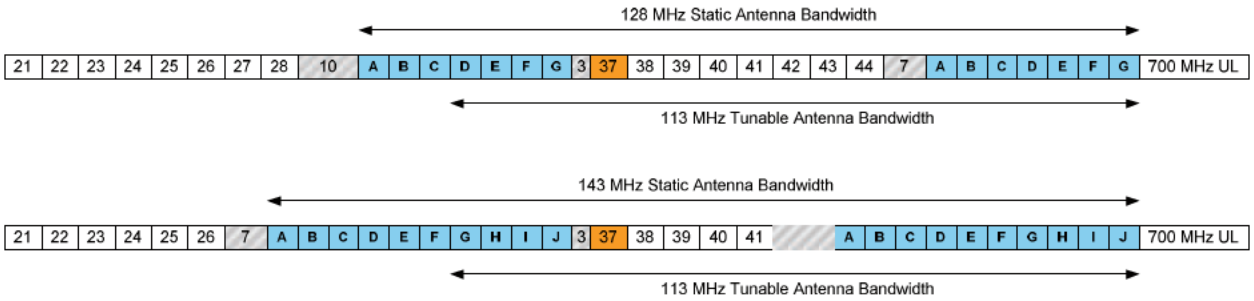

Figure 6. Antenna Bandwidth Examples for the Down from 51 and 36 Framework

30. The antenna bandwidth needed for the Down from 51 and 36 approach in all clearing scenarios is summarized in Table 3.

Licensed Paired Blocks	Repurposed Spectrum	Static Antenna Bandwidth	Tunable Antenna Bandwidth
3	48 MHz	108 MHz	108 MHz
4	60 MHz	113 MHz	113 MHz
5	72 MHz	118 MHz	113 MHz
6	78 MHz	123 MHz	113 MHz
7	90 MHz	128 MHz	113 MHz
8	102 MHz	133 MHz	113 MHz
9	108 MHz	138 MHz	113 MHz
10	120 MHz	143 MHz	113 MHz
11	132 MHz	148 MHz	113 MHz
12	138 MHz	153 MHz	113 MHz
13	150 MHz	158 MHz	113 MHz

[57] In the Down from 51 and 36 band plan, 84 megahertz is not supported, because six sets of paired licensed blocks can be supported with 78 megahertz of repurposed spectrum, while seven sets of paired licensed blocks require 90 megahertz of spectrum. The 90 megahertz plan for Down from 51 and 36 is most comparable to the 84 megahertz plan for Down from 51, because both plans use seven sets of licensed blocks.

Table 3. Down from 51 and 36 Antenna Bandwidth

31. Comparing Tables 2 and 3, significantly lower bandwidths are required in the Down from 51 approach than in the Down from 51 and 36 framework. From an antenna perspective, the Down from 51 and 36 band plan is less desirable than the various Down from 51 band plan approaches because it requires higher bandwidth for the same amount of licensed spectrum, especially for lower clearing targets.[58] This supports our conclusion in the Order to adopt a Down from 51 band plan instead of the Down from 51 and 36 band plan.[59]

32. Antenna Performance Degradation. We expect antenna performance to degrade as the antenna bandwidth increases (i.e., as the amount of repurposed spectrum increases). Specifically, the 84 megahertz scenario could have an antenna penalty of up to 0.3 dB relative to the 72 megahertz scenario, and the 126 megahertz and 138 megahertz scenarios could have antenna penalties of up to 1.5 dB and 2.0 dB, respectively, relative to the 72 megahertz scenario. Below, we discuss how we arrive at these figures.

33. Commenters agree with the broad principle that the larger the bandwidth supported, the greater the penalty.[60] Commenters discuss three inter-related issues for mobile antenna performance: the antenna's physical size, its supported bandwidth, and its efficiency.[61] Commenters generally agree that for a small smartphone form factor, such as a 4-inch device, there will be a reduction in antenna efficiency to support a larger bandwidth in the 600 MHz Band.[62] Qualcomm and AT&T focus on the 1 dB efficiency bandwidth, and suggest it is limited to about 60 megahertz.[63] T-Mobile argues that expanding this antenna bandwidth to about 80 megahertz would involve a performance penalty of about 0.32 dB,[64] but notes there is a variety of technologies that could be deployed in smartphones by early 2015 to eliminate this penalty.[65] Nokia compares a 25+25 megahertz Down from 51 plan covering 638 to 698 MHz, such as the AT&T and Qualcomm band plan proposals, to a 30+30 megahertz Down from 36 and 51 band plan covering 578 to 698 MHz, and concludes that the latter band plan, spanning 120 megahertz, will have a penalty of 1.0 to 1.5 dB relative to the band plan spanning 60 megahertz, for a 4 inch device.[66] Ericsson states that its experience with digital video support in handsets in Europe indicates that performance at 470 MHz could involve a performance penalty of up to 4 dB.[67] Nokia

[58] *See, e.g.*, Intel Reply at 2.

[59] *See* § III.A.2.a (All-Paired, Down From 51 Band Plan).

[60] *See 600 MHz Band Plan Workshop Transcript* at 105–120.

[61] *See, e.g.*, AT&T Comments, Exh. A at 22–23; Ericsson Reply at 29–30.

[62] *See, e.*g., Letter from Derek Khlopin, Head of Government Relations, North America for Nokia, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 15 (filed Mar. 18, 2013) (Nokia Mar. 18, 2013 *Ex Parte* Letter).

[63] *See* Qualcomm Comments at 13–14.

[64] T-Mobile Reply, Exh. A at 16–17.

[65] T-Mobile Reply, Exh. A at 17–18 ("Many recent technology advances have made it possible to address the performance limitations and size issues associated with traditional passive antennas by utilizing microstrip and active antenna technologies . . . advances which include isolated Mode Antenna Technology (iMAT), surface mounted band switching and active impedance matching, printed loop antennas, ceramic substrates, and helical antennas, among others.").

[66] Letter from Derek Khlopin, Head of Government Relations, North America for Nokia, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 18 (filed May. 6, 2013) (Nokia May 6, 2013 *Ex Parte* Letter).

[67] Christian Bergljung, Ericsson, *600 MHz Band Plan Workshop Transcript* at 107.

shows that these penalties will be reduced in 5-inch and 6-inch devices.[68] These comments are summarized in Table 4.

Commenter	Antenna Bandwidth	Degradation
Qualcomm	60 MHz	Baseline = 0 dB
T-Mobile	80 MHz	0.3 dB
Nokia	120 MHz	1.0 to 1.5 dB
Ericsson	228 MHz[69]	4 dB

Table 4. Antenna Performance versus Antenna Bandwidth

34. Taken together, these comments show a clear progression of degradation as the antenna bandwidth increases. This progression emphasizes that there is not an absolute limit to the supportable antenna bandwidth, but rather a continuous degradation as larger bandwidths are supported. For example, extrapolating these numbers implies that 140 megahertz of bandwidth would correspond to approximately a 2 dB penalty and 180 megahertz of bandwidth would correspond to approximately a 3 dB penalty. These penalties are for small smartphone form factors (i.e., 4-inch devices). Larger smartphones, "phablets,"[70] tablets, home modems, or other devices may perform better. And, as mentioned above, there are a number of antenna technologies that can reduce these penalties, including tunable antennas as well as isolated Mode Antenna Technology ("iMAT"), surface-mounted band switching and active impedance matching, printed-loop antennas, ceramic substrates, and helical antennas.[71]

35. Managing Antenna Degradation. As discussed in the Order, the antenna performance penalties that result from offering more than 84 megahertz in the 600 MHz Band are outweighed by the benefits of making more paired spectrum available for wireless broadband service, and our technical analysis corroborates this approach.[72] Ericsson and Verizon's statements at the Band Plan Workshop support this view.[73]

36. To place this impact of antenna degradation in perspective, we can compare the relative propagation characteristics of the sub-1 GHz bands used for cellular technologies. Cellular coverage is generally limited by the uplink band, and the worst coverage will be at the highest uplink frequency. Table 5 shows a simple propagation comparison based on the frequency dependent factor used in the Hata propagation model ($26.16\text{Log}_{10}(f)$[74]):

Band	Highest Uplink	$26.16\text{Log}_{10}(f)$	Relative

[68] Nokia May 6, 2013 *Ex Parte* Letter, Att. at 15–17.

[69] From 470 MHz to 698 MHz is 228 megahertz.

[70] The term "phablet" is often used to describe devices considered between phones and tablets in size, typically including traditional phone functions. These are often 6-inch devices. *See, e.g.*, http://www.pocket-lint.com/news/124518-best-phablets-2014-the-best-big-screened-phones-to-buy-right-now (last visited Apr. 8, 2014).

[71] T-Mobile Reply, Exh. A at 18.

[72] *See* § III.A.2.f.ii (Mobile Antenna Considerations).

[73] Christian Bergljung, Ericsson, *600 MHz Band Plan Workshop Transcript* at 106–109; Sanyogita Shamsunder, Verizon, *600 MHz Band Plan Workshop Transcript* at 131–132.

[74] In the Okumura-Hata model the frequency also affects the correction factors for suburban and rural environments, although this is a smaller effect. Real world propagation may also be affected by other factors, such as building penetration varying by frequency. However, using the $26.16 \log_{10}(f)$ is adequate for placing the losses discussed in context.

	Frequency		Performance
Cellular	846.5 MHz	76.6 dB	-2.2 dB
SMR	824.0 MHz	76.3 dB	-1.9 dB
Upper 700 MHz	787.0 MHz	75.8 dB	-1.4 dB
Lower 700 MHz	716.0 MHz	74.7 dB	-0.3 dB
600 MHz, highest carrier	698.0 MHz	74.4 dB	0.0 dB
600 MHz, using lowest carrier for 126 MHz scenario	673.0 MHz	74.0 dB	0.4 dB

Table 5. Propagation of Sub-1 GHz bands

37. This table shows performance relative to the highest carrier in the 600 MHz Band, with negative numbers indicating worse performance. So, for example, the Cellular Band has roughly 2.2 dB worse performance than the 600 MHz Band. Using this table we can see that an antenna performance penalty of 1.5 dB would mean that the performance of the 600 MHz Band would be about the same as the Upper 700 MHz Band, while a penalty of 2.0 dB would result in performance similar to the 800 MHz Bands, all else being equal. Also, in the case of the 600 MHz Band's 126 megahertz scenario, propagation for the lowest carrier in the 600 MHz Band is 0.4 dB better than the highest carrier, so although spectrum in the lower 600 MHz Band may be more challenging for the antenna, this may be offset by improved propagation.[75] Put another way, the effects of antenna degradation from extending the band plan below channel 37 would make the spectrum comparable to the highly valued and widely deployed 700 MHz and 800 MHz bands. From a coverage perspective, providers already using low-band spectrum could overlay 600 MHz spectrum onto their existing "cell grid" without introducing coverage gaps. Similarly, antenna performance issues would not meaningfully reduce the value of the spectrum to new entrants or providers not already using low-band spectrum in their networks.

38. Furthermore, the antenna degradation can be reduced if wireless providers use a tunable approach. Referring back to Table 2, the Down from 51 plan requires antenna bandwidth of 123 megahertz for 10 sets of paired blocks, up to 143 megahertz for 12 sets of paired blocks, which could correspond to a 2 to 3 dB performance penalty based on our analysis above. However, the tunable antenna bandwidths are much lower, from 93 to 103 megahertz for the same scenarios. That is, even the largest amounts of repurposed spectrum would require antenna bandwidths of less than 103 megahertz, resulting in performance penalties of less than 1.5 dB for tunable antennas. Commenters indicate that tunable antennas will be widely available by the time this spectrum is deployed in user devices.[76] In addition, as mentioned above, there are a number of antenna technologies that can reduce these penalties and, as also mentioned above, these penalties only apply to smaller devices, not all devices that may be used in this band.

39. An alternative mitigation approach proposed by some commenters is to adopt a band plan that limits the paired spectrum to 25+25 megahertz or 35+35 megahertz and allocate any additional cleared spectrum as supplemental downlink ("SDL" or "downlink-only") spectrum.[77] However, we reject this approach. As discussed above, commenters' band plan proposals that use this mitigation technique limit the antenna bandwidth for the paired spectrum from 60 to 80 megahertz. In these cases there is also a second band of SDL spectrum that requires antenna bandwidths of 25 to 57 megahertz as shown above in Figure 4. These SDL blocks must be supplemental to another band. However, as some commenters explain, it can be difficult to aggregate two low bands together, so carriers might choose to pair these

[75] *See also* Christian Bergljung, Ericsson, *600 MHz Band Plan Workshop Transcript* at 108.

[76] *See, e.*g., Craig Sparks, Sprint, *600 MHz Band Plan Workshop Transcript* at 121.

[77] Qualcomm Comments at 6–7.

downlink-only blocks with a high band such as PCS or AWS.[78] As a result, while the low frequency propagation advantages will increase the downlink throughput, the cell radius or coverage area of the downlink-only blocks' carrier will be limited by the uplink using the high band, and therefore will be limited by the propagation characteristics of the high band spectrum. On the other hand, even if the paired spectrum does suffer a 2 dB penalty, as discussed above, it will still have better coverage characteristics than spectrum in the highly-valued 800 MHz Band. Therefore, even with an antenna performance penalty, paired spectrum will better support our goal of making high-quality coverage spectrum available.[79] Although allocating a separate downlink-only band for large clearing targets may appear to mitigate antenna performance issues by breaking the higher bandwidth band into two distinct lower bandwidth bands, the limitations of downlink-only blocks actually reduce the utility of such an approach more than the antenna performance by requiring disparate band use far separated in frequency for control and scheduling of the supplemental downlink, so our all-paired approach results in higher spectrum utility.

C. Intermodulation Interference

40. Commenters raise two primary concerns about intermodulation causing harmful interference to mobile broadband users in the 600 MHz Band. Specifically, commenters argue that television stations should not be placed between the mobile uplink and downlink bands in order to accommodate market variation.[80] We disagree. In addition, commenters state that in-band third order intermodulation products formed by the UE transmission combining with itself could fall into the downlink pass band.[81] As discussed below in greater detail, accommodating market variation by placing television stations between the uplink and downlink bands does not cause harmful interference arising from intermodulation products. Further, we have appropriately sized the duplex gap to prevent in-band third order intermodulation products from falling in the downlink pass band.[82] These determinations are corroborated by our analysis below.

1. Accommodating Market Variation

41. Several commenters argue that placing television stations between the 600 MHz uplink and downlink bands[83] creates intermodulation scenarios that would lead to harmful interference,[84] and

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[78] Karri Kuoppamaki, T-Mobile, *600 MHz Band Plan Workshop Transcript* at 119 ("And the supplemental downlink spectrum . . . most likely would be carrier aggregated with the high band rather than with the 600 MHz Band"); *see also 600 MHz Band Plan Workshop Transcript* at 226–229.

[79] *See* § III.A.2 (Band Plan for the New 600 MHz Band).

[80] *See* Alcatel-Lucent Comments at 3, 14–16; Block Stations *Band Plan PN* Comments at 2–3; CEA *Band Plan PN* Comments at 3; Letter from Julie M. Kearney, Vice President, Regulatory Affairs for Consumer Electronics Association, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 5–6 (filed Aug. 1, 2013); Ericsson Reply at 4, 9–10, 17; Google Reply at 3, 8–9; Motorola Comments at 9–10; Motorola *Band Plan PN* Comments at 4; NAB Comments at 6; NAB Reply at 7; NAB *Band Plan PN* Reply at 1–2; TechAmerica Reply at 4; US Cellular *Band Plan PN* Comments at 3; US Cellular *Band Plan PN* Reply at 8–9.

[81] *See* Alcatel-Lucent Comments at 3, 14–16; Ericsson Reply at 10, App. A at A-1–A-3; Motorola Comments at 10.

[82] *See* Technical Appendix § II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)).

[83] This is referred to by some commenters as "television in the duplex gap." However use of this term is not consistent; for example, some commenters use it to refer to all frequencies between the uplink and downlink bands, while others use it to mean only the portion that is used in all band plans. *See, e.g.*, CEA *Band Plan PN* Comments at 3; CTIA *Band Plan PN* Comments at 4–5, 8, 12–15. *See also* Technical Appendix § II.A (Mobile Filter Considerations).

[84] The FCC defines "interference" as "[t]he effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance

(continued….)

therefore argue that the Commission should not adopt any band plans that place television stations between the uplink and downlink bands.[85] Although we defer our decision on how to accommodate market variation, we recognize that placing television stations between the uplink and downlink bands may be necessary to accommodate market variation,[86] and from a technical perspective, the benefits of doing so outweigh the costs because the intermodulation interference is manageable.[87]

a. Calculating Intermodulation Interference with Television Stations Between the 600 MHz Uplink and Downlink Bands

42. We calculate the likely strength of intermodulation products generated in the UE receiver based on the expected key inputs and the values shown below in Table 6. Our rationale for choosing these values is explained below in the Section II.C.1.c of the Technical Appendix (Explanation of Inputs).

(Continued from previous page)
degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy." 47 C.F.R. §2.1(c). It also defines "harmful interference" as "[i]nterference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with [the International Telecommunications Union] Radio Regulations." 47 C.F.R. § 2.1(c). In addressing the potential for intermodulation interference, we must eliminate all instances of "harmful interference" as opposed to all instances of "interference."

[85] *See* Alcatel-Lucent Comments at 3, 14–16; Ericsson Reply at 10, App. A at A-1–A-3; Motorola Comments at 10.

[86] *See* § III.A.2.d (Market Variation).

[87] *See* Technical Appendix §II.C (Intermodulation Interference).

Input	Value
Television signal strength received by UE	-23 dBm
UE transmit power	18 dBm
UE receive filter attenuation	25 dB
UE interference threshold	-92 dBm / MHz
UE LNA IP3 point[88]	-5 dBm

Table 6. Inputs for Intermodulation Calculations

43. The intermodulation products will be generated by non-linearities in the Low Noise Amplifier ("LNA").[89] As can be seen in Figure 7, both the UE transmit signal and the received television signal must pass through the receive filter before reaching the LNA, and therefore both will be attenuated by the receive filter, resulting in powers of 18-25=-7 dBm and -23-25=-48 dBm respectively at the LNA input.

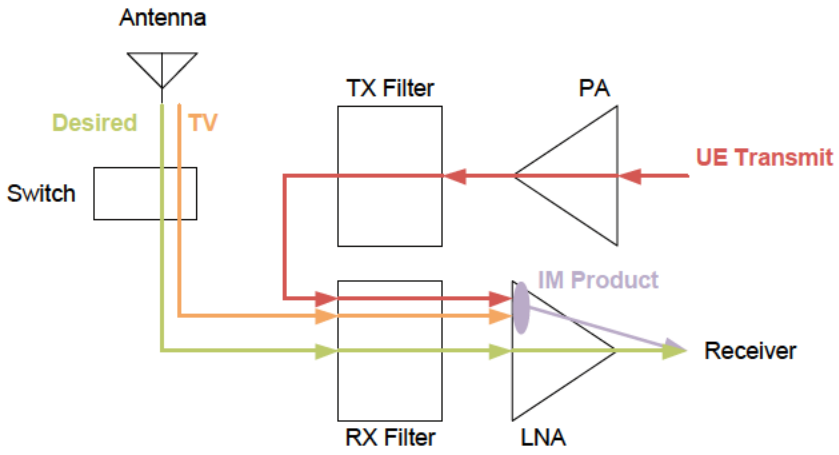

Figure 7. Signal Paths for Intermodulation in the LNA Input

44. In the 600 MHz Band Plan, the uplink band is a higher frequency than the downlink band[90] so the UE transmit ("TX") is higher in frequency than the broadcast signal and the product of concern is the $2f_1$-f_2 signal.[91] Accordingly, the power and bandwidth of the intermodulation product are given by:

$$P_{\mathbf{IM}} = 2P_{\mathbf{f1}} + P_{\mathbf{f2}} - 2\,I_{\mathbf{ip3}} \qquad \text{for } 2f_1 + f_2,\ 2f_1 - f_2$$
$$B_{\mathbf{IM}} = 2B_{\mathbf{f1}} + B_{\mathbf{f2}} \qquad \text{for } 2f_1 + f_2,\ 2f_1 - f_2$$

Using the IP3 point from Table 6 above and the just calculated power values, this results in a power of

[88] The third order intercept, or IP3 point, is value that measures the non-linearity of a device and allows the power of the intermodulation products to be calculated. *See e.g.* Lou Frenzel, *What's The Difference Between The Third-Order Intercept And The 1-dB Compression Points?*, Electronic Design, Oct. 24, 2013, http://electronicdesign.com/what-s-difference-between/what-s-difference-between-third-order-intercept-and-1-db-compression-point (last visited Apr. 23, 2014).

[89] We consider intermodulation products generated in other components in the next section, see Technical Appendix § II.C.1.b (Additional Considerations).

[90] *See* Technical Appendix § III.B (Specific Band Plan Scenarios).

[91] In this Technical Appendix we use f_1 to refer to the lower of the two combining signals and f_2 to refer to the higher of the two signals.

2(-48)+(-7)-2(-5) = -96-7+10 = -93 dBm, a bandwidth of at least 2(5.38 MHz)+180kHz=10.94 MHz, [92] and a power spectral density ("PSD") of at most -93-10log$_{10}$(10.94)=-104 dBm/MHz. The -104 dBm/MHz is 12 dB below the threshold of interference in Table 6 above, and provides a significant margin of error. Based on these calculations, harmful interference will not occur if broadcast stations are placed between the mobile uplink and downlink bands.

45. Ericsson and Alcatel-Lucent disagree with this conclusion, and assert that intermodulation interference will cause harmful interference to mobile broadband users of the 600 MHz Band.[93] Our calculations differ from Ericsson and Alcatel-Lucent because these commenters assume little or no attenuation of the television signal between the uplink and downlink bands.[94] Our calculations would also show a potential problem with no filter attenuation. However, attenuation of signals in the duplex gap is minimal only if the signal is too close to the downlink pass bands.[95] In a narrow duplex gap, such as in the PCS band, signals anywhere in the duplex gap are unlikely to be attenuated.[96] However, with a wider duplex gap, signals can be attenuated as long as there is adequate separation from the downlink band. If we determine it is necessary to place broadcast stations between the uplink and downlink bands, we will provide adequate frequency separation between the downlink band and the broadcast signals to allow for attenuation of the broadcast signals.[97]

b. Additional Considerations

46. *Reverse Intermodulation*. A few commenters argue that reverse intermodulation could also cause harmful interference to 600 MHz Band receivers.[98] Here, "reverse intermodulation" refers to

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[92] A DTV signal occupies 5.38 megahertz of the six megahertz channel. *See* ATSC A/53 Part 2: RF/Transmission System Characteristics, section 5.4, 15 Dec. 2011, available at http://www.atsc.org/cms/index.php/standards/standards/50-atsc-a53-standard (last visited Apr. 23, 2014). The narrowest UE signal we consider is an LTE UE transmitting on a single 180 kHz resource block See 3GPP TS 36.211 V12.1.0 at 15 (5.2.3) available at http://www.3gpp.org/ftp/Specs/archive/36_series/36.211/36211-c10.zip (last visited Apr. 23, 2014). A UE using more resource blocks, or another technology such as HSPA, would have a larger bandwidth and therefore the intermodulation product would be more spread out and have a lower PSD.

[93] *See* Ericsson Reply at 10, App. A at A-1–A-3; Alcatel-Lucent Comments at 14–16.

[94] Ericsson Reply, App. A at A-2–A-3 (calculating attenuation of 10 dB); Alcatel-Lucent Comments at 15.

[95] As discussed above, "close" means about 1% of the frequency, or about seven megahertz, because at separations less than that the filter attenuation may not be adequate. *See* Technical Appendix § II.A (Mobile Filter Considerations).

[96] This is further discussed above in Section II.A of the Technical Appendix (Mobile Filter Considerations). For the PCS band, the duplex gap is only 0.80% (15 megahertz), so it is reasonable in that case to assume that the entire duplex gap is used for the filter transition band, and attenuation of signals in the duplex gap may be minimal.

[97] Other commenters concur with our conclusion the broadcast stations can operate between the uplink and downlink bands. *See, e.g.*, T-Mobile *Band Plan PN* Reply at 6 ("[T]he presence of television in a portion of the uplink spectrum (duplex gap) should not pose any special technical concern[s]"); Verizon *Band Plan PN* Comments at 7 ("Locating broadcasters (especially high-powered operations) between uplink and downlink operations is not a preferred solution and should not be contemplated on a pervasive basis. To the extent it is necessary to accommodate some markets that do not reach the minimum threshold (generally 72 megahertz or 84 megahertz), however, broadcasters in low-clearing markets could be located on channels that correspond to the paired uplink and paired downlink blocks in the higher-clearing markets."); T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter, Att. at 2 (band plan proposal places a television station between the uplink and downlink blocks).

[98] Motorola states that reverse intermodulation products would be generated by mixing television transmissions and mobile device transmit signals (e.g., handsets transmitting at 685.5 MHz would mix with television channel 42 signals centered at 641 MHz to create in band intermodulation products at 596.5 MHz). Motorola Comments at 10. However, DISH states that the claims of intermodulation, reverse intermodulation, and harmonic interference by opponents of the Commission's band plan are exaggerated because there are technical solutions to deal with them. DISH Reply at 8–10; DISH *Band Plan PN* Comments at 5–6.

intermodulation generated by non-linearities in the PA output, rather than the LNA input. As demonstrated in Figure 8, this reverse intermodulation case, where the television signal combines with the UE transmission to generate a product that falls on the UE receive frequency, is essentially the same as Channel 51 broadcast stations potentially causing intermodulation interference to Lower 700 MHz Band licensees.[99]

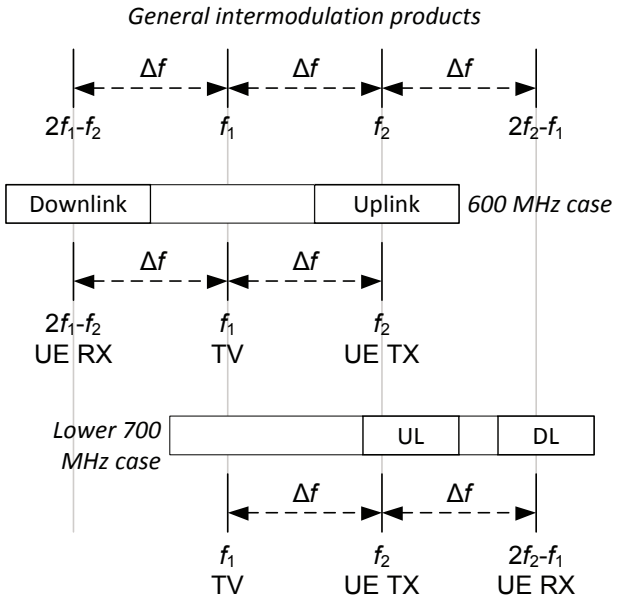

Figure 8. Comparison of 600 MHz and 700 MHz Intermodulation Scenarios

47. To analyze this case, we use the inputs discussed in Table 6 above, and also assume the UE Power Amplifier ("PA") to have an output IP3 point of +45 dBm.[100] If we take the worst case of the television signal falling inside the pass band of the UE TX filter then the power levels at the PA output are +18 dBm for the UE transmission and -23 dBm for the television signal. Then, using the formulas above, we find that the intermodulation product power is -118 dBm.[101] As can be seen in Figure 9, the product must pass through the TX and receive ("RX") filters after being generated in the PA output. As it falls on the RX frequency, it will not be attenuated by the RX filter, but it will be attenuated by the TX filter. In fact, to prevent self-desensitization from the transmitter OOBE, the TX filter typically has a rejection of at least 50 dB,[102] so this signal will be attenuated to -168 dBm. As before, the product bandwidth is at least10.94 MHz[103] and therefore the PSD is at most -168-10log$_{10}$(10.94)=-179 dBm/MHz. This result of -179 dBm/MHz is 87 dB below our threshold of interference, and therefore harmful interference will not occur.

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[99] CCA argues that the Commission should seize the opportunity to immediately clear Channel 51, because interference concerns involving Channel 51 already have hampered base station deployment in the Lower 700 MHz Band. CCA Comments at 13–14; CCA *Band Plan PN* at 5. Mobile Future argues that the Commission should allow broadcasters operating in Channel 51 to relocate to different spectrum in advance of the incentive auction, without adversely affecting their rights to participate in the reverse auction because it would help address interference issues that have hindered adjacent band Lower 700 MHz A Block licensees from deploying mobile broadband. Mobile Future Reply at 10–11.

[100] How we arrived at the UE PA having an output IP3 point of +45 dBm is discussed further in Section II.C.1.c of the Technical Appendix (Explanation of Inputs).

[101] $P_{\mathrm{IM}} = 2P_{\mathrm{f1}} + P_{\mathrm{f2}} - 2\ I_{\mathrm{ip3}}$ = 2(-23 dBm)+(18 dBm)-2(45 dB) = -46+18-90 = -118 dBm.

[102] *See* Technical Appendix § II.A (Mobile Filter Considerations).

[103] *See* Technical Appendix n.92.

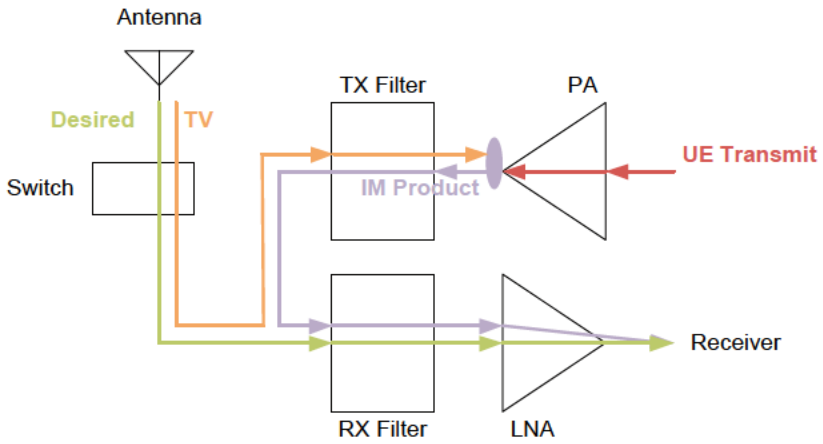

Figure 9. Signal Paths for Intermodulation in the LNA Input

48. *Intermodulation in other components*. AT&T suggests that intermodulation could also occur in the antenna switch or other components in front of the duplexer, where the television signal has not been attenuated.[104] However, these components generally have fairly high IP3 points. For example, in the Band Plan Workshop, Avago stated that a typical IP3 point for an antenna switch is +70 dBm.[105] Using this value, we would expect the product of the unattenuated signals to have a power of -168 dBm.[106] As before, the product bandwidth is at least 10.94 MHz,[107] and therefore the PSD is at most $-168-10\log_{10}(10.94) = -179$ dBm/MHz, which is 87 dB below our threshold of interference. Accordingly, harmful interference will not occur.

49. *Multiple television stations*. AT&T argues that the situation in the 600 MHz Band is very different than in the Lower 700 MHz Band, because there is only one broadcast station to consider at any particular location in the Lower 700 MHz Band case while there could be multiple broadcast stations in one area in the 600 MHz Band duplex gap.[108] However, this ignores the fact that many channels below channel 51 are used for television. The reason there is limited concern over channel 50, which also forms frequency combinations that could theoretically cause interference, is that channel 50 is six megahertz further away from the edge of the Lower 700 MHz Band than the channel 51 broadcast stations and the channel 50 transmissions are easily attenuated. Second, a given UE at a given time is susceptible only to television signals that fall halfway between the transmit and receive frequencies it is actually using, not all television signals between the uplink and downlink bands.

50. Motorola states that two television station signals could combine and fall on a device's receive frequency.[109] Since the two television signals would each be -23 dBm, compared to the case we have been considering where the television signal is -23 dBm and the UE TX signal is +18 dBm, as long as these signals are attenuated, any products would be significantly weaker (by 18 dBm - -23 dBm = 41 dB). In other similar cases, the combining television signals have not caused harmful interference. For example, similar combinations of the form $2f_1+f_2$ and $2f_2+f_1$ (instead of $2f_1-f_2$ and $2f_2-f_1$) would affect PCS

[104] *See* Neeti Tandon, AT&T, *600 MHz Band Plan Workshop Transcript* at 42.

[105] *See* William Mueller, Avago, *600 MHz Band Plan Workshop Transcript* at 68–69.

[106] $P_{IM} = 2P_{f1} + P_{f2} - 2\,I_{ip3}$ = 2(-23 dBm)+(18 dBm)-2(70 dB)=-46+18-140 =-168 dBm.

[107] *See* Technical Appendix n.93.

[108] AT&T Comments, Exh. A at 12.

[109] Motorola Comments at 10. This is different from the case we have been considering where one television signal combines with the UE transmit signal.

handsets the same way, but television intermodulation concerns have not reduced the utility and value of the PCS band.[110]

51. *Severity of Interference*. Intermodulation between a television signal and the UE TX signal can only cause interference when the UE is both transmitting and receiving. In technologies such as LTE and WiMAX, even for applications where user data is being sent and received continuously (such as a VoIP call), the UE may not actually transmit and receive at the same time. For example, in an LTE FDD system, there are 20 slots in each 10 ms frame, and the resources assigned in a frame for the UE transmission and reception may not occur on the same slots. Further, with features in the LTE standard such as load balancing, robustness optimization, and dynamic scheduling, there is no fixed frequency relationship between the resource blocks assigned for transmit and receive, so although a television station may be in the (TX+RX)/2 point during part of a frame, it may not be in a subsequent frame. Finally, even if there is an actual decrease in the signal-to-noise ratio of some resource blocks, this may simply result in lowered throughput due to the system choosing lower rate modulation and coding schemes or retransmitting some data. Such temporary throughput reductions may not be perceptible to the end user and do not necessarily "repeatedly interrupt"[111] the service.

c. Explanation of Inputs

52. As described above, we use the framework set out in the Commission's rules defining "interference" and "harmful interference."[112] Below we discuss the other inputs we must consider, which include the power of television signals and user equipment, signal attenuation, the interference threshold, and IP3 points.

53. *Television Signal Power*. One input we must determine is the likely television signal level that a wireless device may experience. This issue has been discussed extensively in the *700 MHz Interoperability* proceeding where essentially the same intermodulation issue was raised.[113] In that proceeding, Qualcomm submitted drive tests from its proposed MediaFLO system, which operated a broadcast network limited to 50 kW effective isotropic radiated power ("EIRP").[114] These plots show a significant number of data points above -46.8 dBm and -43.8 dBm,[115] while there are significantly fewer above -32.1 dBm,[116] and a very small number of points above -29.1 dBm.[117] After adjusting these figures upwards by 13 dB,[118] the broadcast signals experienced by outdoor mobile devices will rarely be

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[110] Although not stated explicitly, it appears that Motorola is concerned about two television transmitters in the duplex gap but not elsewhere (such as next to the downlink band), because Motorola assumes that there will be no attenuation of the broadcast signals in the duplex gap. As discussed above, television in the duplex gap is not a concern as long as there is adequate frequency separation to attenuate the signals. *See* Technical Appendix § II.C.1 (Accommodating Market Variation).

[111] 47 C.F.R. § 2.1(c).

[112] *See* Technical Appendix n.85.

[113] *See, e.g.*, Qualcomm Comments, WT Docket No. 12-69 at 13–28 (filed June 1, 2012) (*Qualcomm 700 Comments*); V-COMM Reply Comments, WT Docket No. 12-69 at 11–23 (filed July 13, 2012) (*V-COMM 700 Comments*).

[114] *See Qualcomm 700 Comments* at 13, 18.

[115] *See Qualcomm 700 Comments* at 15–17.

[116] *See Qualcomm 700 Comments* at 27–28.

[117] *See Qualcomm 700 Comments* at 25–26.

[118] This 13 dB adjustment accounts for the difference between the 50 kW permitted in the MediaFLO spectrum and the 1 MW allowed for broadcast television.

above -15 dBm.[119] Similarly, V-Comm submitted an analysis of Channel 51 antenna patterns and power levels showing that the power levels exceeded -13 dBm in only 2 out of 24 studied stations.[120] V-Comm also submitted drive test data of several Channel 51 transmitters confirming almost no points above -13 dBm.[121] Both the Qualcomm and V-Comm studies specify the power that would be measured by a receiver with a 0 dBi antenna, which means, the UE antenna loss must be applied to these numbers.

54. In this proceeding, Ericsson suggests signal levels of up to -30 dBm could be received, citing a 3GPP contribution from Nokia.[122] The Nokia contribution measured transmissions from 50 kW and 600 kW transmitters, and applied an average antenna gain of -8 dBi, based on -6 dBi for a UE in a laptop position and -10 dBi for speech position.[123] To compare this figure to the Qualcomm and V-Comm studies, we need to adjust by 2 dB for the difference between 600 kW and 1 MW, and 8 dBi for the average antenna gain impact. Taking these together, the Ericsson and Nokia television signal level would be -20 dBm for a 1 MW station before applying UE antenna gain, which is a little lower than the -15 dBm value from the Qualcomm drive tests and -13 dBm from the V-COMM analysis. Google submitted predictions based on the principles of OET-69, showing areas around television transmitters of -15 dBm to -7 dBm.[124] These are based on predictions rather than measurements, however, and are therefore less reliable. Given these submissions, we will use the median value of -15 dBm, before antenna gain is applied, and follow the Nokia approach of applying -8 dBi of antenna gain to obtain a level of -23 dBm as the highest likely television signal level in our analysis.[125] This -23 dBm value is therefore used in Table 6 in the intermodulation calculations above.

55. *UE Signal Power*. We consider an LTE signal as a typical case, both because commenters have suggested it is a likely technology to be used in this band[126] and UE power levels for LTE are similar to many other cellular technologies.[127] The maximum UE transmit power for a typical LTE device is 23 dBm.[128] However, with power control the actual transmit power is often much lower, and can be as low as -40 dBm.[129] We also consider the correlation between the television signal input

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[119] Qualcomm also shows several plots of predicted coverage for Channel 51 signals with significant areas over -20 dBm, and some area over -10 dBm, *see Qualcomm 700 Comments* at 45–53. However, these predictions are for a receiver height of 10 m, which means they are significantly stronger than the signal that would be received by a mobile with a typical antenna height of 1.5 m. *See Qualcomm 700 Comments* at 44; *V-COMM 700 Comments* at 23.

[120] *See V-COMM 700 Comments* at 11–14. The V-COMM study assumed free space loss to a mobile with no further propagation or clutter losses, which means the received power levels are likely to be lower than its study indicates.

[121] *See V-COMM 700 Comments* at 17–22.

[122] *See* Ericsson Reply, App. at A-1; Christian Bergljung, Ericsson, *600 MHz Band Plan Workshop Transcript* at 35.

[123] Nokia, R-100430, *TV transmission power at UE antenna port*, 3GPP RAN WG4 #54 (Feb. 2010), *available at* ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_54/Documents/R4-100430.zip.

[124] *See* Letter from Paul Margie, Counsel for Google to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Att. at 2 (Modeling Overview) (filed Jan. 30, 2014) (Google Jan. 30, 2014 *Ex Parte* Letter).

[125] For comparison, Alcatel-Lucent concludes from the Nokia study that the level should be -38 to -25 dBm, lower than our calculation. *See* Alcatel-Lucent Comments at 15.

[126] *See, e.g.*, AT&T Comments, Exh. A at 6 (agreeing with the Commission's assumption that the most efficient use of the 600 MHz Band will be for FDD LTE operation).

[127] *See, e.g.*, 3GPP TS 25.101 V12.3.0 at 26–27, available at http://www.3gpp.org/ftp/Specs/archive/25_series/25.101/25101-c30.zip (last visited Apr. 23, 2014), 3GPP2 C.S0011-0 v1.0 at 4–13, available at http://www.3gpp2.org/Public_html/specs/speclist.cfm (last visited Apr. 23, 2014).

[128] *See 3GPP RF UE Standard* at 40 (Table 6.2.2-1showing every band is limited to 23 dBm except for Band 14, which is a public safety band).

[129] *See 3GPP RF UE Standard* at 63 (6.3.2.1)

power and the UE transmit power. The locations where high television power levels are observed are not typically "edge of coverage" scenarios because these high levels are usually seen in urbanized areas outdoors in unobstructed areas where signal levels in wireless networks are generally good.[130] We estimate that the likely UE signal level in an urbanized area is at least 10 dB better than the "edge of coverage" because wireless carriers are likely to assume losses of 10 dB or more for building penetration that is needed in urbanized areas.[131] When the signal is 10 dB above the minimum required signal, we expect the UE TX power to be 5 to 10 dB below the maximum power, or 13 to 18 dBm for an LTE device.[132] For our analysis, we will use a UE TX power of 18 dBm, which is reflected in Table 6 above.

56. *Attenuation of signals*. If a signal passes through the pass band of a filter, such as a UE transmission through the UE transmit filter, or a receive frequency though a receive filter, we conservatively assume no attenuation, although in fact there could be some small insertion loss.[133] If the signal is not in the pass band, but is within seven megahertz of the pass band, we assume it falls within the transition band, and conservatively treat that as no attenuation as well, although in some cases it may be significantly higher.[134] We assume other frequencies are in the stop band, with an attenuation of 25 dB, except in the cases of the UE transmit filter with a frequency in the UE receive band and the UE receive filter with a frequency in the UE transmit band, where we assume the rejection is 50 dB.[135] The 25 dB attenuation is reflected in Table 6 above, while the 50 dB value was used in the subsequent discussion of reverse intermodulation, and below in Table 7 for UE self-intermodulation.

57. *Threshold for Interference*. When considering the power spectral density that may cause interference in the UE receiver, we will use a device noise figure of 12 dB and a criterion of a 3 dB noise rise.[136] Using these figures, we determine that: (1) the thermal noise in 1 MHz is -114 dBm/MHz; and (2) the noise in the device considering the noise figure is -102 dBm/MHz. In order to create at most a 3 dB noise rise, the PSD must be -102 dBm/MHz or less. This level affects UEs that are operating at the edge of coverage where the noise floor is the determining factor in their received signal quality. However, as discussed above for the UE transmit power, the situations in which high television power levels are observed are not typically "edge of coverage" scenarios.[137] Therefore, we assume that the UE will be 10 dB better than "edge of cell" coverage and that the intermodulation products would likely have to exceed -92 dBm/MHz to cause harmful interference. This -92 dBm/MHz number is reflected in Table 6 above.

58. IP3 Points. In the above analysis we used the IP3 point for the UE LNA. We also discussed IP3 points for a UE PA and antenna switch under "additional considerations." Both Alcatel-

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[130] Maps submitted by Qualcomm and Google both show the highest TV power levels in urban areas without considering clutter or building penetrations losses. *See Qualcomm 700 Comments* at 15–17; Google Jan. 30, 2014 *Ex Parte* Letter at Att.

[131] *See e.g.* Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene H. Dortch, FCC, WT Docket No. 12-268, Att. at 9 (filed Apr. 1, 2014) (T-Mobile assumes 14 dB for residential buildings and 20 dB for commercial buildings, both significantly more than our 10 dB assumption).

[132] *See* 3GPP TS 36.213 V12.1.0 at 12 and following, available at http://www.3gpp.org/ftp/Specs/archive/36_series/36.213/36213-c10.zip (last visited Apr. 23, 2014).

[133] *See* Technical Appendix § II.A (Mobile Filter Considerations).

[134] *See* Technical Appendix § II.A (Mobile Filter Considerations).

[135] *See* Technical Appendix § II.A (Mobile Filter Considerations).

[136] *See Service Rules for Advanced Wireless Services in the 2000–2020 MHz and 2180–2200 MHz Bands*, WT Docket No. 12-70, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16124–25, paras. 57–58 (2012) (*AWS-4 Report and Order*) (parameters similar to those proposed by Motorola Mobility for evaluating mobile-to-mobile interference were found to be reasonable).

[137] *See* Technical Appendix para. 55.

Lucent and Ericsson provided typical LNA IP3 points of -5 dBm.[138] We used -5 dBm in Table 6. In the *700 MHz Interoperability* proceeding, Vulcan Wireless presented data for an Avago PA with an IP3 point of +50 dBm.[139] In the Band Plan Workshop, Avago indicated a typical IP3 point for a switch would be +70 dBm.[140] These high IP3 points are to be expected, because the switch and antenna are designed to handle the PA output without introducing additional distortion. These values are used in Section II.C.1.b of the Technical Appendix (Additional Considerations) where appropriate.

2. User Equipment Self-Intermodulation

59. This Section considers the potential for harmful interference from the in-band intermodulation products. Google and Alcatel-Lucent suggest that UE self-intermodulation is an important concern in sizing the duplex gap,[141] while AT&T suggests this type of intermodulation can be mitigated and is not a concern.[142] Our analysis confirms that this type of intermodulation is a concern, and by extending Alcatel-Lucent's approach, we confirm that we can create duplex gaps that are appropriately sized so that these intermodulation products do not fall into the downlink pass band. For self-intermodulation, the third order products outside the TX signal bandwidth appear as signals directly above and below the carrier with the same bandwidth as the carrier, as shown in Figure 10.

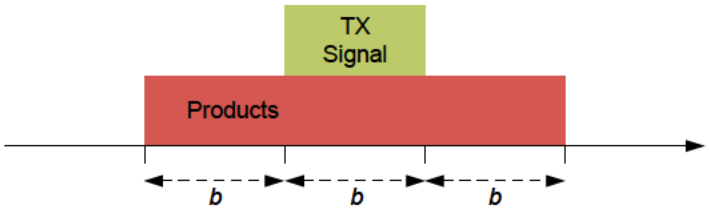

Figure 10. Self-Intermodulation Products

60. To evaluate self-intermodulation, we use a calculation similar to the one we in Section II.C.1.c of the Technical Appendix (Explanation of Inputs). First, we considered the correlation between a television signal and the UE TX signal, and concluded that when the television signal was very strong, we should assume 18 dBm for the UE signal. Here, there is no correlation to consider so we look at a UE signal of 23 dBm. This also applies to our consideration of the interference threshold, which becomes -102 dBm/MHz since it is no longer appropriate to assume the UE is not at the edge of coverage. Second, in Section II.C.1.c of the Technical Appendix (Explanation of Inputs) we considered a very narrow UE signal, 180 kHz, because that gave a conservatively high power spectral density. However, self-intermodulation of a 180 kHz signal only extends 180 kHz on each side, and is not likely to extend across a duplex gap. Here, wide UE signals should be looked at to consider how wide the duplex gap needs to be to prevent overlap, so we assume a 20 megahertz LTE carrier. Third, and finally, here, we are looking at the interference the duplexer is designed to prevent between the uplink and the downlink, so a tighter rejection of 50 dB is appropriate, as discussed in Section II.C.1.c of the Technical Appendix (Explanation of Inputs). Table 7 summarizes the inputs used with these revisions.

Input	Value
UE transmit signal strength	23 dBm
UE filter attenuation	50 dB

[138] Alcatel-Lucent Comments at 15; Ericsson Reply, App. at A-3.

[139] Letter from Michele C. Farquhar, Counsel to Vulcan, to Marlene H. Dortch, FCC, WT Docket No. 11–18, Att. at 13 (filed Nov. 30, 2011) (Vulcan Nov. 30, 2011 *Ex Parte*).

[140] William Mueller, Avago, *600 MHz Band Plan Workshop Transcript* at 68–69.

[141] *See* Google/Microsoft Comments, Att. at 4; Alcatel-Lucent Reply at 7.

[142] *See* AT&T Reply, App. A at 23.

UE interference threshold	-102 dBm/MHz
UE LNA IP3 point (input)	-5 dBm
UE PA IP3 point (output)	+45 dBm

Table 7. Inputs for Intermodulation Calculations

61. First we consider self-intermodulation at the PA, which is a common source of OOBE in mobile broadband systems. The power is calculated using:

$$P_{\mathbf{IM}} = 3P_{out} - 2\,I_{\mathbf{ip3}}$$

This yields a power of -21 dBm.[143] The intermodulation product ("IM") bandwidth is three times the occupied bandwidth, so for the widest LTE bandwidth, the 18 megahertz occupied bandwidth of a 20 megahertz carrier,[144] this yields a PSD of $-21-10\log_{10}(3\cdot 18)=-38$ dBm/MHz. This is then filtered 50 dB by the UE TX filter, so the PSD reaching the receiver is -88 dBm/MHz, 14 dB above our -102 dBm/MHz threshold of interference.

62. It is also possible that the IM will be generated in the LNA, in which case the signals are attenuated before reaching the point of intermodulation. If this occurs the input power would be -27 dBm,[145] and the power of the product is -71 dBm.[146] For the 18 megahertz bandwidth this yields a PSD of -83 dBm/MHz, which is 9 dB above our -102 dBm/MHz threshold of harmful interference.

63. Both cases create about the same power level, which is above our threshold of harmful interference. Therefore, we agree with Google, Microsoft, and Alcatel-Lucent that we should arrange the duplex gap so there is no overlap of the third harmonic self-interference of the UE transmit signal with the UE receive signal.[147]

64. To cause harmful interference with the device receiver, this product must fall on the device receive frequency. Therefore, this interference from the third order product is only possible if the separation between the edge of the receive channel and the edge of the transmit channel is less than the bandwidth of the transmit channel. The center-to-center frequency separation between the transmit and receive signals is known as the "duplex spacing." Since the uplink and downlink signals are the same bandwidth per each five megahertz block of paired spectrum, duplex spacing can also be measured lower edge to lower edge or upper edge to upper edge. This is shown in Figure 11.

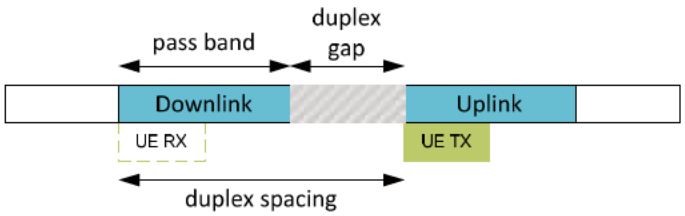

Figure 11. Relationship of duplex spacing, duplex gap, and pass band

[143] $P_{\mathbf{IM}} = 3P_{out} - 2\,I_{\mathbf{ip3}}$ = 3(23 dBm)-2(45dBm)=69-90=-21 dBm.

[144] For LTE carriers (except for a 1.4 megahertz carrier), the occupied bandwidth is 90% of the nominal bandwidth. In particular, 5, 10, 15, and 20 megahertz LTE carriers have occupied bandwidths of 4.5 megahertz, 9 megahertz, 13.5 megahertz, and 18 megahertz, respectively. *See* Alcatel-Lucent Reply at 7.

[145] Subtracting the 50 dB of attenuation from the 23 dBM power yields -27 dBm.

[146] $P_{\mathbf{IM}} = 3P_{out} - 2\,I_{\mathbf{ip3}}$ = 3(-27 dBm)-2(-5 dBm)=-81+10=-71 dBm.

[147] *See* Google/Microsoft Comments, Att. at 4; Alcatel-Lucent Reply at 7.

65. Because the receive signal bandwidth is equal to the transmit signal bandwidth, and they must be separated by the transmit signal bandwidth, the duplex spacing must be at least two times the widest transmit signal. This is illustrated in Figure 12.

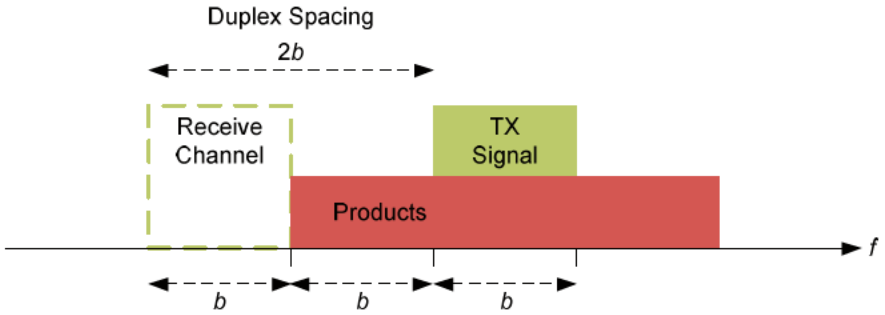

Figure 12. Duplex Spacing of 2b or More Prevents Overlap

66. The relationship of the duplex spacing to the duplex gap depends on the type of band plan and the amount of spectrum in the band plan.[148] For an FDD band with equal uplink and downlink bands, the duplex gap is equal to the duplex spacing minus the pass band size, see Figure 11 above. Google and Microsoft suggest that the duplex gap must equal the pass band size to prevent overlap of third order intermodulation products, but this assumes that the entire pass band can be used for the transmit signal.[149] As Alcatel-Lucent suggests, it is more realistic to assume that the widest transmit signal is a 20 megahertz LTE carrier, and furthermore, for LTE signals, the occupied bandwidth is 90% of the nominal carrier width, or 18 megahertz for a 20 megahertz RF carrier.[150] In addition, for an allocation of 15+15 megahertz or more, we assume that one operator is unlikely to acquire all the blocks, so the largest RF carrier would be at least five megahertz smaller than the total pass band, meaning the occupied bandwidths range from nine megahertz to 18 megahertz.[151] As Alcatel-Lucent points out, Google and Microsoft's analysis overstates the potential for third-order intermodulation interference, by assuming both more than the actual occupied bandwidth of the pass band for the transmit signal, and also that a single operator will acquire all of the five megahertz blocks. Figure 13 illustrates the duplex gap sizes needed to prevent overlap for various pass band sizes when these factors are taken into account.

[148] *See* Alcatel-Lucent Reply at 7.

[149] That is, for a 25+25 MHz FDD plan, the gap must be at least 25 MHz, for a 30+30 MHz FDD plan the gap must be at least 30 MHz, and so forth. *See* Google/Microsoft Comments, Att. at 4.

[150] *See* Alcatel-Lucent Reply at 7.

[151] *See, e.g.*, Alcatel-Lucent Reply at 7 (stating that even with a 25 megahertz pass band one operator having 20 megahertz is an unlikely case).

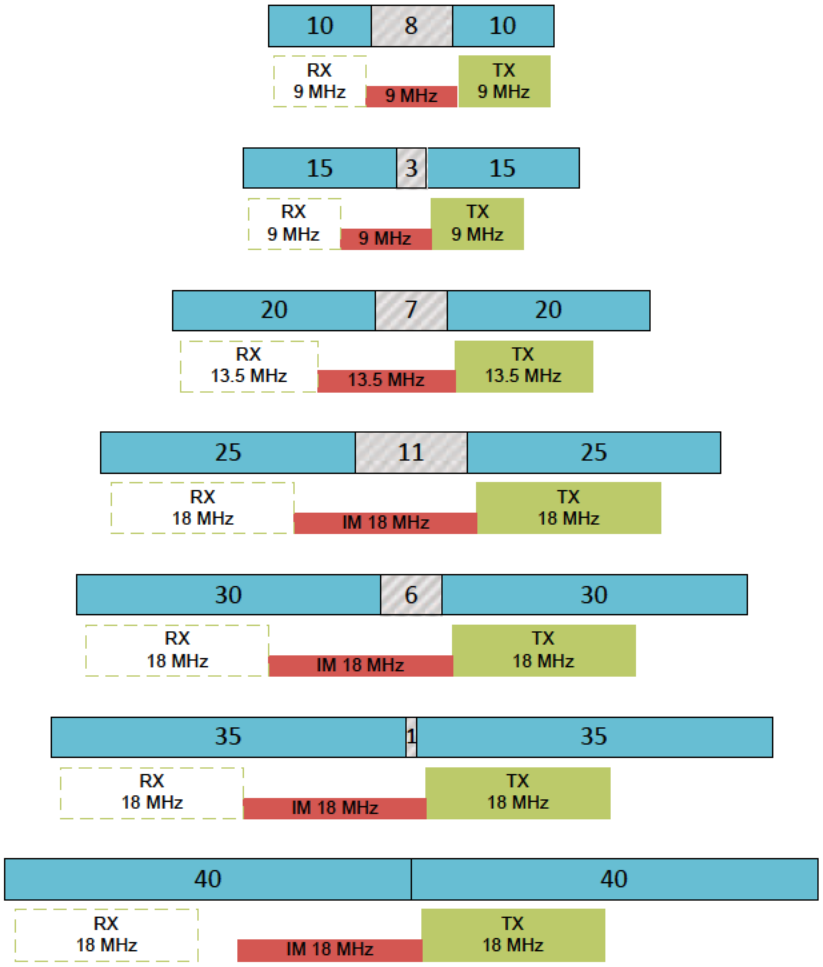

Figure 13. Minimum Duplex Gaps to Prevent Self-Intermodulation

67. These separations are summarized as follows:

Pass Band	Separation for no 3rd order overlap
10 MHz	8 MHz
15 MHz	3 MHz
20 MHz	7 MHz
25 MHz	11 MHz
30 MHz	6 MHz
35 MHz	1 MHz
40 MHz and above	0 MHz

Table 8. Separation to Prevent UE Self-Intermodulation

As discussed below in Section II.E.5 of the Technical Appendix (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)), we size the duplex gap at 11 megahertz, so in all cases there is adequate separation to prevent UE self-intermodulation.

D. Harmonic Interference

68. *Background.* Several commenters express concerns about harmonic interference from 600 MHz mobile devices to mobile devices in other bands such as the PCS band and the BRS/EBS

band.[152] Harmonics are a form of intermodulation product that are generated by self-intermodulation of a signal in a transmitter and appearing at multiples of the frequency of the desired transmit signal.[153] Most commenters focus on interference within the mobile device, which is caused by simultaneous use of certain bands via carrier aggregation.[154] In addition, other commenters argue that mobile-to-mobile interference could occur between 600 MHz devices and devices in other bands.[155] A number of commenters state that using the 643–667 MHz band for mobile uplink transmissions will result in harmonic interference.[156]

69. Not all commenters agree that the harmonics interference will result in harmful interference, however.[157] Alcatel-Lucent acknowledges that while the harmonics interference will occur, the harmonics that are generated from base station emissions are manageable.[158] Sprint argues that potential third-harmonic conflicts already exist in the U.S., and "yet we have seen little evidence of such interference problems to date."[159] T-Mobile explains that the vast majority of the time, the device transmitter will operate with far less than 23 dBm power and, as a result, produce far less desensitization into the PCS receiver.[160] As discussed below in greater detail, we agree with these commenters that any potential harmonics interference created in the 600 MHz Band can be effectively mitigated so that it does not result in harmful interference, which is corroborated by our analysis below.

70. *Mobile-to-mobile interference*. To determine if harmonic emissions are likely to cause harmful interference to devices in other bands, such as the PCS and BRS/EBS bands, we analyze the power levels involved. Because harmonics are self-intermodulation products, our calculations are similar to those in Section II.C.1.c of the Technical Appendix (Explanation of Inputs) for PA-generated self-intermodulation.[161] However, the harmonic region is far from the UE transmit and receive regions, and may not fall in a stop band of the UE TX filter, but rather in the other band. Furthermore, we must add the path loss between the two mobile devices. We assume a two-meter separation,[162] propagation

[152] *See, e.g.*, Alcatel-Lucent Comments at 3, 13–14; AT&T Comments at 4, 19, 27, 29, Exh. A at 17–20; CTIA Comments at 26; Ericsson Reply at 31–32, App. A; Nokia Comments at 13–14; Qualcomm Comments at iii–iv, 6, 7, 13; Verizon Comments at 9–10, 14.

[153] For example, a transmitter at 700 MHz could have harmonics at 1400 MHz, 2100 MHz, 2800 MHz, and so forth.

[154] *See, e.g.*, Qualcomm Comments at iii–iv, 6, 7–13; Qualcomm Reply at 19–23. Qualcomm states that analysis "show[s] that it would be particularly challenging to support a 600 MHz uplink band that extends beyond 25 MHz in mobile devices that also support bands above 600 MHz." Qualcomm Comments at 6.

[155] *See, e.g.*, Alcatel-Lucent Comments at 3, 13–14. Alcatel-Lucent explains its assumptions: "Considering the body loss for both terminals, a new entrant's terminal transmitting, for example, at 650 MHz at 200 MWatts (23dBm) can inject -26dBm into a nearby PCS terminal's receive antenna." *Id*. at 13.

[156] Alcatel-Lucent Comments at 3, 13–14; AT&T Comments at 27, Exh. A at 17; CTIA Comments at 26; Ericsson Reply at 31–32; Nokia Comments at 13–14; Verizon Comments at 9–10, 14.

[157] Alcatel-Lucent Comments at 17; DISH Reply at 8–9; Sprint Comments at 25; T-Mobile Reply at 23–26, App. at 23–25; Letter from Trey Hanbury, Counsel for T-Mobile, to Marlene Dortch, Secretary, FCC GN Docket No. 12-268 at 7, 12, 21 (filed Apr. 17, 2013).

[158] Alcatel-Lucent Comments at 17.

[159] Sprint Comments at 25.

[160] T-Mobile Reply at 24.

[161] *See* Technical Appendix § II.C.2 (User Equipment Self-Intermodulation).

[162] *See AWS-4 Report and Order*, 27 FCC Rcd at 16124–25, paras. 57–58 (parameters similar to those proposed by Motorola Mobility for evaluating mobile-to-mobile interference were found to be reasonable).

centered at 665 MHz,[163] and, consistent with our approach above in determining television signal levels, -8 dBi of antenna gain on each mobile.[164] This leads to a total coupling loss of 51 dB between the mobiles.[165] Table 9 summarizes the inputs used with these revisions.

Input	Value
UE transmit signal strength	23 dBm
UE filter attenuation	25 dB
UE-to-UE coupling loss	51 dB
UE interference threshold	-102 dBm/MHz
UE PA IP3 point (output)	+45 dBm

Table 9. Inputs for Intermodulation Calculations

71. The harmonic power for the third harmonic is calculated using:

$$P_{\mathrm{IM}} = 3P_{out} - 2\,I_{\mathrm{ip3}}$$

This yields a power of -21 dBm.[166] The harmonic bandwidth is three times the desired signal bandwidth. Considering a five megahertz LTE carrier with an occupied bandwidth of 4.5 megahertz,[167] the PSD is $-21-10\log_{10}(3\cdot 4.5) = -32$ dBm/MHz. This is then filtered at least 25 dB by the UE TX filter, so the PSD reaching the antenna is at most -57 dBm/MHz. With the 51 dB of coupling, the interference level at the victim UE's receiver is at most -108 dBm/MHz, which is 6 dB below our -102 dBm/MHz threshold for harmful interference. Accordingly, third harmonic interference will not result in harmful mobile-to-mobile interference.

72. To calculate the power of fourth and higher harmonics in this way requires IP4[168] and higher intercept points, which are not commonly specified. However, higher order harmonics grow progressively weaker.[169] As a result, these other harmonics will not cause harmful mobile-to-mobile interference since the third order harmonics will not, as determined above.

73. *Mobile self-interference*. In the case of mobile self-interference, there is no propagation loss. Therefore, removing this factor from the previous calculation we find that the PSD of -57 dBm/MHz is well above the harmful interference threshold of -102 dBm/MHz. Therefore, if the mobile self-interference is not mitigated, it would appear that there is a significant risk of harmful interference. As discussed below, it is not necessary to limit the portion of the band available for uplink because: (1) the calculations are conservative; (2) the problem only affects a mobile device actively using two bands at

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[163] 665 MHz is the center of 633–698 MHz, the largest uplink band considered in Section III of the Technical Appendix (Band Plan).

[164] *See* Technical Appendix § II.C.1.c (Explanation of Inputs).

[165] The free space path loss is 38 dB, to which we add the antenna loss, obtain a total coupling of 35 + 8 + 8 = 51 dB.

[166] $P_{\mathrm{IM}} = 3P_{out} - 2\,I_{\mathrm{ip3}}$ = 3(23dBm)-2(45dBm)=69-90= -21 dBm.

[167] A narrower carrier would yield a harmonic with a higher PSD, but also a very narrow harmonic which would be much less likely to land on a frequency actually being used by the victim mobile. Given this tradeoff between PSD and probability, we chose a middle value of a five megahertz carrier, rather than the extreme cases of a 180 kHz resource block and a 20 megahertz carrier we used in Section II.C of the Technical Appendix (Intermodulation Interference).

[168] The IP4 point is similar to the IP3, but used for the calculation of fourth order products. *See* Technical Appendix n.89.

[169] Qualcomm Comments at 10 n.15.

once; and (3) mobile self-interference has not prevented spectrum from being put to productive use where it occurs.

74. First, these calculations are conservative in several ways, including assuming time and frequency alignment of the use of the two bands in the device, and only 25 dB filtering of the harmonic by the TX filter. The calculations also consider a device at the edge of coverage in both bands, which, given the differing coverage of various frequencies, seems unlikely. For example, a device at the edge of BRS/EBS or PCS coverage would be well covered by the 600 MHz Band signal, and therefore transmitting well below maximum power, which in turn greatly reduces the strength of the harmonic.[170] These factors indicate that mobile self-interference can be mitigated by a variety of methods such as notch filtering of the harmonic or power control of the lower band in carrier aggregation operation.[171] Further, at our Band Plan Workshop, participants generally agreed that harmonic interference was a relatively minor problem.[172]

75. Second, the mobile self-interference problem only affects a mobile device actively using two bands at once, such as a carrier aggregation scenario in LTE. Not all bidders will plan to use carrier aggregation in the particular band combinations that are affected. In particular, given the Down from 51 band plan, mobile uplink will be in the upper part of the band where the harmonic concerns are with the PCS and BRS/EBS bands.[173] Therefore, carriers may not be able to aggregate certain 600 MHz blocks with these bands, but these blocks will still be usable if the carrier either does not aggregate them (as in current LTE networks), or aggregates them with other bands, such as AWS-1. Given that there are a variety of scenarios in which a paired block can be put to use by any operator, we decline to restrict offering these 600 MHz blocks because they cannot be aggregated under the particular scenario described above.

76. Third, we note that Bands 12 and 17 have harmonics that can fall in AWS-1, and Band 13 has harmonics that can fall in the GPS band. As many commenters have pointed out, these have presented technical challenges to the implementation of these bands,[174] however, these bands are being put to productive use and do not seem to have lost significant utility due to these challenges.

77. *Conclusion*. The risk of mobile-to-mobile harmful interference through harmonic interference is minimal. Although we recognize that harmful interference within a device could occur in a carrier aggregation scenario, we agree with commenters who suggest that this potential can be mitigated

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[170] This problem only occurs in carrier aggregation, in which case we expect both bands are transmitted from the same operator on the same tower.

[171] *See* Sprint *Band Plan PN* Comments at 15 ("Through standard Commission rulemaking (including reasonable out-of-band emissions limits) and modest industry resolve, such harmonic effects can easily be solved—particularly in the case of crucial low-band spectrum, which readily invites practical, technical solutions."); T-Mobile Reply at 24 ("While devices that incorporate both the interfering and victim frequencies could experience harmful interference under high-power conditions, operators have several techniques to prevent harmonic interference from ever occurring. These simple, cost-effective interference-avoidance techniques include improved filtering, careful block selection, and spectrum exchanges.").

[172] David Steer, BlackBerry, *600 MHz Band Plan Workshop Transcript* at 73; Richard Engelman, Sprint, *600 MHz Band Plan Workshop Transcript* at 75–76; Sanyogita Shamsunder, Verizon, *600 MHz Band Plan Workshop Transcript* at 78–79.

[173] *See, e.g.*, AT&T Reply Comments at 14.

[174] Christian Bergljung, Ericsson, *600 MHz Band Plan Workshop Transcript* at 69–70; Sumit Verma, Qualcomm, *600 MHz Band Plan Workshop Transcript* at 71 ("17+4" refers to the lower 700 band and AWS-1 being used simultaneously); Sanyogita Shamsunder, Verizon, *600 MHz Band Plan Workshop Transcript* at 79 (the second harmonic problem" and "GNSS" refer to the Upper 700 Band and GPS).

in various ways, and or technical analysis corroborates this approach.[175] As a result, as discussed in the Order, the potential cost of harmonics interference does not outweigh the benefit of maximizing paired spectrum, which is valued by wireless carriers.[176]

E. Effect of Frequency Separation on Inter- and Intra-service Interference (Guard Bands)

78. In this Section, we consider the impact of frequency separation on the likelihood of harmful interference between the new 600 MHz wireless broadband service and three incumbent services in the 600 MHz Band: television, Wireless Medical Telemetry Service ("WMTS"), and the Radio Astronomy Service ("RAS"). We chose reasonable technical parameters for our analysis, allowing us to prevent the likelihood of harmful interference while promoting the efficient use of spectrum. We reject the suggestion of Google and Microsoft that we must use "worst-case" assumptions because we will not know the actual band plan before the auction and the claimed "dearth" of studies on DTV-LTE interference scenarios.[177] Although we will not know the actual band plan until the auction concludes, we provide specific band plan scenarios below, and consider the appropriate guard band for each.[178] Furthermore, throughout this appendix we consider the known parameters of DTV and LTE as well as analysis submitted in the 700 MHz interoperability proceeding concerning DTV and LTE interference scenarios.[179] This analysis corroborates our conclusion that the guard bands in our 600 MHz Band Plan are technically reasonable to protect against harmful interference. As described below in Section III of the Technical Appendix (Band Plan), we have tailored the guard band between television and 600 MHz services to the technical properties of the 600 MHz Band under each spectrum recovery scenario.

1. Potential for Interference between Television and 600 MHz Services

79. *Background*. In the *NPRM*, the Commission proposed establishing guard bands between wireless broadband service and broadcast television operations to prevent inter-service interference.[180] As discussed in the Order, under our 600 MHz Band Plan, depending upon the amount of spectrum that is repurposed, television and the 600 MHz downlink band may be adjacent to each other.[181] If this occurs, there are two interference cases that we need to protect against. Specifically, we need to protect against a television transmitter interfering with a mobile broadband UE receiver, and a mobile broadband UE transmitter interfering with a television receiver.

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[175] *See* Sprint Reply at 18 ("With little additional low-band spectrum available, neither industry nor the Commission should preclude spectrally efficient, pro-competitive solutions simply because of harmonic issues that invite practical, technical solutions.").

[176] *See* § III.A.2.f.iv (Harmonic Interference) *see also* AT&T Comments at 18–19, Exh. A at 26; CCA Comments at 13; CEA Comments at 20; C Spire Comments at 6–7; Ericsson Reply at 17; Google/Microsoft Comments at 32–34; Leap Comments at 5–6; MetroPCS Comments at 21; Mobile Future Reply at 5; Motorola Comments at 10; RIM Comments at 8; US Cellular Reply at 17–19; Verizon Comments at 6.

[177] *See* Google/Microsoft Comments at 40.

[178] *See* Technical Appendix § III.B (Specific Band Plan Scenarios).

[179] *See e.g.* Technical Appendix §§ II.C.1.c (Explanation of Inputs), II.E.1 (Potential for Interference between Television and 600 MHz Services).

[180] *NPRM*, 27 FCC Rcd at 12412, para. 152.

[181] *See* § III.A.2.a (All-Paired, Down From 51 Band Plan)

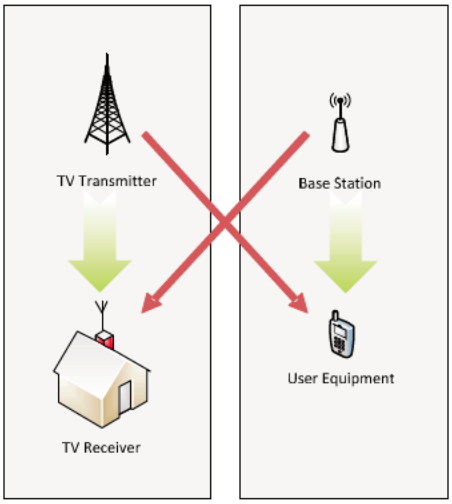

Figure 14. Interference Cases

80. Commenters assert that a guard band is needed for these interference cases.[182] They do not agree on the appropriate guard band size, arguing for sizes ranging from six megahertz to more than 12 megahertz.[183]

81. *Discussion*. Based on our review of the record, any allocated guard bands between the 600 MHz downlink and television will be at least seven megahertz; an 11 megahertz guard band will provide additional rejection in the television to downlink case, and in our judgment, is technically reasonable to protect against harmful interference between the 600 MHz downlink and television. In addition, an 11 megahertz guard band between the 600 MHz downlink and television allows for a large filter transition, which will simplify filter manufacturing.[184] These determinations are corroborated by our analysis below.

82. FDR Methodology. To calculate the amount of separation that is technically reasonable to prevent harmful interference between different licensed services outside the guard bands, we used frequency dependent rejection ("FDR") methodology. FDR is a methodology used by NTIA and other federal agencies to calculate the amount of attenuation offered by a receiver to a transmitted signal, especially between systems with disparate transmission bandwidth, out-of-band emissions, or receiver characteristics.[185] This methodology measures the extent to which frequency separation reduces the

[182] *See, e.g.*, CTIA Reply at 23–24; Ericsson Reply at 17; Google/Microsoft Comments at 39–42; Motorola Comments at 12–13.

[183] *Compare* xG Comments at 3 (xG supports "6 MHz guard bands between television operations . . . and 600 MHz downlink operations.") *with* PISC Reply at 11 (the "guard band below the auctioned downlink band . . . need[s] to be 10 to 12 MHz or more to avoid interference among licensed users."). In addition, we note that a number of commenters argued for a variety of guard bands, but in some cases provided no data to support their proposals. *See, e.g.*, Google Jan. 30, 2014 *Ex Parte* Letter at Att.

[184] *See* Technical Appendix § II.A (Mobile Filter Considerations).

[185] *See, e.g.*, Communications Receiver Performance Degradation Handbook, http://www.ntia.doc.gov/files/ntia/publications/jsc-cr-10-004final.pdf at 28–31(last visited Apr. 17, 2014); NTIA Technical Memo TM-09-461 (http://www.its.bldrdoc.gov/publications/2498.aspx) at 5–8, 5–9 (last visited Apr. 17, 2014); Frequency Dependent Rejection (FDR) Overview, http://ntiacsd.ntia.doc.gov/msam/FDR/FDRoverview.htm (last visited Apr. 17, 2014). In the *Inter-service Interference PN*, OET employed this methodology to determine harmful interference between television and wireless operations with respect to frequency separation. *Inter-service Interference PN*, 29 FCC Rcd at 731 (noting the FCC's use of NTIA's Microcomputer Spectrum Analysis Models (MSAM) FDR computer program to calculate off-frequency rejection (dB) as a function of frequency separation (i.e., determine harmful interference between digital television and wireless operations)).

potential for interference between a transmitter and a receiver.[186] Specifically, it compares the interference potential to a theoretical situation where all the transmitter power falls directly on the receiver's desired channel. For example, if a transmitted signal reaches a receiver at a power of -40 dBm, and the FDR is 50 dB, this means the interference is equivalent to -90 dBm in the receiver's channel. While FDR is generally lowest for no frequency separation, it is not necessarily zero in that case.[187]

83. The FDR value can also be viewed as a kind of net attenuation of transmitted signal at the receiver, as a function of the frequency separation between the receiver and transmitter. This attenuation takes into account the out-of-band transmissions of the transmitter, the receiver's rejection or blocking performance, the different bandwidths of the transmitter and receiver, and the amount of overlap between the transmitted signal and the receiver. It can be seen as the additional loss added to the typical signal propagation loss between the perfectly tuned transmitter and receiver. The mathematical formula for FDR[188] is:

$$FDR(\Delta f) = 10log_{10}\left[\frac{\int_{-\infty}^{+\infty} S(f)\,df}{\int_{-\infty}^{+\infty} S(f)R(f+\Delta f)df}\right]$$

where S(f) is the transmitted power spectral density, R(f) is the receiver selectivity tuned to the transmitter center frequency, and Δf is the center-to-center frequency separation between the transmitter and receiver. That is, Δf=0 means the signals have the same center frequency. If a six megahertz television channel and a five megahertz LTE channel are directly adjacent, Δf=5.5 MHz, and if there is a seven megahertz edge-to-edge guard band between them Δf=12.5 MHz. We utilized trapezoidal numerical integration to evaluate the integrals in this FDR equation using a frequency increment of 100 kHz.

84. Curves Used. To calculate the FDR, we need curves for the transmitter spectral density and the receiver frequency selectivity. In general, we follow the relevant assumptions laid out in the *Inter-Service Interference PN*,[189] which several commenters support.[190] Ericsson suggests these parameters should be used for analyzing guard bands as well as inter-service interference.[191] The National Association of Broadcasters, however, suggests that the LTE parameters should be replaced by the highest power allowed by our adopted rules.[192] We decline to adopt NAB's approach. In analyzing the

[186] Specifically, the FDR methodology compares the interference potential to a theoretical situation where all the transmitter power falls directly on the receiver's desired channel. For example, if a transmitted signal reaches a receiver at a power of -40 dBm, and the FDR is 50 dB, this means the interference is equivalent to -90 dBm in the receiver's channel. While FDR is generally lowest for no frequency separation, it is not necessarily zero in that case. The FDR value can also be viewed as the amount of transmitted signal attenuation at the receiver, which depends on the frequency offset (separation) between the receiver and transmitter due to the receiver detuning and different receiver and transmitter bandwidth overlaps.

[187] Consider a six megahertz interfering signal and three megahertz receive channel. If the center frequencies are aligned, ignoring OOBE and blocking considerations, we expect an FDR of 3 dB, as only half the transmitter's power falls in the receiver channel. (Recall that 3 dB is a factor of two.) FDR calculations do take into account the transmitter OOBE and receiver blocking as well as the channel bandwidths and in-channel power, providing one number that accounts for both OOBE and blocking (or overload) interference.

[188] FDR Program, http://ntiacsd ntia.doc.gov/msam/FDR/FDR_PROGRAM.doc at 1–2 (last visited Apr. 17, 2014).

[189] *See e.g.*, *Inter-service Interference PN*, 29 FCC Rcd at 730–34.

[190] *See, e.g.*, CTIA *Inter-service Interference PN* Comments at 7, Sprint *Inter-service Interference PN* Comments at 4–5.

[191] Ericsson *Inter-service Interference PN* Comments at 2.

[192] NAB *Inter-service Interference PN* Comments at 13.

impact of frequency separation on the likelihood of interference, the values we choose here will prevent the likelihood of harmful interference while promoting spectrum efficiency.

85. For the television transmitter, we use the mask set out in our rules and the maximum allowed EIRP.[193] AT&T and Intel suggest that we could reduce the potential for harmful interference by choosing to repack only transmitters at or below 50 kW adjacent to the guard band.[194] However, Google argues that to do so would "restrict the Commission's flexibility when repacking remaining broadcasters in each market in a manner that ensures optimal use of remaining television band spectrum."[195] We decline to consider this due to the increase in repacking complexity. For the television receiver, we use the adjacent-channel rejection provided by the ATSC Recommended Practice on receiver performance.[196] For the mobile broadband BS transmitter, we use an EIRP of 63 dBm and the OOBE mask we adopt in this Order, which is $43+10\log_{10}(P)$ measured in 100 kHz, or -13 dBm / 100 kHz, outside of the transmit channel.[197] For the mobile broadband receivers, we use the 3GPP standards for LTE UE receivers, assuming LTE performance will be representative of mobile broadband technologies deployed at 600 MHz.[198] The curves we use are shown in Figures 15 and 16. As an example, these curves are shown with an edge-to-edge offset of seven megahertz. However, all offsets are considered in calculating the FDR curves.

[193] 47 C.F.R. § 73.622(h).

[194] AT&T Comments at 22, Exh. A at 26–27; Intel Reply at 19–20.

[195] Google Reply at 6.

[196] *See* ATSC Recommended Practice A/74: Receiver Performance Guidelines, section 5.4.2, Adjacent Channel Rejection, 7 Apr. 2010, available at http://www.atsc.org/cms/standards/a_74-2010.pdf (last visited May 1, 2014).

[197] The EIRP, as in the *Inter-service Interference PN*, is based on a 2x40 watt PA (49 dBm), 15 dBi of antenna gain, and 1 dB of line loss in a 10 megahertz RF carrier. *Inter-service Interference PN*, 29 FCC Rcd at 733. (These values are expressed as ERPs in the *Inter-service Interference PN* while here they are expressed as EIRPs in the Order and Technical Appendix. *See e.g.* http://www.alcatel-lucent.com/products/multi-carrier-remote-radio-head (last visited Apr. 30, 2014). *See also* Letter from Steve B. Sharkey, Chief, Engineering and Technology Policy for T-Mobile USA, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed May 7, 2014). The adopted OOBE level is discussed in Section VI.B.1.a (Out-of-Band Emission Limits).

[198] 3GPP TS 36.104 V12.3.0 (*3GPP RF BS Standard*) at 79 (7.5.1), 81 (7.6.1.1) available at http://www.3gpp.org/ftp/Specs/archive/36_series/36.104/36104-c30.zip (last visited Apr. 24, 2014). *3GPP RF UE Standard* at 117 (7.5.1), 120 (7.6.1.1).

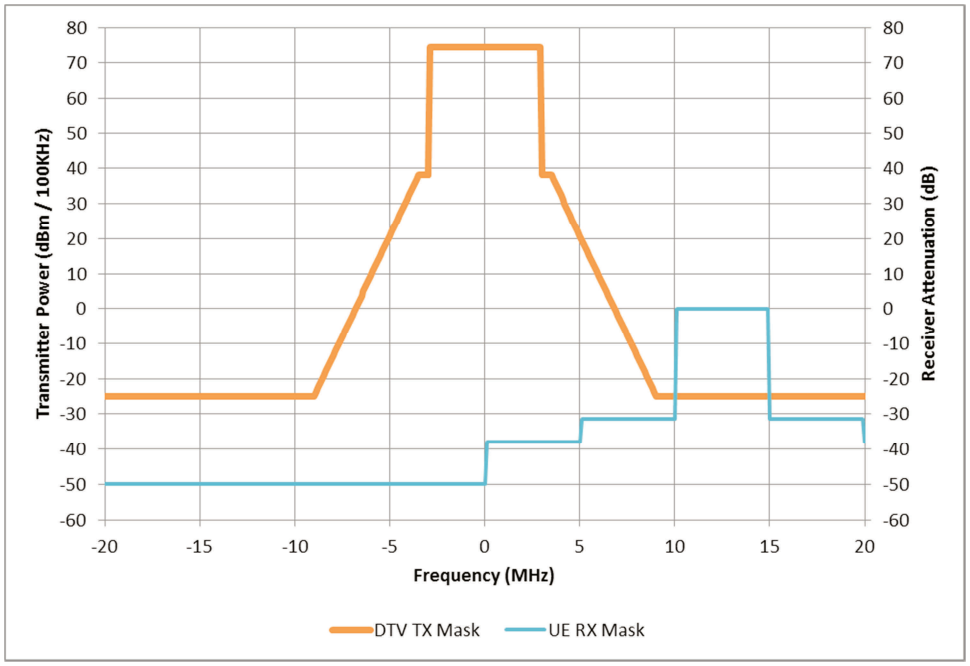

Figure 15. Television Transmitter into Mobile Device Receiver

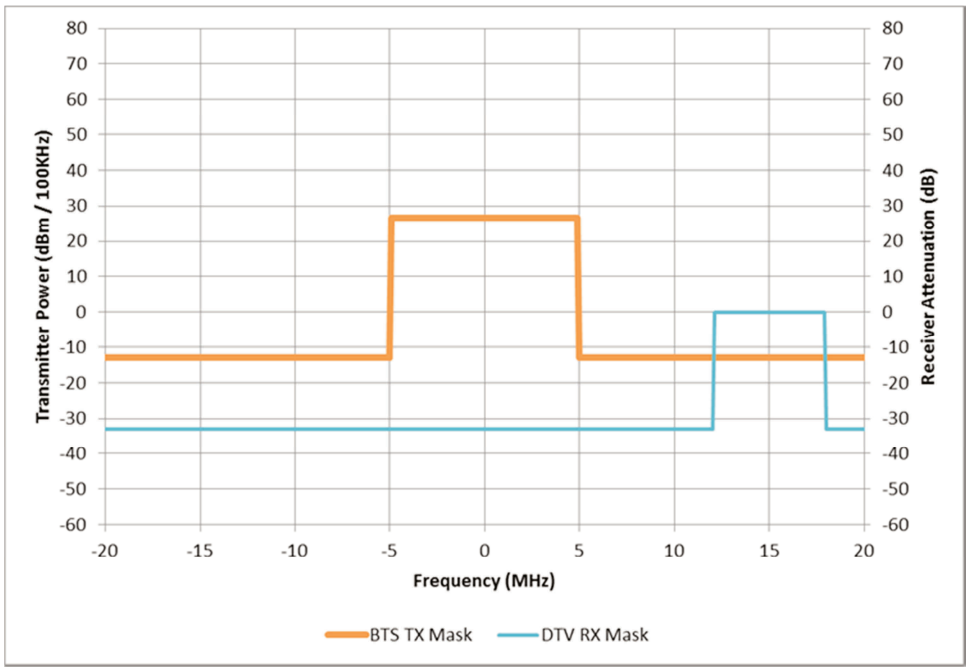

Figure 16. Base Station Transmitter into Television Receiver

86. FDR calculations. The resulting FDR curves for 600 MHz downlink and television are shown in Figure 17. This chart shows the edge-to-edge separation, rather than the center-to-center separation. As shown in Figure 17, when the edge-to-edge separation is negative, the television signal overlaps the LTE channel and the rejection is minimal for both television to LTE and LTE to television cases. Once there is no overlap, with an edge-to-edge separation, or guard band, of zero, the rejection climbs to 32 dB for the LTE UE and 33 dB for the television receiver. The television rejection stays constant with increasing separation, while the UE continues to improve up to 38 dB at five megahertz and to 50 dB at 10 megahertz.

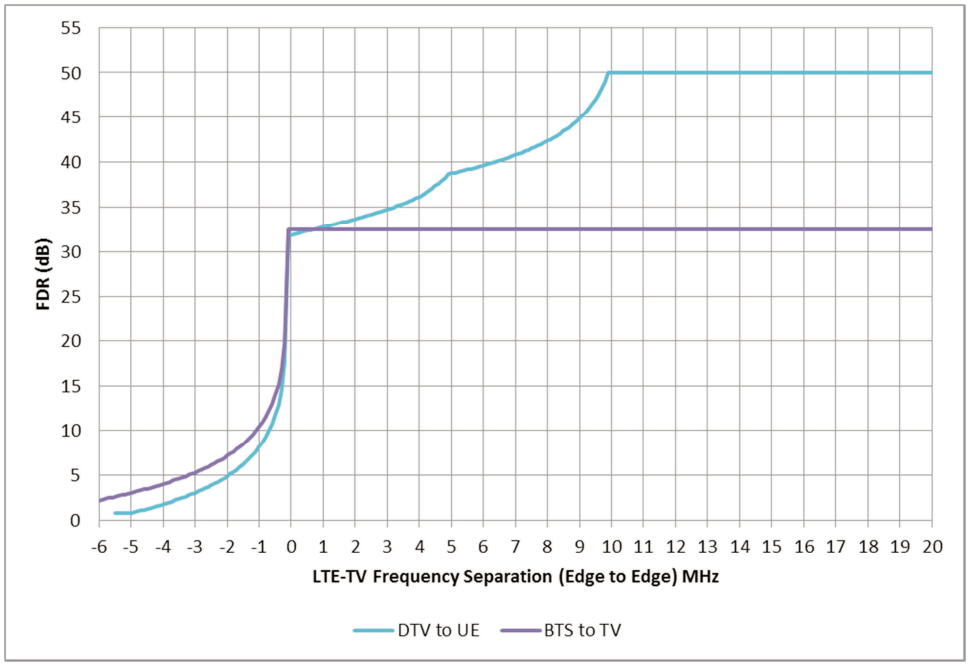

Figure 17. Television and 600 MHz Downlink FDR

87. Wireless broadband filters. The FDR calculations are based on using in-band requirements for the LTE system: the $43+10\log_{10}(P)$ requirement must be met inside the band (outside the operating channel), and the 3GPP blocking requirements used are in-band blocking requirements. In this case, where we are considering guard bands between services, the television service will be outside the band, and the transmit and receive filters of the LTE system provide additional rejection.[199] To take this into account, we consider two assumptions, the minimum reasonable transition bandwidth of seven megahertz, and the 11 megahertz which is achievable by all filter technologies and vendors. Assuming that both transmit and receive filters will provide 25 dB to any signals at least seven megahertz outside the band leads to the FDR results shown in Figure 18. [200]

[199] This is different from the situation considered in the *Inter-service Interference PN*, where the television station may be within the nationwide band plan, and so not necessarily outside the LTE filter pass bands. Therefore these FDR values are somewhat different from the OFR values in the *Inter-service Interference PN*. *Inter-service Interference PN*, 29 FCC Rcd at 731–732.

[200] *See* Technical Appendix § II.A (Mobile Filter Considerations). We apply these numbers to the LTE BS, although in fact it should have much better performance than that afforded by mobile SAW and BAW filters.

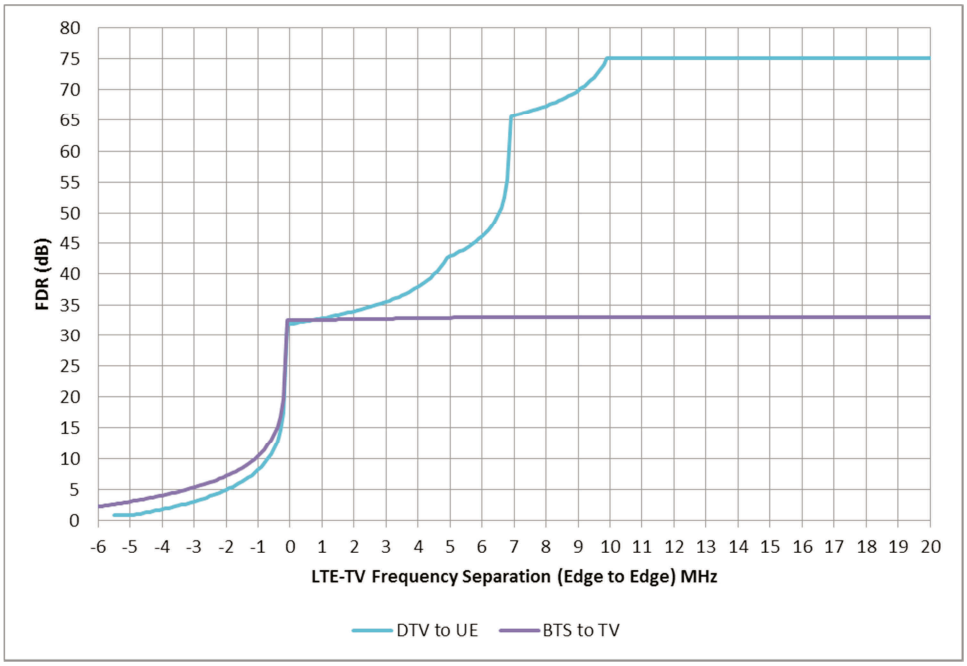

Figure 18. Television and 600 MHz Downlink FDR with Seven megahertz Transition Band

88. As shown above, UE rejection at seven megahertz is 65 dB, significantly higher than the values at five megahertz and below. It continues to improve to 75 dB at 10 megahertz, after which there is little additional improvement.[201] The television rejection is constant at 33 dB as long as there is no channel overlap. Figure 19 shows the results with a transition band of 11 megahertz.

[201] As discussed below, however, creating a guard band of 11 megahertz allows for a wider variety of filters to be used. *But see* Verizon Reply at 4 ("Guard bands . . . that are larger than 10 MHz . . . would be technically unnecessary and unreasonable from an engineering standpoint.").

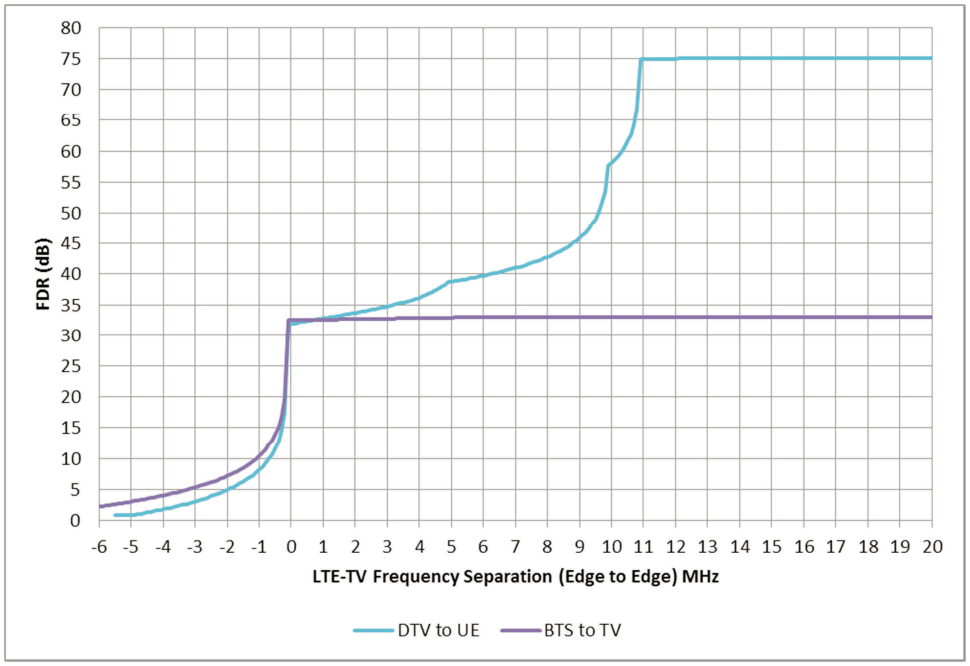

Figure 19. Television and 600 MHz Downlink FDR with 11 megahertz Transition Band

89. In this case, UE rejection at 10 megahertz is 58 dB, and improves to 75 dB at 11 megahertz, after which there is little additional improvement.[202] The television rejection is still nearly constant at 33 dB as long as there is some guard band.

90. Google argues that based on the TV signal strength experienced by the mobile, the TV to LTE downlink frequency separation should range from seven megahertz (for -27 dBm) to 12 megahertz (for -7 dBm), and then shows plots of TV signal strength with some areas of over -11 dBm, corresponding to 11 megahertz.[203] As discussed above, we consider a signal strength of over -23 dBm very unlikely, which using Google's table would require no more than eight megahertz of guard band.[204] In addition, Google provides no support for its table converting TV signal strength to guard band size, so we do not rely on it. Google and Microsoft also argue that guard bands of 6 to 12 megahertz allow significant reverse intermodulation interference to LTE,[205] but as discussed above we find no significant potential for reverse intermodulation interference.[206] Finally, Google and Microsoft argue that a Kansas University study shows that LTE levels of -34 dBm in a channel adjacent to DTV and -23 dBm in a second adjacent channel may cause interference to DTV receivers. The first adjacent channel does not occur in our proposal since our guard band is always more than six megahertz. Although Google states that the Kansas University study shows that DTV receivers are actually more susceptible to second adjacent interference, our television rules do not currently protect against second adjacent interference, and we have not seen any evidence of widespread problems resulting from this type of interference. Therefore we decline to consider this factor in setting the appropriate guard band size.

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[202] As discussed below, however, creating an 11 megahertz guard band allows for a wider variety of filters to be used. *But see* Verizon Reply at 4 ("Guard bands . . . that are larger than 10 MHz . . . would be technically unnecessary and unreasonable from an engineering standpoint.").

[203] *See* Google Jan. 30, 2014 *Ex Parte* Letter, Att. at 2 (Modeling Overview).

[204] *See* Technical Appendix § C.1.c (Explanation of Inputs); Google Jan. 30, 2014 *Ex Parte* Letter, Att. at 2 (Modeling Overview).

[205] *See* Google/Microsoft Comments, Att. at 5.

[206] *See* Technical Appendix § II.C.1.b (Additional Considerations).

91. Several commenters state that the 3GPP blocking specification of -44 dBm at 10 megahertz from a five megahertz LTE carrier implies that the guard band must be at least 10 megahertz.[207] For example, Alcatel-Lucent compares this to the likely TV power from the Nokia study, concludes that additional filter attenuation is needed, and suggests that at least 10 megahertz is need to achieve the filter attenuation.[208] The calculations of RIM and Intel are similar.[209] As mentioned above, in this Appendix we determine that a likely TV power at the UE is -23 dBm, so 21 dB of attenuation would be needed using this approach.[210] However, our analysis of mobile filters corroborates our conclusion that it is reasonable to expect 25 dB isolation or more at seven megahertz of separation, so a seven megahertz guard band is in fact adequate, although we also recognize that creating an 11 megahertz guard band allows for a wider variety of filters to be used. The FDR analysis above uses the 3GPP specification and our filter assumptions and the conclusion is consistent that the guard band should be at least seven megahertz, although larger guard bands offer some additional protection up to 11 megahertz. Taken with our filter analysis, this corroborates our decision that the guard band between television and 600 MHz services should be at least seven megahertz and no larger than 11 megahertz.

92. Nokia describes an Asia-Pacific study that suggested that a 5 to 6 megahertz guard band addresses some but not all interference cases studied, while a nine megahertz guard band improves but does not solve the interference cases, and makes several recommendations including improving LTE UE RX filters.[211] Nokia does not draw specific conclusions from this, and notes that it relies more heavily on the DVB-T standard than the ATSC standard used in the U.S. Google also mentions European and Asian-Pacific studies.[212] We consider our FDR analysis more relevant, as it is based on U.S. TV bandwidths and rules, rather than other standards. DISH and CCIA suggest that six megahertz is an adequate guard band, with DISH point out that six megahertz separation between Channel 51 and Band 17 has resulted in usable LTE spectrum.[213]

93. We consider all these factors in the assignment of specific guard bands in specific band plans below, assigning guard bands between seven and 11 megahertz in all cases.[214]

2. Potential for Interference between 600 MHz Downlink and WMTS

94. The decision in the Report and Order provides a three megahertz guard band between channel 37 and adjacent wireless broadband downlink stations to avoid harmful interference between new wireless base stations and WMTS stations. Below, we explain the methodology used to make this determination.

95. As an initial matter, we only consider the potential of adjacent channel interference — from OOBE and overload interference —because the new wireless base stations will not operate co-channel to any WMTS station. We consider the transmit characteristics of LTE wireless broadband base stations operating under differing conditions: (1) consistent with our treatment of base stations in the *Inter-Service Interference PN*;[215] (2) as adopted in the Order; and (3) as provided in the 3GPP standard.[216]

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[207] Alcatel-Lucent Comments at 15; RIM Comments at 11; Intel Comments at 18.

[208] Alcatel-Lucent Comments at 15.

[209] Rim Comments at 11; Intel Comments at 18.

[210] *See* Technical Appendix § II.C.1.c (Explanation of Inputs).

[211] Nokia Comments at 18–19.

[212] Google Comments at 40–41.

[213] CCIA Comments at 2; DISH Reply at 4.

[214] *See* Technical Appendix § III.B (Specific Band Plan Scenarios).

[215] *See* Technical Appendix n. 197.

We also use the receiver characteristics of WMTS stations and their protection criteria as provided by GEHC.[217]

96. Specifically, the *Inter-service Interference PN* considered transmit power of 2000 W/10 MHz or 200 W/MHz. The rules adopted in the Order specify that a 600 MHz band wireless broadband base station can operate with a maximum power of 1000 W/MHz ERP.[218] In addition, Section 27.53 of our rules specify that emissions outside of a licensee's band of operation be attenuated to at least -13 dBm (*i.e.,* emissions are reduced by at least $43 + 10 \log_{10}(P)$ dB). We also observe that the 3GPP standard provides an LTE spectrum emission mask that ranges from -7dBm/100 kHz at the channel edge to -14 dBm/100 kHz at 5 megahertz away from that edge.[219] We expect emissions from actual devices to decrease consistent with the roll-off specified in the 3GPP standard. Thus, we can provide analysis based on the typical power levels transmitted by wireless base stations[220] and a worst case analysis based on the use of the maximum allowable power under the rules. In both cases, we also conduct a worst case analysis based on the assumption of no reduction in out-of-band energy beyond the specified -13 dBm and a more realistic analysis where the out-of-band energy decreases with increasing frequency separation from the band edge.[221] By analyzing the potential for interference to WMTS from base stations operating at 200 W/MHz EIRP, we show that these stations are protected under the deployment scenarios carriers employ today. However, because of the nature of the applications provided by WMTS, we also conducted the analysis with respect to the maximum power allowed under the rules so that we ensure WMTS is still protected if there is an instance where a carrier deploys a higher powered base station.

97. GEHC specifies protection criteria that limiting the field strength as measured at the perimeter of a health care facility at the edge of channel 37 to 20mV/m/MHz would protect WMTS from overload interference. Similarly, limiting the field strength to 10μV/m/100 kHz would provide WMTS protection from out-of-band interference. GEHC also provides characteristics of a typical WMTS receiver bandpass filter designed to protect the low noise amplifier (LNA) of the receiver's front-end from overload by strong nearby signals.[222] Typically, such a filter is part of a distributed antenna system (DAS) active antenna module. The FCC transmit mask and out-of-band emissions mask, a more realistic emission mask that begins at -13 dBm/100 kHz and decreases at the same slope as the LTE 3GPP standard mask, as well as the WMTS protection criteria can be seen in Figure 20 and the WMTS bandpass filter frequency response is depicted in Figure 21.

(Continued from previous page)

[216] *See* 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) Radio Transmission and Reception (Release 10) (2013), at 32, Table 6.6.3.1-3 (3GPP Technical Standards); See § VI.B.1.b (Power Limits).

[217] GEHC Comments at 24.

[218] See § VI.B.1.b (Power Limits).

[219] *See* 3GPP Technical Standard at 32, Table 6.6.3.1-3.

[220] *See* T-Mobile *ex parte* filed May 7, 2014.

[221] We expect the emission mask for actual devices would meet or exceed our requirement that out-of-band emissions be below -13dBm/100 kHz at the channel edge. In addition, we expect that the out-of-band emissions would decrease in a manner consistent with the LTE 3GPP standard to levels less than -20 dBm/100 kHz at 5 megahertz away from the channel edge.

[222] GEHC Comments at 39 – 46. *See also*, Tai-Saw Technology Company product specification for Part No. TA0326A, 611 MHz SAW Filter available at http://www.taisaw.com/upload/product/TA0326A_Rev%204.0_.pdf.

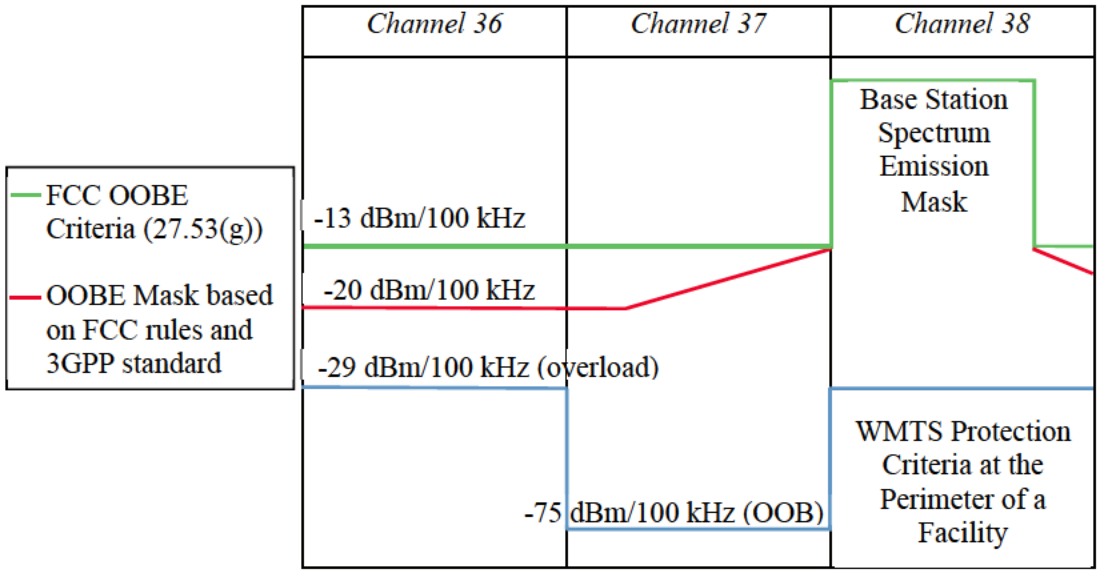

Figure 20. Base Station Spectrum Emission Masks and WMTS Protection Criteria Required at the Perimeter of a Facility

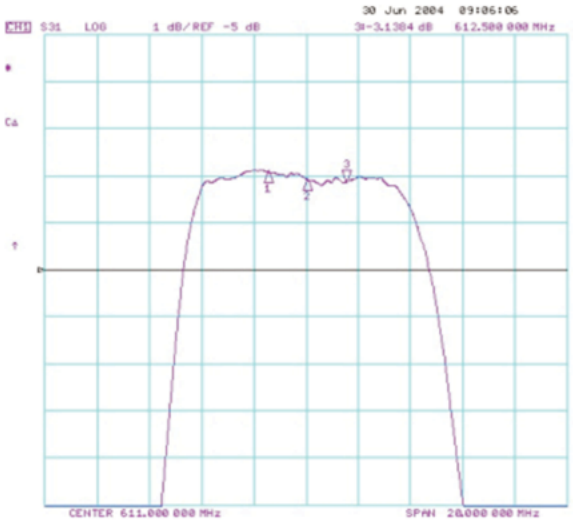

Figure 21. Typical Channel 37 SAW Band Pass Filter Frequency Response

98. For our analysis, we converted the WMTS field strength protection criteria to maximum allowable EIRP levels in dBm/100 kHz (see Figure 20) using the following formula:

$$EIRP\ (dBm/100\ kHz) = E(dB\mu V/m/100\ kHz) + 20\log_{10}(d) - 104.8$$

Assuming a standard three meter measurement distance, this formula simplifies to:

$$EIRP\ (dBm/100\ kHz) = E(dB\mu V/m/100\ kHz) - 95.3$$

The resulting EIRP limits at the perimeter of the healthcare facility to protect WMTS in channel 37 are:

-29dBm/100 kHz[223] for overload interference; and

[223] This is based on the provided protection criteria of 20mV/m/MHz = 20,000 µV/m/MHz = 2,000 µV/m/100kHz = 66 dBµV/m/100kHz.

-75dBm/100 kHz for out-of-band interference.

99. Referring back to Figure 20, we note that the power spectral density plot clearly shows that OOB and overload interference to WMTS with no guard band or distance separation is above the calculated protection limits. The separation distance necessary to protect WMTS receivers from wireless base stations can be calculated using a conservative free space propagation model (Equation 1).

$$d = \frac{c}{4\pi f}\sqrt{\frac{P}{P_r}} \quad \text{(Equation 1)}$$

where:
$P = P_t - L$ (EIRP in milliwatts)
P_t = total transmit EIRP (dBm) integrated over the 6 megahertz channel
L = excess loss (building attenuation, etc.)[224]
P_r = WMTS protection criteria (milliwatt) at the WMTS perimeter
f = frequency in Hz (611,000,000 Hz or 611 MHz)
c = speed of light ($3x10^8$ m/s)
d = separations distance (m)

100. To calculate the necessary separation distance to protect against overload interference, we consider in our analysis the rejection of the WMTS receive filter and the total power in the adjacent channel assuming a 5 megahertz full power wireless base station which results in 200 watts/megahertz for the typical case and 1000 watts/megahertz EIRP for the worst case. Various size guard bands are assumed by sliding the wireless base station power spectral density plot away from channel 37 in 1 megahertz increments. At each guard band the total average power in the adjacent channel is calculated and the separation distance necessary to protect WMTS is determined. Table 10 shows the distance needed to protect WMTS from adjacent channel interference for wireless base stations operating at typical power levels and in accordance with the Commission's out-of-band emission requirement. Table 11 shows the protection distances needed when the combined FCC and 3GPP emission masks are considered. Tables 12 and 13 similarly show the protection distances for the worst case of a base station operating at the maximum power allowed under the rules. Because overload interference is caused by the overlap of the WMTS filter into the adjacent channel (e.g., channel 38), the interference is dominated by the wireless base station in-band power which results in the same protection distances for a given transmit power regardless of emissions mask analyzed. This is shown by the identical results between Tables 10 and 11 and between Tables 12 and 13. Calculations were made using various values for additional loss ranging from the very conservative 0 dB to the 20 dB used by GEHC. The tables show that for a three megahertz guard band under both out-of-band emission conditions, the separation distance necessary to protect WMTS from overload interference is reasonably small regardless of transmitter power, even using a conservative value for additional loss. The distance is less than the distance that would be expected between the perimeter of a medical facility and a nearby wireless base station.[225]

[224] In its analysis, GEHC assumed 20 dB of excess loss due to building attenuation and other factors. GEHC Comments at 47–51.

[225] The worst case deployment scenario would entail a full power wireless base station located on a roof top across from the health care center with direct line of sight into that facility.

Frequency Offset (MHz)	Base Station Power in Adjacent Channel[226]		SAW Filter Rejection[227] (dB)	Protection Distance (m)		
	W/6 MHz	dBm/100 kHz		Additional Loss (dB)		
				0	10	20
0	1000	42.22	0.5	134.21	42.44	13.42
1	1000	42.22	1	126.71	40.07	12.67
2	800	41.25	3	90.02	28.47	9.00
3	600	40	10	34.82	11.01	3.48
4	400	38.24	14	17.94	5.67	1.79
5	200	35.23	18	8.00	2.53	0.80

Table 10. Separation Distances to Protect WMTS from Overload Interference (200 W/MHz Transmitter and Emission Mask with No Out-of-Band Roll-Off)

Frequency Offset (MHz)	Base Station Power in Adjacent Channel		SAW Filter Rejection (dB)	Protection Distance (m)		
	W/6 MHz	dBm/100 kHz		Additional Loss (dB)		
				0	10	20
0	1000	42.22	0.5	134.21	42.44	13.42
1	1000	42.22	1	126.71	40.07	12.67
2	800	41.25	3	90.02	28.47	9.00
3	600	40	10	34.82	11.01	3.48
4	400	38.24	14	17.94	5.67	1.79
5	200	35.23	18	8.00	2.53	0.80

Table 11. Separation Distances to Protect WMTS from Overload Interference (200 W/MHz Transmitter and Combined FCC/3GPP Emission Mask)

Frequency Offset (MHz)	Base Station Power in Adjacent Channel		SAW Filter Rejection (dB)	Protection Distance (m)		
	W/6 MHz	dBm/100 kHz		Additional Loss (dB)		
				0	10	20
0	5000	49.21	0.5	300.11	94.90	30.01
1	5000	49.21	1	283.32	89.59	28.33
2	4000	48.24	3	201.29	63.65	20.13
3	3000	46.99	10	77.87	24.62	7.78
4	2000	45.23	14	40.11	12.62	4.01
5	1000	42.22	18	17.89	5.66	1.79

Table 12. Separation Distances to Protect WMTS from Overload Interference (1000 W/MHz Transmitter and Emission Mask with No Out-of-Band Roll-Off)

[226] This is the total power of the base station transmitter across either channel 36 or channel 38.

[227] The filter rejection parameter is only used for overload interference calculations as there is no rejection in the filter passband to suppress transmitter out-of-band emissions.

Frequency Offset (MHz)	Base Station Power in Adjacent Channel		SAW Filter Rejection (dB)	Protection Distance (m)		
	W/6 MHz	dBm/100 kHz		Additional Loss (dB)		
				0	10	20
0	5000	49.21	0.5	300.11	94.90	30.01
1	5000	49.21	1	283.32	89.59	28.33
2	4000	48.24	3	201.29	63.65	20.13
3	3000	46.99	10	77.87	24.62	7.78
4	2000	45.23	14	40.11	12.68	4.01
5	1000	42.22	18	17.90	5.66	1.79

Table 13. Separation Distances to Protect WMTS from Overload Interference (1000 W/MHz Transmitter and Combined FCC/3GPP Emission Mask)

101. Similarly, the necessary separation distance to protect against OOB interference can be calculated. For this analysis, the average transmitter power into the passband of the WMTS receiver in channel 37 is determined by integrating the out-of-band transmitter power spectral density over the 6 MHz channel bandwidth for the various guard band sizes. Tables 14 through 17 show that for both transmit power cases and under both emission masks, a three megahertz guard band provides reasonable small separation distances to protect WMTS from OOB interference; even smaller than that needed to protect from overload interference. Thus, we conclude that a three megahertz guard band will protect WMTS devices from nearby wireless base stations.

Frequency Offset (MHz)	Base Station OOB Power into channel 37		Protection Distance (m)		
			Additional Loss (dB)		
	(mW/6 MHz)	(mW/100 kHz)	0	10	20
0	3	0.05	49.19	15.56	4.92
1	3	0.05	49.19	15.56	4.92
2	3	0.05	49.19	15.56	4.92
3	3	0.05	49.19	15.56	4.92
4	3	0.05	49.19	15.56	4.92
5	3	0.05	49.19	15.56	4.92

Table 14. Separation Distances to Protect WMTS from Out-of-Band Interference (200 W/MHz Transmitter and Emission Mask with No Out-of-Band Roll-Off)

Frequency Offset (MHz)	Base Station OOB Power into channel 37		Protection Distance (m)		
			Additional Loss (dB)		
	(mW/6 MHz)	(mW/100 kHz)	0	10	20
0	1.34	0.022	32.89	10.40	3.29
1	1.05	0.017	29.11	9.20	2.91
2	0.83	0.013	25.88	8.18	2.58
3	0.7	0.012	23.73	7.51	2.37
4	0.63	0.011	22.55	7.13	2.25
5	0.6	0.010	21.97	6.95	2.20

Table 15. Separation Distances to Protect WMTS from Out-of-Band Interference (200 W/MHz Transmitter and Combined FCC/3GPP Emission Mask)

Frequency Offset (MHz)	Base Station OOB Power into channel 37		Protection Distance (m)		
			Additional Loss (dB)		
	(mW/6 MHz)	(mW/100 kHz)	0	10	20
0	3	0.05	49.19	15.56	4.92
1	3	0.05	49.19	15.56	4.92
2	3	0.05	49.19	15.56	4.92
3	3	0.05	49.19	15.56	4.92
4	3	0.05	49.19	15.56	4.92
5	3	0.05	49.19	15.56	4.92

Table 16. Separation Distances to Protect WMTS from Out-of-Band Interference (1000 W/MHz Transmitter and Emission Mask with No Out-of-Band Roll-Off)

Frequency Offset (MHz)	Base Station OOB Power into channel 37		Protection Distance (m)		
			Additional Loss (dB)		
	(mW/6 MHz)	(mW/100 kHz)	0	10	20
0	1.34	0.022	32.89	10.40	3.29
1	1.05	0.017	29.11	9.20	2.91
2	0.83	0.013	25.88	8.18	2.58
3	0.7	0.012	23.73	7.51	2.37
4	0.63	0.011	22.55	7.13	2.25
5	0.6	0.010	21.97	6.95	2.20

Table 17. Separation Distances to Protect WMTS from Out-of-Band Interference (1000 W/MHz Transmitter and Combined FCC/3GPP Emission Mask)

102. Finally, we note that the three megahertz guard band will also provide protection under other deployment scenarios such as a 10 megahertz wide transmit channel. Based on the adopted out-of-band emission requirements and the 3GPP standard, the out-of-band characteristics are identical

regardless of whether the transmitter is 5 or 10 MHz wide.[228] Thus, the calculated separation distances will not change for such deployments.

3. Potential for Interference between 600 MHz Downlink and RAS

103. As noted in the Order, there will be a three megahertz guard band between channel 37 and adjacent wireless broadband downlink stations to avoid harmful interference between new wireless base stations and WMTS stations. Because RAS also operates in channel 37, RAS observatories will also benefit from this guard band. However, because the RAS stations are very sensitive, the Order also requires that new wireless base station installations near RAS locations to coordinate with the National Science Foundation (NSF) prior to commencing operation near RAS observatories.

104. We note that RAS observatories using channel 37 are single dish and Very Long Baseline Array (VLBA). As noted in the Order, the Commission already has existing rules currently in place that require notification to the single dish installations at Green Bank, WV and Arecibo, PR.[229] Therefore, we need only consider coordination distance criteria for those RAS stations that make up the VLBA.

105. We base our technical analysis on the RAS interference protection criteria published in ITU-R Recommendation RA.769 and both the FCC and combined FCC/3GPP OOBE limits.[230] The threshold level to protect VLBA stations from OOB interference, -149 dBm/100 kHz, is depicted in Figure 22 along with the wireless base station emission mask.

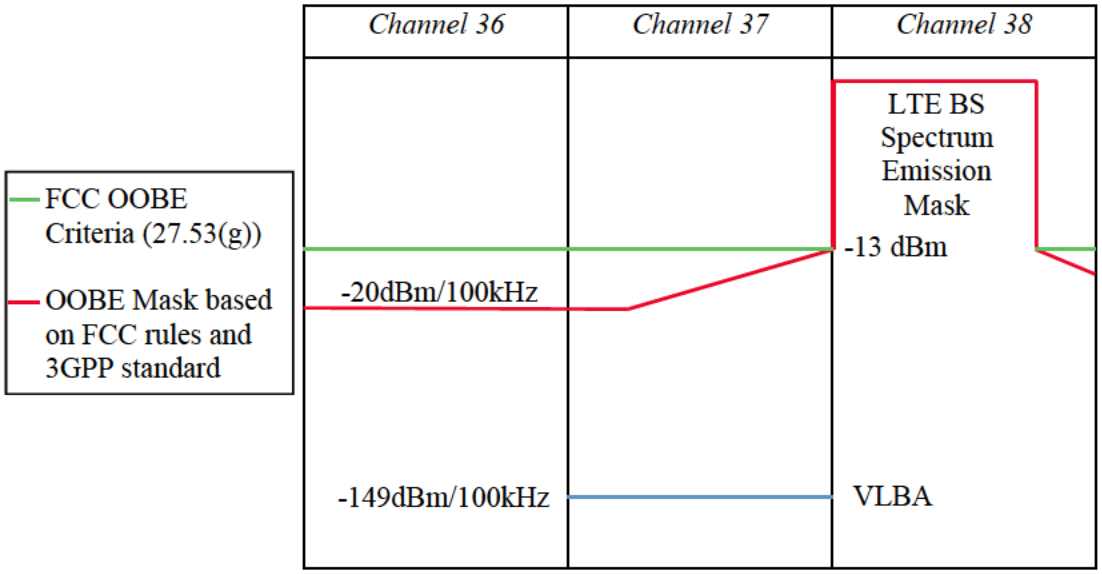

Figure 22. Wireless Base Station Spectrum Emission Mask and RAS Protection Criteria

106. We can therefore calculate the distance at which RAS facilities may be affected by new wireless base stations using a similar methodology as used in the analysis for WMTS. First, we note that NSF suggests a 35 km coordination zone around VLBA sites.[231] Using that as a basis, we can determine

[228] 3GPP Technical Standard at 32, Table 6.6.3.1-3.

[229] *See* 47 C.F.R. § 1.924.

[230] Recommendation ITU-R RA.769 ("Protecting Criteria used for radio astronomical measurements"), Section 27.53 (g) and 3GPP Technical Standard at 32, Table 6.6.3.1-3

[231] Letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius Knapp, Chief, Office of Engineering and Technology, FCC, GN Docket No. 12-268 (filed May 6, 2014) forwarding comments from National Science Foundation (NSF).

the appropriate path loss exponent[232] for signals in the vicinity of RAS sites. In making this calculation, we are also mindful that these calculations are worst case as neither we nor NSF account for "discrete specific terrain shielding surrounding the observatories (such as large mountains)"[233] or any other additional losses. Thus, the path loss equation (Equation 2) with P_t = 0.05 mW/100 kHz (base station out-of-band energy from Table 14 of the WMTS analysis with no guard band) and the stated RAS protection criteria for P_r, we can solve for the path loss exponent, n. Under these conditions, n results in a value of 2.37. Therefore, we conclude that using a path loss exponent of 2.4 is appropriate for analyzing potential interference to VLBA sites. We now consider the more realistic out-of-band case where the energy rolls off at a rate comparable to that in the 3GPP standard. Referring to Table 15 of the WMTS analysis shows that the out-of-band energy into channel 37 when a three megahertz guard band is present is 0.012 mW/100 kHz. Then using Equation 2, a protection distance of 17.2 km is calculated.

$$d^n = \left(\frac{c}{4\pi f}\right)^2 \frac{P_t}{P_r} \qquad \text{(Equation 2)}$$

where:
P_t = total transmit EIRP (milliwatts) integrated over the 6 megahertz channel
P_r = RAS protection criteria (milliwatt)
f = frequency in Hz (611,000,000 Hz or 611 MHz)
c = speed of light ($3x10^8$ m/s)
d = separations distance (m)
n = path loss exponent (2.4)

107. Therefore, it is reasonable to require 600 MHz wireless licensees to conduct coordination with the NSF when deploying base stations in the 600 MHz downlink within 25 km of VLBA observatories so that the parties can take measures, if necessary, to reduce the potential for interference. In taking this action, we are providing for a zone of radius approximately 1.5 times greater than what we calculated (assuming no terrain shielding) in order to ensure that we provide ample protection to these sites. In addition, we note that we do not expect dense wireless base station deployments near VLBA sites as many are in remote areas.

4. Potential for Interference between 600 MHz Uplink and 700 MHz Uplink

108. The 600 MHz uplink band and the Lower 700 MHz A block (698 MHz to 704 MHz) are both used for terrestrial uplink services.[234] Commenters agree that because both of these bands are designed for terrestrial uplink systems, these bands are harmonized, i.e., the adjacent operations are compatible with and do not cause interference to each another, and no guard band is needed.[235] Accordingly, we do not establish a guard band between these two services.[236]

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[232] The path loss exponent describes the relationship between the average received power and distance. Under free space conditions the path loss exponent equals 2. The value under real world conditions usually varies between 2 and 4.

[233] *Id.*

[234] For example, 3GPP defines 699 MHz to 716 MHz for uplink operations in Band 12. *See 3GPP UE RF Standard* at 23 (Table 5.5-1).

[235] *See, e.g.*, Alcatel-Lucent Comments at 21 (no guard band is needed between 600 MHz uplink and lower 700 MHz uplink); CEA *Band Plan PN* Comments at 3 (the 600 MHz uplink block should be situated adjacent to the 700 MHz uplink block, eliminating any need for a guard band between those operations).

[236] The Commission has not created guard bands between harmonized wireless operations. *See* 47 C.F.R. §§ 22.905 (cellular), 24.229 (PCS), 27.5(h) (AWS). In each of these rule parts, examination of the frequencies ranges of each

(continued….)

5. Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)

109. *Background*. In the *NPRM*, the Commission sought comment on the size of the duplex gap.[237] To determine the appropriate duplex gap size, we must examine the potential for interference between the 600 MHz downlink and uplink bands. Many FDD technologies, including FD-LTE, allow simultaneous transmission and reception in the device. By virtue of being co-located within the same device with no propagation loss, the UE transmitter is perhaps the greatest interference threat to the UE receiver when they are in simultaneous use. For this reason, the FDD UE has a duplexer, which is simply a receive filter and a transmit filter designed to operate together to reduce the likelihood of this type of interference. The frequency separation between the two filters is often referred to as the duplex gap.[238] Factors that affect the impact of frequency separation on UE self-interference are the transmitter's OOBE and the capability of the UE filters.[239] Commenters do not agree about the appropriate size for the duplex gap. A number of device manufacturers and wireless carriers state that the duplex gap should be around 10 to 12 megahertz[240] while other commenters argue that a duplex gap of 20 megahertz or more is reasonable.[241]

110. *Discussion*. Based on our analysis of the record, a duplex gap of 11 megahertz is technically reasonable to prevent self-interference. This determination is corroborated by our technical findings, below.

111. OOBE. As discussed above in Section II.C.2 of the Technical Appendix (User Equipment Self-Intermodulation), the strongest OOBE will be in the areas covered by the third order self-

(Continued from previous page)
block shows that these blocks are contiguous without guard bands or other separations. *See also* Technical Appendix § II.E (Effect of Frequency Separation on Inter- and Intra-service Interference (Guard Bands)).

[237] *NPRM*, 27 FCC Rcd at 12417, para. 167.

[238] The duplex gap may also refer to all the frequencies between the two filters, and in this proceeding it has been used by commenters in several related but distinct senses, such as all frequencies between the uplink and downlink pass bands regardless of the filter arrangement. As discussed in the Order, the spectral separation to prevent interference between the uplink and downlink band in the 600 MHz Band is a guard band under the Spectrum Act. *See* § III.C.2.b (Guard Bands). To avoid confusion, we will refer to the spectrum between the uplink and downlink bands in the 600 MHz Band as a duplex gap even though it is technically a guard band.

[239] *See* Sumit Verma, Qualcomm, *600 MHz Band Plan Workshop Transcript* at 29–32.

[240] *See, e.g.*, Alcatel-Lucent Comments at 21 ("The duplex gap between wireless uplink and wireless downlink should be between 10 and 12 MHz"); AT&T Reply at 21 ("the size of the duplex gap needed to avoid such adjacent-channel interference is 10–12 megahertz"); Letter from H. Nwana, Executive Director, Dynamic Spectrum Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed May 7, 2014) ("[T]he duplex gap between uplink and downlink licensed operations must be 11 or 12 MHz at an absolute bare minimum to create one usable 6 MHz unlicensed channel and ensure that licensed devices are protected from harmful interference."); Letter from Michael Calabrese, New America Foundation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 at 2 (filed May 6, 2014) ("The Order should find that a duplex gap of [at] least 11–12 MHz wide is technically reasonable."); Qualcomm Reply at 18 ("A duplex gap of approximately 11 to 12 MHz is the minimum needed to avoid interference between mobile downlink and uplink."); Verizon Comments at 18 ("The [duplex] gap must be at least 10 MHz (and possibly larger), depending on the overall band design."); Verizon Reply at 3–4 ("[D]uplex gaps that are larger than . . . 11 MHz . . . would be technically unnecessary and unreasonable from an engineering standpoint.").

[241] Comcast Comments at 44 ("the Commission is well within its authority to adopt the 'Down from 51' band plan proposal, designate at least a contiguous 20 MHz block as the duplex gap"); Free Press *Band Plan PN* Reply at 5 ("sound engineering suggests that a duplex gap of at least 20 megahertz would serve as a technically reasonable method of protecting against interference"); NTCA Reply at 3 ("a duplex gap of at least 20 MHz—is technically reasonable and is the best way to promote the objectives of the Spectrum Act and the public interest"); WSA Comments at 25 ("WSA recommends that a . . . duplex gap size could be 18–24 MHz").

intermodulation products.[242] Google, Microsoft, and Alcatel-Lucent suggest that the duplex gap should be wide enough so that no third order products from the transmit channel fall into the paired receive channel.[243] As discussed above, we agree that this is necessary, but disagree with Google and Microsoft's conclusion that the duplex gap must equal the pass band size (that is, over 25 megahertz for a 25+25 megahertz scenario).[244] Instead, we agree with Alcatel-Lucent's conclusion that the 25+25 megahertz scenario results in an 11 megahertz requirement, and extend the logic to other scenarios, all of which require less than 11 megahertz as summarized in Table 9.[245] Google also argues that 3GPP bands with larger gaps often have better receiver sensitivity, and therefore it is reasonable to enlarge the duplex gap to optimize receiver sensitivity.[246] However, this also increases the antenna bandwidth, and as discussed above, this may in turn lead to degradation, so there may not be improved UE performance with enlarged duplex gaps.[247]

112. Transition bandwidth. In some cases the requirement to avoid overlap of third order product leads to very small separations.[248] However, to achieve adequate rejection the transmit band must be in the stop band of the receive filter, and the receive band must be in the stop band of the transmit filter. This means the separation between the uplink and downlink must be at least as large as the transition band. Above we determined that the transition band must be at least seven megahertz to achieve 25 dB of rejection, but a larger transition band allows a wider variety of filter technologies and vendors, with 11 megahertz supportable by both SAW and BAW technologies and many filter vendors. However, as also discussed above, considerably greater rejection is needed to prevent self-interference, 50 dB or more. In addition, we note that while we consider meeting a seven megahertz transition bandwidth to be achievable, it may be more difficult to meet it on both sides on the downlink filter. Considering these factors, an 11 megahertz transition bandwidth is most appropriate, and technically reasonable, for the duplex gap.

113. Minimum duplex gap. Since the 11 megahertz transition bandwidth is also large enough to prevent overlap of third order self-intermodulation products in all cases, the minimum duplex gap considering both OOBE and transition bandwidth is 11 megahertz.

114. As we have pointed out, existing bands have duplex gaps of varying sizes, both in absolute terms and relative to the size of the pass band.[249] These gaps may result from a wide variety of factors, including what spectrum bands are available for pairing uplink and downlink for any given service. In considering what is technically reasonable to prevent harmful interference, we must balance the goal of optimizing receiver sensitivity against these other factors, including antenna performance and efficient use of spectrum. The fact that 3GPP has implemented bands with larger duplex gaps is therefore not an indication that these sizes are necessary or desirable for technical considerations.[250] There is

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[242] *See* Technical Appendix § II.C.2 (User Equipment Self-Intermodulation).

[243] *See* Google/Microsoft Comments, App. at 4; Alcatel-Lucent Reply at 7.

[244] We note that in their May 8, 2014 filing, Google and Microsoft express support for the establishment of a nationwide 11 MHz duplex gap. Letter from Paul Margie, Counsel, Google, Inc. and Microsoft, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed May 8, 2014).

[245] *See* Technical Appendix § II.C.2 (User Equipment Self-Intermodulation).

[246] *See* Google/Microsoft Comments, App. at 2; *NPRM*, 27 FCC Rcd at 12421, para. 178 n.262.

[247] *See* Technical Appendix § II.B (Mobile Antenna Considerations).

[248] *See* Technical Appendix § II.C.2 (User Equipment Self-Intermodulation).

[249] *See* Technical Appendix Table 9.

[250] For this reason, Motorola's comment that the average duplex gap for bands below 1 GHz is 19 megahertz is not an argument that the duplex gap should be 19 megahertz. Although Motorola states the smallest duplex gap below 1 GHz is 10 megahertz, as shown in Table 1, it is currently five megahertz. As the Commission noted in the *H Block*
(continued….)

substantial record support for our sizing of the duplex gap as technically reasonable to prevent harmful interference in light of the band plans adopted for the 600 MHz Band. These views are corroborated by the foregoing analysis.

III. BAND PLAN

A. Overview

115. As discussed in the Order, the amount of 600 MHz spectrum that we can repurpose for wireless services, which will determine the final 600 MHz Band Plan, will depend on the outcome of the incentive auction.[251] Therefore, instead of adopting a single band plan in the Order, we adopt a set of band plan scenarios that comprise the 600 MHz Band Plan, one of which will become the final 600 MHz Band Plan.[252] Below, we set forth these scenarios and demonstrate how we apply the technical considerations discussed above in practice. We will determine how these scenarios will be used in the incentive auction (i.e., how we will determine which scenario will apply at a given point in the incentive auction, including how the scenario that will become the final 600 MHz Band Plan will be determined) through pre-auction public notices, including the *Comment PN* and the *Procedures PN*, as discussed in the Order.[253]

116. Below we provide a diagram depicting all of the potential 600 MHz Band Plan scenarios we may use in the forward auction to license the 600 MHz Band.[254] In Section III.B of the Technical Appendix (Specific Band Plan Scenarios), we discuss in depth each of the potential scenarios.[255] We emphasize that we may not necessarily employ each of these scenarios in the forward auction for the reasons discussed above. Further, we do not offer a scenario for each possible number of cleared television channels. Because we are licensing paired 5+5 blocks (i.e., 10 megahertz) from cleared/repurposed six megahertz channels and need to account for spectrum for guard bands as well, we cannot always offer additional sets of spectrum blocks for each television channel cleared. As a result, for example, we can offer four sets of paired blocks from 60 megahertz (10 television channels) repurposed, (i.e., 60 megahertz is our "clearing target") and five sets of paired blocks from 72 megahertz (12 television channels) repurposed, but cannot offer a distinct scenario for a six megahertz clearing target because we cannot offer more sets of licensed blocks than what we are already offering under the 60 megahertz scenario.

(Continued from previous page)
Order, "[p]rivate standards bodies may have other bases for their determinations, which may reflect compromises among the participants that are not subject to the statutory mandates that must inform our actions." *Service Rules for Advanced Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915–1920 MHz and 1995–2000 MHz Bands*, Report and Order, WT Docket No. 12-357, 28 FCC Rcd 9483, 9509, para. 65 (2013) (*H Block Report and Order)*.

[251] *See* § III.A (Band Plan for the New 600 MHz Band).

[252] *See* § III.A (Band Plan for the New 600 MHz Band).

[253] *See* § IV.A (Overview and Integration of the Reverse and Forward Auctions).

[254] *See* Technical Appendix Fig. 23 (Band Plan Scenarios).

[255] *See* Technical Appendix § III.B (Specific Band Plan Scenarios).

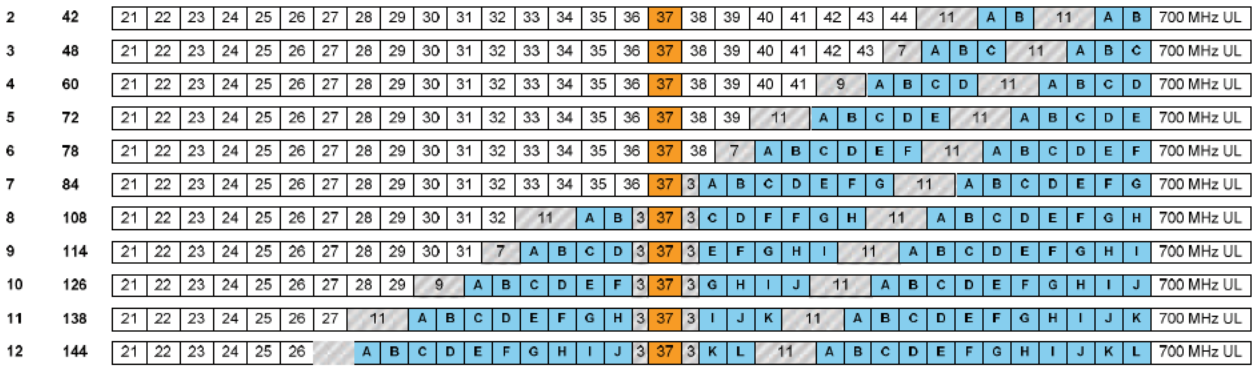

Figure 23. Band Plan Scenarios

B. Specific Band Plan Scenarios

117. Below we discuss in detail the specific 600 MHz Band Plan scenarios we may use in the forward auction. These range from offering two sets of paired blocks to 12 sets of paired blocks, in the configurations shown above. In this Section, we discuss the number of licensed blocks we can offer based on the amount of repurposed spectrum, and the size of the guard bands, including the duplex gap, under each of these scenarios. Section II of the Technical Appendix (Technical Considerations) above provides an extensive discussion of the issues raised here to support these conclusions and details on commenters' positions on these technical considerations that are summarized here.[256]

118. We note that we do not offer a scenario for fewer than two sets of paired blocks or more than 12 sets of paired blocks. As discussed in the Order, the costs outweigh the benefits of offering only one set of paired blocks, given that we would need to clear five television channels in this scenario.[257] Further, we decline to create scenarios for more than 12 sets of paired blocks, i.e., using more than a 144 megahertz clearing target.[258]

119. Specifically, we do not offer scenarios with 13 or more sets of paired blocks, due to the inefficiencies associated with the position of channel 37 (used for RAS and WMTS) in the 600 MHz Band. To offer 14 sets of paired blocks, we would need to place one downlink block above channel 37 and the rest of the downlink blocks below channel 37, resulting in an additional duplexer to support only this one block. Therefore, in this case the costs outweigh the benefits of placing only one downlink block above channel 37.

1. Two Sets of Paired Blocks (42 megahertz repurposed)

120. Under this scenario, shown in Figure 24, we create two sets of paired blocks from 42 megahertz of repurposed spectrum.[259] We establish an 11 megahertz duplex gap, which, as discussed above, is large enough to ensure there is no overlap of third order intermodulation products between transmit and receive channels, and allows for a feasible transition band for the transmit and receive filters. We also use an 11 megahertz guard band between the 600 MHz downlink and television operations, which provides reasonable rejection and allows for an achievable transition bandwidth in the mobile

[256] *See* Technical Appendix § II (Technical Considerations).

[257] *See* § III.A (Band Plan for the New 600 MHz Band).

[258] *See* § III.A (Band Plan for the New 600 MHz Band).

[259] We note that we cannot use this scenario (two sets of paired blocks) for 36 megahertz of repurposed spectrum, because doing so would leave us with only 16 megahertz for guard bands – i.e., a five megahertz guard band between the downlink band and television operations and an 11 megahertz duplex gap, which would be difficult to achieve with mobile filters and below the minimum separation necessary between the 600 MHz downlink band and television operations.

filters. This scenario requires 10 megahertz filter pass bands and 31 megahertz of antenna bandwidth, which no commenters suggest present technical difficulties.

Figure 24. 42 megahertz scenario

2. Three Sets of Paired Blocks (48 megahertz repurposed)

121. The Band Plan scenario for three sets of paired blocks is shown below in Figure 25, which we will use if we have 48 megahertz of repurposed spectrum.[260] Under this scenario, we establish an 11 megahertz duplex gap, which is large enough to ensure there is no overlap of third order intermodulation products between transmit and receive channels, and allows for a feasible transition band for the transmit and receive filters. We create a seven megahertz guard band between the downlink band and television operations, which provides reasonable rejection and allows for a feasible transition bandwidth. This scenario requires 15 megahertz filter pass bands and 41 megahertz of antenna bandwidth, which no commenters suggest present technical difficulties.

Figure 25. 48 megahertz scenario

3. Four Sets of Paired Blocks (60 megahertz repurposed)

122. Under this scenario, shown in Figure 26, we create four sets of paired blocks from 60 megahertz of repurposed spectrum.[261] We create an 11 megahertz duplex gap, which is large enough to ensure there is no overlap of third order intermodulation products between transmit and receive channels, and allows for a feasible transition band for the transmit and receive filters. We also create a nine megahertz guard band between the downlink band and television operations, which provides reasonable rejection and allows for a feasible transition bandwidth. This scenario requires 20 megahertz filter pass bands and 51 megahertz of antenna bandwidth, which no commenters suggest present technical difficulties.

Figure 26. 60 megahertz scenario

4. Five Sets of Paired Blocks (72 megahertz repurposed)

123. The Band Plan scenario for five sets of paired blocks is shown below in Figure 27, which we will use if we have 72 megahertz of repurposed spectrum.[262] Under this scenario, we establish an 11 megahertz duplex gap, which is required in this case to ensure there is no overlap of third order intermodulation products between transmit and receive channels and allow for a transition bandwidth that can be supported by all mobile filter technologies.[263] We establish an 11 megahertz guard band between the downlink band and television operations, which provides reasonable rejection and allows for a

[260] We note that we cannot use this scenario with 42 megahertz (or less) which provides only 12 megahertz for the guard band and duplex gap, which would be difficult to achieve with mobile filter technologies.

[261] We note that we cannot use this scenario with 54 megahertz (or less) which would provide only 14 megahertz for the guard band and duplex gap, which would be difficult to achieve with mobile filters.

[262] We note that we cannot use this scenario with 66 megahertz (or less) which would provide for a five megahertz guard band and an 11 megahertz duplex gap, below what is achievable with mobile filters.

[263] *But see* Alcatel-Lucent Reply at 7 (suggesting that in this case, a 10 megahertz duplex gap could be sufficient in practice because the probability of intermodulation products is low).

feasible transition bandwidth. This plan is similar to the illustrative band plan provided by AT&T, as well as the plans proposed by Intel and Qualcomm.[264] This scenario requires 25 megahertz filter pass bands and 61 megahertz of antenna bandwidth, which no commenters suggest present significant technical difficulties.[265]

Figure 27. 72 megahertz scenario

5. Six Sets of Paired Blocks (78 megahertz repurposed)

124. Under this scenario, shown in Figure 28, we create six sets of paired blocks from 78 megahertz of repurposed spectrum.[266] We create an 11 megahertz duplex gap, which, as discussed above, is required to ensure there is no overlap of third order intermodulation products between transmit and receive channels and allow for a transition bandwidth that can be supported by all mobile filter technologies. We establish a seven megahertz guard between the downlink band and television operations, which provides reasonable rejection and allows for a feasible transition bandwidth. This scenario has a 30 megahertz pass band in the uplink and downlink bands.

125. As discussed above in Section II.A of the Technical Appendix (Mobile Filter Considerations), some commenters suggest we should limit paired spectrum to 25 megahertz pass bands (i.e., five sets of paired blocks) due to mobile filter limitations. However, we reject this limitation because we recognize that technology improves over time and 30 megahertz mobile filter pass bands may become feasible,[267] and, as discussed in Section II.A of the Technical Appendix (Mobile Filter Considerations), the 600 MHz Band could be implemented with multiple filters (duplexers) if necessary, similar to the APT 700 band and T-Mobile and Verizon's 600 MHz band plan proposal.[268]

126. This scenario requires 71 megahertz of antenna bandwidth, which is somewhat above the approximately 60 megahertz limit some commenters propose for the 600 MHz Band.[269] As discussed in the Mobile Antenna Considerations Section above, and in the Order, we reject this limit and agree with T-Mobile that any performance degradation will be small (less than 1 dB) and can be mitigated by using tunable antennas or other technologies.[270]

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[264] *See, e.g.*, AT&T Comments, App. A at 29; Intel Comments at 5; Qualcomm Comments at 15.

[265] Qualcomm suggests that 62 megahertz of antenna bandwidth is "challenging but technically possible." Qualcomm Comments at 13.

[266] We note that we cannot use this scenario with 72 megahertz (or less) which would provide only 12 megahertz total for both the guard band and duplex gap, which would be difficult to achieve with mobile filter technologies.

[267] IWPC mentions that lithium niobate filters can provide 6% pass bands today, corresponding to 36 megahertz. Although, such filters provide lower Q values, which may translate into wider transition bands or lower stop band rejection. IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 14.

[268] APT700 refers to the Asia-Pacific Telecommunity band for 700 MHz, *see* T-Mobile Reply at 21, n 67. For the T-Mobile and Verizon proposal, *see* T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter.

[269] In Section § II.B of the Technical Appendix (Mobile Antenna Considerations), we discuss commenter views in greater detail.

[270] T-Mobile Reply, Exh. A at 16. We note that if we offer a Band Plan scenario with more than 84 megahertz, there is a decrease of 1 or 2 dB in antenna performance. *See* Technical Appendix § II.B (Mobile Antenna Considerations).

127. Finally, some commenters suggest the uplink pass band should be limited to 25 megahertz due to the potential for harmonic interference with the BRS/EBS band.[271] As discussed above, the likelihood of such interference is low, and it does not prevent use of the spectrum; it only limits the potential for carrier aggregation with the BRS/EBS band. As addressed in the Order, this potential limitation is outweighed by the benefit of making more spectrum available, and as a result, we determine that we should not limit the size of the paired bands if enough repurposed spectrum is available.[272]

Figure 28 – 78 megahertz scenario

6. Seven Sets of Paired Blocks (84 megahertz repurposed)

128. The Band Plan scenario for seven sets of paired blocks is shown below in Figure 29, which we will use if we have 84 megahertz of repurposed spectrum. Under this scenario, we establish an 11 megahertz duplex gap, which, as discussed above, will ensure there is no overlap of third order intermodulation products between transmit and receive channels, and allow for a transition bandwidth that can be supported by all mobile filter technologies. We create a three megahertz guard band between the mobile downlink and WMTS services in channel 37, which as discussed above, will minimize the likelihood of harmful interference to WMTS devices.[273] We also note that this three megahertz guard band combined with channel 37 forms an effective nine megahertz guard band between the downlink band and television operations, which, as discussed above, provides reasonable rejection and allows for a feasible transition bandwidth. This plan is the same as the joint T-Mobile-Verizon Wireless plan for 84 megahertz, which is also supported by AT&T in the event 84 megahertz of spectrum is repurposed.[274]

129. This scenario has a 35 megahertz pass band in both the uplink and downlink bands, and requires 81 megahertz of antenna bandwidth in a static approach. As discussed above in Section III.B.5 of the Technical Appendix (Six Sets of Paired Blocks (78 megahertz repurposed)), this configuration exceeds the pass band sizes and antenna bandwidth limits proposed by some commenters to address mobile filter, antenna bandwidth, and/or harmonic interference concerns.[275] For the reasons discussed

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[271] Qualcomm Comments at 11. In its table, "analysis block 19," corresponding to the uplink A block in this 78 megahertz scenario, has "H4" in the BRS/EBS row, indicating a fourth harmonic falls in some portion of the BRS/EBS band, in this case only the 2672 to 2690 MHz portion.

[272] *See* § III.A (Band Plan for the New 600 MHz Band).

[273] *See* Technical Appendix § II.E.2 (Potential for Interference between 600 MHz Downlink and WMTS).

[274] *See* T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter, Att. at 1; AT&T Oct. 21, 2013 *Ex Parte* Letter.

[275] *See* Qualcomm Reply at 25 ("2 x 35 MHz — or wider — FDD band plan at 600 MHz would require user devices to incorporate both an additional large antenna and a second duplexer. This would unacceptably increase the cost and size of today's space constrained smartphones"). *But see* T-Mobile/Verizon Sept. 16, 2013 *Ex Parte* Letter at 1 ("Our band plan is based on a 35x35 MHz Frequency Division Duplexing ("FDD") pairing, which offers more opportunity for carriers to acquire paired spectrum than any FDD proposal. While delivering more paired spectrum, our band plan also has fewer design trade-offs and interference hazards than alternative proposals."); Qualcomm *Band Plan PN* Comments at 8–9 ("On the other hand, a straight DF51 2 x 35 MHz plan that divides the band into two adjacent segments that lie above Channel 37 — a 2 x 15 MHz segment and a 2 x 20 MHz segment — could be supported by a single antenna provided that an adequate tuner is available."). *See also* Qualcomm Comments at 11 (where the table shows "analysis blocks" 18 and 19, corresponding to the A and B uplink blocks in this scenario, have some third and fourth harmonics falling in the PCS and BRS/EBS bands). *But see* Sprint Comments at 25 ("Potential third-harmonic conflicts already exist in the U.S., and yet we have seen little evidence of such interference problems to date. The solutions that work today to avoid interference in these situations are also likely to be effective for 600 MHz transmissions."); T-Mobile Reply at 23–26 (concluding "[w]here, as here, the potential for harmonic interference is limited and manageable and the benefits of maximizing paired spectrum are extensive

(continued….)

above, and in the Order, we decline to limit the amount of paired spectrum we will offer in the forward auction, should we have enough repurposed spectrum available.

Figure 29. 84 megahertz scenario

7. Eight Sets of Paired Blocks (108 megahertz repurposed)

130. Under this scenario, shown in Figure 30, we create nine sets of paired blocks from 108 megahertz of repurposed spectrum.[276] We create an 11 megahertz duplex gap, which will ensure there is no overlap of third-order intermodulation products between transmit and receive channels, and allow for a feasible transition bandwidth. Under this scenario, we establish two three megahertz guard bands between the mobile downlink band and WMTS services in channel 37 (both above and below channel 37), which will minimize the likelihood of harmful interference to WMTS devices. We also establish an 11 megahertz guard band between the downlink band and television operations, which provides reasonable rejection and allows for a feasible transition bandwidth, as discussed above.

131. This scenario has a 40 megahertz pass band in the uplink band, and two pass bands in the downlink band (30 megahertz above channel 37 and 10 megahertz below channel 37), which will require implementing two to three duplexers. Under a two duplexer approach, the band would be split into 30+30 megahertz and 10+10 megahertz. Although a 30+30 megahertz duplexer exceeds the 25 megahertz pass band discussed above, IWPC mentions that alternate technologies such as lithium niobate may allow for larger pass bands (up to 36 megahertz).[277] Although lithium niobate offers lower Q values and therefore potentially larger transition bands, as can be seen in the diagram below, the 30+30 megahertz filter would be 33 megahertz from television operations, allowing a very large transition band for this filter; while the 10+10 megahertz duplexer would need an 11 megahertz transition bandwidth, which is feasible today. Alternatively, this scenario could be implemented using three duplexers, with two duplexers in the 30+30 megahertz portion, similar to the APT 700 band and T-Mobile and Verizon's band plan proposal, as discussed above in Section II.A of the Technical Appendix (Mobile Filter Considerations). Under either a two or three duplexer approach, the duplex spacing of the lower 10+10 megahertz portion would be different from the upper 30+30 megahertz portion. This does not present an implementation challenge; in the past 3GPP has approved a band with different duplex spacing for different blocks within the band.[278]

132. In addition to creating a 40 megahertz pass band in the uplink band, this configuration requires 103 megahertz of antenna bandwidth in a static approach, but only 73 megahertz in a tunable approach. As discussed above in Section III.B.5 of the Technical Appendix (Six Sets of Paired Blocks (78 megahertz repurposed)), this configuration exceeds the pass band sizes proposed by some commenters to address mobile filter, antenna bandwidth, and/or harmonic interference concerns. For the

(Continued from previous page)
and broad-based, the Commission can and should take note of successful, real-world spectrum-management practices and auction the maximum amount of paired for commercial wireless broadband use.").

[276] We note that we cannot use this scenario with 102 megahertz (or less) which would allow for only a five megahertz guard band between television operations and the 600 MHz downlink band, which would be difficult to achieve with mobile filters.

[277] IWPC Nov. 27, 2012 *Ex Parte* Letter, Att. at 14.

[278] Specifically, different duplex spacing was approved for Band 23, which consisted of one block at 2000–2010 MHz paired with 2190–2200 MHz, and the second block at 2010–2020 MHz paired with 2180–2190 MHz. *See* 3GPP TS 36.101 V10.3.0 at 18, 26 (Tables 5.5-1, 5.7.4-2), available at http://www.3gpp.org/ftp/Specs/archive/36_series/36.101/36101-a30.zip (last visited May 2, 2014). This was removed in V10.6.0 to reflect the consolidation of Band 23 spectrum under a single operator. *See* 3GPP R4-120615, available at http://www.3gpp.org/ftp/tsg_ran/wg4_radio/TSGR4_62/Docs/R4-120615.zip (last visited May 2, 2014)

reasons discussed above, and in the Order, we decline to limit the amount of paired spectrum we will offer in the forward auction, should we have enough repurposed spectrum available.

Figure 30. 108 megahertz scenario

8. Nine Sets of Paired Blocks (114 megahertz repurposed)

133. The Band Plan scenario for nine sets of paired blocks is shown below in Figure 31, which we will use if we have 114 megahertz of repurposed spectrum.[279] As discussed above in Section II.E.5 of the Technical Appendix (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)), we establish an 11 megahertz duplex gap to ensure there is no overlap of third order intermodulation products between transmit and receive channels, and allow for a feasible transition bandwidth. In this scenario, we create two three megahertz guard bands between the mobile downlink and WMTS services in channel 37, both above and below channel 37, which will minimize the likelihood of harmful interference to WMTS devices.[280] We establish a seven megahertz guard band between the downlink band and television operations, which provides reasonable rejection and allows for a feasible transition bandwidth.

134. This scenario has a 45 megahertz pass band in the uplink band and two pass band in the downlink band (25 megahertz above channel 37 and 20 megahertz below channel 37), which can be implemented with two duplexers, 25+25 megahertz and 20+20 megahertz, within the capabilities of current mobile filter technology. This plan has similarities to the FDD plan for 120 megahertz of repurposed spectrum proposed by Ericsson, however the uplink and downlink blocks are arranged as a single FDD band, rather than two distinct FDD bands with two separate duplex gaps.[281] It requires 88 megahertz of antenna bandwidth using a tunable antenna, and may have some degradation. As discussed above in Section III.B.5 of the Technical Appendix (Six Sets of Paired Blocks (78 megahertz repurposed)), this configuration exceeds the pass band sizes and antenna bandwidth limits proposed by some commenters to address mobile filter, antenna bandwidth, and/or harmonic interference concerns. For the reasons discussed above, and in the Order, we decline to limit the amount of paired spectrum we will offer in the forward auction, should we have enough repurposed spectrum available.

Figure 31. 114 MHz Band Plan Scenario

9. Ten Sets of Paired Blocks (126 megahertz repurposed)

135. Although commenters focus on how to configure a band plan for 120 megahertz of repurposed spectrum or less, as discussed in the Order, we provide scenarios for more than 120 megahertz should we have sufficient repurposed spectrum and decide to offer more than 120 megahertz in the forward auction. As discussed above and in the Order, we note that we have not yet determined our initial clearing target, so we may not necessarily offer these scenarios in the forward auction. We will provide further guidance in the *Comment PN* and *Procedures PN*.

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[279] We note that we cannot use this scenario with 108 megahertz (or less), because we would have only one megahertz remaining for the guard band between television operations and the 600 MHz downlink band, which would be very difficult to achieve with mobile filters, and is below the necessary minimum separation.

[280] *See* § III.D.1 (Channel 37 Services).

[281] Ericsson Reply at 18.

136. Under this scenario, shown in Figure 32, we create 10 sets of paired blocks from 126 megahertz of repurposed spectrum.[282] As discussed above, we create an 11 megahertz duplex gap in this case to ensure there is no overlap of third order intermodulation products between transmit and receive channels, and allow for a feasible transition bandwidth. In this scenario, we create two three megahertz guard bands between the mobile downlink band and WMTS services in channel 37 (both above and below channel 37), which as discussed in the Order, will minimize the likelihood of harmful interference to WMTS devices.[283] We also create a nine megahertz guard band between the downlink band and television operations, which provides reasonable rejection and allows for a feasible transition bandwidth for all filter technologies, as discussed above.

137. This scenario has a 50 megahertz pass band in the uplink band, and two pass bands in the downlink band (30 megahertz below channel 37 and 20 megahertz above channel 37), which, as in the 108 megahertz scenario above, could be implemented with two or three duplexers. This scenario requires 93 megahertz of antenna bandwidth assuming a tunable antenna, and may have some degradation. As discussed above in Section III.B.5 of the Technical Appendix (Six Sets of Paired Blocks (78 megahertz repurposed)), this configuration exceeds the pass band sizes and antenna bandwidth limits proposed by some commenters to address mobile filter, antenna bandwidth, and/or harmonic interference concerns. For the reasons discussed above, and in the Order, we decline to limit the amount of paired spectrum we will offer in the forward auction, should we have enough repurposed spectrum available.[284]

Figure 32. 126 megahertz scenario

10. Eleven Sets of Paired Blocks (138 megahertz repurposed)

138. The Band Plan scenario for 11 sets of paired blocks is shown below in Figure 33, which we will use if we have 138 megahertz of repurposed spectrum.[285] In this scenario, we create an 11 megahertz duplex gap, which will ensure there is no overlap of third order intermodulation products between transmit and receive channels, and allow for a feasible transition bandwidth.[286] In this scenario, we establish two three megahertz guard bands between the mobile downlink band and WMTS services in channel 37 – both above and below channel 37 – which, as discussed above, will minimize the likelihood of harmful interference to WMTS devices. We also create an 11 megahertz guard band between the downlink band and television operations, which, as discussed above, provides reasonable rejection and allows for a feasible transition bandwidth.

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[282] We note that we cannot use this scenario with 120 megahertz (or less) which would leave enough spectrum for only a three megahertz guard band between the downlink band and television operations, which would be very difficult to achieve with mobile filters, and is therefore below the minimum necessary separation.

[283] *See* § III.D.1 (Channel 37 Services).

[284] Further, we agree with Ericsson that if we can offer 120 megahertz or more, antenna issues would need to be addressed in any case, and the benefits of offering more spectrum to interested bidders outweigh the costs. Christian Bergljung, Ericsson, *600 MHz Band Plan Workshop Transcript* at 128–129 ("As we mentioned in terms of antenna performance, of course, as you go down in frequency, there is a penalty to be paid and we quoted some numbers out of the previous experience. . . . However, we see this as one of the biggest opportunities to realize part of the 500 MHz spectrum in the National Broadband Plan, so if it can be extended to 120 megahertz, I think we should do our utmost to make that—to realize that spectrum.").

[285] We note that we cannot use this scenario with 132 megahertz (or less), because the guard band between television operations and the downlink band would be five megahertz, which would be difficult to achieve with mobile filters.

[286] See Technical Appendix § II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)).

139. This scenario has a 55 megahertz pass band in the uplink band, and two pass bands in the downlink band (40 megahertz and 15 megahertz), which would most likely be implemented with three duplexers. This scenario requires 98 megahertz of antenna bandwidth assuming a tunable antenna, and may have some degradation. As discussed above in Section III.B.5 of the Technical Appendix (Six Sets of Paired Blocks (78 megahertz repurposed)), this configuration exceeds the pass band sizes and antenna bandwidth limits proposed by some commenters to address mobile filter, antenna bandwidth, and/or harmonic interference concerns. For the reasons discussed above, and in the Order, we decline to limit the amount of paired spectrum we will offer in the forward auction, should we have enough repurposed spectrum available.

Figure 33. 138 megahertz scenario

11. Twelve Sets of Paired Blocks (144 megahertz repurposed)

140. The Band Plan scenario for 12 sets of paired blocks is shown below in Figure 34, which we will use if we have 144 megahertz of repurposed spectrum.[287] In this scenario, we create an 11 megahertz duplex gap, which will ensure there is no overlap of third order intermodulation products between transmit and receive channels, and allow for a feasible transition bandwidth.[288] In this scenario, we establish two three megahertz guard bands between the mobile downlink band and WMTS services in channel 37 – both above and below channel 37 – which, as discussed above, will minimize the likelihood of harmful interference to WMTS devices. We also create a seven megahertz guard band between the downlink band and television operations, which, as discussed above, provides reasonable rejection and allows for a feasible transition bandwidth.

141. This scenario has a 60 megahertz pass band in the uplink band, and two pass bands in the downlink band (50 megahertz and 10 megahertz), which would most likely be implemented with three duplexers. This scenario requires 103 megahertz of antenna bandwidth assuming a tunable antenna, and may have some degradation. As discussed above in Section III.B.5 of the Technical Appendix (Six Sets of Paired Blocks (78 megahertz repurposed)), this configuration exceeds the pass band sizes and antenna bandwidth limits proposed by some commenters to address mobile filter, antenna bandwidth, and/or harmonic interference concerns. For the reasons discussed above, and in the Order, we decline to limit the amount of paired spectrum we will offer in the forward auction, should we have enough repurposed spectrum available.

Figure 34. 144 megahertz scenario

[287] We note that we cannot use this scenario with 138 megahertz (or less), because the guard band between television operations and the downlink band would be only two megahertz, which would be very difficult to achieve with mobile filters, and is therefore below the minimum necessary separation.

[288] See Technical Appendix § II.E.5 (Potential for Interference between 600 MHz Uplink and 600 MHz Downlink (Duplex Gap)).

APPENDIX D

Commenter Short Names

Short name	Name of Filer
4 NY Broadcasters	American Broadcasting Companies, Inc., WBNG License, Inc., United Communications
4G Americas	4G Americas
A. Weiss	Adrienne Weiss
ACTBN	Action Community Television Broadcasting Network, Inc.
Affiliates Associations	ABC Television Affiliates Association, CBS Television Network Affiliates Association
AIC	Azteca International Corporation
Alcatel-Lucent	Alcatel-Lucent
Alcatel-Lucent et al.	Alcatel-Lucent, AT&T, Ericsson, Intel, NAB, Qualcomm and VZ
American Tower	American Tower Corporation
Anon. Broadcaster 1	Anonymous Broadcast Licensees
Anon. Broadcaster 2	Prospective Reverse Auction Participant
Anon. Broadcaster 3	Broadcaster for the Promotion of Channel Sharing Arrangements
Anon. Broadcaster 4	Broadcast Licensee
Anon. Citizen	Anonymous
Anon. Part 90	Blooston Part 90 Licensees
APTS [see joint comments PTV]	Association of Public Television Stations
ASHE	American Society for Healthcare Engineering
AT&T	AT&T, Inc. or AT&T Services, Inc.
ATBA	Advanced Television Broadcasting Alliance
Atlantic Telephone	Atlantic Telephone Membership Corporation
B. Kobb	Bennett Z. Kobb
Bahakel	Bahakel Communications, Ltd.
Belo	Belo Corp.
Block Stations	Lima Communications, Corp./Independence Television Company/WAND TV Partnership/Idaho Independent Television, Inc./West Central Ohio Broadcasting, Inc.
Blooston Rural	Blooston Rural Carriers
Bluegrass	Bluegrass Cellular, Inc.
Boeing	The Boeing Company
Bonten	Bonten Media Group, Inc.
Brattle	The Brattle Group
Broadcast Networks	Broadcast Networks (CBS/FOX.NBCU/Disney/Univision)
Broadcom	Broadcom Corporation
Broadcom/CSR/Marvell	Broadcom, CSR Technology, Inc., and Marvell Semiconductor
Broadway League	The Broadway League, Inc.
C Spire	Cellular South, Inc. (d/b/a C Spire Wireless)
Capitol	Capitol Broadcasting Company, Inc.
Casa	Casa En Denver, Inc.
Cavell, Mertz (see R. Mertz)	Cavell, Mertz & Associates, Inc.
CBS	CBS Corporation

CCA	Competitive Carriers Association
CCB	Carolina Christian Broadcasting, Inc.
CCIA	Computer & Communications Industry Association (CCIA)
CEA	Consumer Electronics Association
Cellular One	Texas 10, LLC d/b/a Cellular One and Central Louisiana Cellular
Channel 32	Channel 32 Montgomery LLC
Chat Mobility	Chat Mobility
Cisco	Cisco Systems, Inc.
CIT	CIT Group, Inc.
Clearwire	Clearwire Corporation
Cohen	COHEN, DIPPELL AND EVERIST, P.C.
Collective Wireless Microphone Interests	Collective Wireless Microphone Interests
Comcast	Comcast
Comcast and NBC Universal	Comcast Corporation and NBC Universal Media, LLC
Comm. Tech	Communications Technologies, Inc.
CompTIA	Computing Technology Industry Association
Copper Valley	Copper Valley Wireless, LLC
Council Tree	Council Tree Investors, Inc.
Cox Media	Cox Media Group
CP Comm.	CP Communications PA, LLC
CPB [see joint comments PTV]	Corporation for Public Broadcasting
CSR	CSR Technology, Inc.
CTI	Community Television, Inc.
CTIA	CTIA - The Wireless Association
D. Honig, MMTC	David Honig (president for MMTC)
Dielectric	Dielectric LLC
DIRECTV/DISH	DIRECTV and DISH Network
DISH	DISH Network Corporation
Disney	The Walt Disney Company
Dispatch	The Dispatch Printing Company, d/b/a the Dispatch Broadcast Group
DTVAmerica	DTVAmerica Corporation
Dynamic Spectrum Alliance	Dynamic Spectrum Alliance
Entravision	Entravision Holdings, LLC
EOBC	Expanding Opportunities for Broadcasters Coalition
Ericsson	Ericsson Inc
FMBC	Fort Myers Broadcasting Company
Free Press	Free Press
GatesAir	GatesAir, Inc.
GEHC	GE Healthcare
Globe	Globe LPTV LLC
Google	Google Inc.
Google/Broadcom	Google Inc. and Broadcom Corporation
Google/Microsoft	Google Inc. and Microsoft Corporation
Grain Management	Grain Management, LLC
Gray TV	Gray Television, Inc.
H. Uhi	Harrison Uhl

Harris Broadcast	Harris Corporation, Broadcast Communications Division or HBC Solutions, Inc. (Harris Broadcast)
HTSC	High Tech Spectrum Coalition (HTSC)
IAA	Incentive Auction Advocates
IBN	INTERNATIONAL BROADCASTING NETWORK
ICN	International Communications Network, Inc.
IEEE 802	IEEE 802 LMSC or IEEE 802 LN/Man Stds Cmte
Intel	Intel Corporation
ITI	Information Technology Industry Council
J. Pavlica	John Pavlica, Jr.
J. Pila	Joshua Pila (LIN)
J. Pratt	Joshua Pratt
Joint Reply of the Commissioner of Baseball, NBA, NFL, NHL, NCAA, NASCAR	Office of the Commissioner of Baseball, National Basketball Association, National Football League, National Hockey League, National Collegiate Athletic Association, and National Association for Stock Car Auto Racing
KAZN	KAZN License, LLC
KLCS	KLCS
KRBK	KRBK, LLC
KSW	King Street Wireless, LP
Leadership Conference	Leadership Conference on Civil and Human Rights
Leap	Leap Wireless International and Cricket Communications
Lectrosonics	Lectrosonics, Inc.
Leggett	Nickolaus E. Leggett
LeSEA	LeSEA Broadcasting Corporation
LIN	LIN Television Corporation
Lincoln	Lincoln Broadcasting, LLC
Local Media	Local Media TV Holdings, LLC
LPTV Spectrum	LPTV Spectrum Rights Coalition
M. Gravino	Michael Gravino
Mako	Mako Communications, LLC
Marvell	Marvell Semiconductor
McBride	McBride Spectrum Partners, LLC
Media General	Media General, Inc.
MetroPCS	MetroPCS Communications, Inc.
Microsoft	Microsoft Corporation
Mike Gravino	Mike Gravino (LPTV Spectrum Rights Coalition)
MMTC	Minority Media and Telecommunications Council (MMTC)
Mobile Future	Mobile Future
Motorola	Motorola, Inc.
Motorola Mobility	Motorola Mobility LLC
MSGPR	MSGPR Ltd Co
NAB	National Association of Broadcasters (NAB)
NABOB	National Association of Black Owned Broadcasters, Inc.
NAS-CORF	National Academy of Sciences -- CORF
NATE	National Association of Tower Erectors
NCTA	National Cable & Telecommunications Association
NERA	NERA Economic Consulting

Neul	Neul Ltd
New America Found.	New America Foundation
NFL	National Football League
NHMC	National Hispanic Media Coalition
Nokia	Nokia Siemens Networks US LLC
NPR	National Public Radio, Inc.
NRAO	National Radio Astronomy Observatory
NRB	National Religious Broadcasters
NTA	National Translator Association
NTCA	National Telecommunications Cooperative Association
NTCA	NTCA-The Rural Broadband Association
NTCA	The Rural Broadband Association (NTCA)
NTIA	National Telecommunications and Information Administration
NYSBA	New York State Broadcasters Association, Inc.
Parker	Parker Broadcasting of Louisiana, LLC
PBS [see joint comments PTV]	Public Broadcasting Service
Performing Arts	Performing Arts Wireless Microphones Working Group
Philips Healthcare	Philips Healthcare
Pioneer	Pioneer Communications, Inc.
PISC	Public Interest Spectrum Coalition (PISC)
Polnet	Polnet Communications Ltd.
Post-Newsweek	Post-Newsweek Stations, Inc.
PTV	Association of Public Television Stations, Corporation for Public Broadcasting, Public Broadcasting Service
Public Knowledge	Public Knowledge
Public Service Wireless	Public Service Wireless Services, Inc.
Public TV Licensees	Public TV Licensees
Qualcomm	QUALCOMM Incorporated
R. Brey	Ronald J Brey
R. Mertz or Cavell, Mertz	Richard H. Mertz (on behalf of Cavell, Mertz & Associates, Inc.)
Raycom	Raycom Media, Inc.
RIM	Research In Motion Corporation
RTG	Rural Telecommunications Group, Inc.
RWA	Rural Wireless Association, Inc.
SAG-AFTRA	SAG-AFTRA, AFL-CIO (Screen Actors Guild-American Federation of Television and Radio Artists)
Samsung	Samsung Electronics America, Inc. and Samsung Telecommunications America, LLC
SBBC	School Board of Broward County, Florida
SBE	Christopher D. Imlay
SEI	SpectrumEvolution, Inc.
Select Spectrum	Select Spectrum, LLC
Sennheiser	Sennheiser Electronic Corporation
Shure	Shure Incorporated
Signal Above	Signal Above, LLC
Sinclair	Sinclair Broadcast Group, Inc.
Sony	Sony Electronics Inc.
Spectrum Bridge	Spectrum Bridge Inc.

Sprint	Sprint Nextel Corporation or Sprint Corporation
SSN	Silver Spring Networks
Stainless	Stainless, LLC
State Broadcaster Associations	Named State Broadcasters Associations
TechAmerica	TechAmerica
TechFreedom	TechFreedom
Thompson Engineering	Jeff C Tappenden
TIA	Telecommunications Industry Association
T-Mobile	T-Mobile USA, Inc.
Tribune	Tribune Company
TTBG	TTBG, LLC
UCC	United Communications Corporation
Univision	Univision Communications Inc.
US Cellular	United States Cellular Corporation or U.S. Cellular Corp
UVM	Una Vez Mas, L.P.
Venture	Venture Technologies Group, LLC
Verizon	Verizon and Verizon Wireless
Vision	Vision Communications, LLC
WatchTV	WatchTV, Inc.
Weigel	Weigel Broadcasting Company
WGAL	WGAL Hearst Television, Inc.
WGAW	Writers Guild of America, West
Wi-Fi Alliance	Wi-Fi Alliance
Wireless Microphone Interests	Wireless Microphone Interests
WISPA	The Wireless Internet Service Providers Association
WISPA	Wireless Internet Service Providers Association
WLFM	WLFM, LLC
WMTS Coalition	The WMTS Coalition
WMTS Coalition	WMTS Coalition
WSA	WhiteSpace Alliance
WSDAG	White Space Database Administrator Group
Young Broadcasting	Young Broadcasting, LLC

STATEMENT OF
CHAIRMAN TOM WHEELER

Re: *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268.

Today we take a huge step towards turning an innovative approach to making efficient, market-driven use of our spectrum resources from concept to reality.

The Incentive Auction is a once-in-a-lifetime opportunity to expand the benefits of mobile wireless coverage and competition to consumers across the Nation, offering more choices of wireless providers, lower prices, and higher quality mobile services. The auction will also provide a game-changing financial opportunity to broadcasters and fully fund the Public Safety Trust Fund (PSTF) for FirstNet. Maximizing participation by both broadcasters and wireless providers in the auction will be crucial to achieving these goals.

There has been much discussion about how we should define success for the Incentive Auction, with most of the talk focused on how many megahertz of spectrum will be repurposed for broadband and how much revenue will be raised from the auction.

Obviously, those are important objectives.

But we should not lose sight of the fact that simply creating a marketplace that enables us to buy spectrum, re-band it, and then re-sell it, and to do these three things nearly simultaneously, will be a tremendous accomplishment in and of itself.

This new approach to the marketplace could revolutionize how spectrum is allocated. The Incentive Auction will harness market forces to reallocate valuable low-band (below 1 GHz) spectrum from television broadcasters who voluntarily choose to relinquish some or all of their spectrum usage rights in exchange for incentive payments, to wireless providers who will bid against each other to buy those frequencies to provide mobile broadband services. The low-band spectrum we will auction is particularly valuable because it has physical properties that increase the reach of mobile networks over long distances at far less cost than spectrum above 1 GHz. It also reaches deep into buildings and urban canyons.

What happens in this new marketplace in terms or spectrum repurposed and revenue raised will depend on the fundamental economic concept of supply and demand. The rules we adopt today will help to establish a marketplace that will be attractive to both buyers and sellers, and will protect and promote competition.

Television broadcasters' participation in the Incentive Auction will be purely voluntary, and participation in the Incentive Auction does not mean they have to leave the over-the-air TV business entirely. New channel-sharing technologies offer broadcasters a rare opportunity for an infusion of cash to expand their business model and explore new innovations, while continuing to provide their traditional services to consumers. We will ensure that broadcasters have all of the information they need to make informed business decisions about whether and how to participate – including providing information about likely opening bids and a projected timeline of actions leading up to the auction.

Consistent with the requirements of the Spectrum Act, we will make available a significant amount of unlicensed spectrum (think Wi-Fi) on a nationwide basis, providing economic value to businesses and consumers alike.

We are also taking steps today to address the needs of wireless microphone users, which include broadcasters reporting on breaking news, and providers at sports and entertainment events, schools, places of worship and business venues. These users provide invaluable services to American consumers, and we will continue to develop a framework of solutions to ensure that the spectrum needs of these users will be met in the future.

Thank you to the dozens of staff from across the Commission for your unprecedented efforts to bring us to this point. I am confident that you will continue to make policy recommendations that will result in a successful auction in the middle of next year.

STATEMENT OF
COMMISSIONER MIGNON L. CLYBURN

Re: *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268.

Like many of you in this room I spend a fair amount of time in airports. During my early days of travel, newspapers, and magazines were the must-have, must-read attachments for any trip. Today -- not so much. If you take the Metro or other short haul services, you more likely will find riders glued to a tablet, cell phone, or other wireless device.

News, information, entertainment or even basic communication is now delivered anytime and everywhere. School-aged children, old-school stalwarts, people from all walks of life are adopting the ubiquitous and utilitarian tools of today, which make our lives more convenient, more accessible and more efficient.

This is the world in which we live, and it is a wonderful place indeed.

But as our societal appetite for feature rich content increases, and in order for us to continue along this path, we must position ourselves to provide this nation with an adequate amount of spectrum -- making this proceeding one of most important and challenging of the day.

Innovation in mobile broadband, has spurred spectrum demand, at a breathtaking pace. I still marvel at the fact, that when I first took office in the summer of 2009, tablet computers had not even hit the market. Now estimates are that by 2016, more than 100 million people in our nation will own one.

Those tablets use 121 times as much spectrum, as the traditional cellphone, so if we want all communities to have access to the most advanced wireless technologies, our regulatory policies must keep pace and that includes repurposing more spectrum for commercial wireless services.

In 2012, Congress took a dramatic step by giving us statutory authority to conduct the world's first voluntary incentive auction in a way that also preserves the integrity of the broadcast TV industry. Now, the Commission must move expeditiously and carefully to carry out this directive.

Designing this auction is daunting and unprecedented. It must integrate three major elements: (1) the reverse auction for those TV stations that want to relinquish their spectrum rights for payment, (2) the repacking of broadcast TV stations that want to stay on the air, and (3) the "forward auction" which would license repurposed spectrum for wireless services. Each element presents its own set of difficult, technical issues; but further complicating the task is that Congress imposed specific requirements for each element.

However, the Commission staff has shown that it is more than up to the challenge. In this NPRM, the staff set us on a course that indeed would benefit both the broadcast TV and wireless industries and advance communications policy objectives, such as participation by smaller companies, competition, and accommodating other existing services that have proven so valuable. With this Order, the staff has recommended rules that improve on those goals.

I am particularly pleased that the Order does more to promote participation, by designated entities, or DEs, and small businesses. We make clear we intend to initiate a rulemaking that would revisit a number of DE rules, including increasing bidding credits and the attributable material relationship rule and wrap up that proceeding early enough so parties can account for any rule changes as

they plan for the incentive auction. We also state that we intend to resolve a pending request to waive the material relationship rule in the near term.

Another noteworthy change in the forward auction rules will promote more competition. It is important that our wireless auctions also attract carriers, who may have a smaller service footprint and less capital than nationwide providers, yet possess a strong desire to acquire more spectrum in order to serve a particular footprint. This approach promotes competition in local markets and has the added benefit of ensuring that the auction promotes efficient allocation of spectrum to the highest and best use. This is particularly important, in this case, since we must incentivize broadcast TV stations to participate in the reverse auction. We can promote these goals by auctioning smaller block sizes of spectrum in smaller geographic area licenses. So I am glad that we pushed large and small carriers to develop a consensus so we could shift from the larger Economic Areas to smaller Partial Economic Areas.

I am also pleased that we have reaffirmed our commitment to ensuring that unlicensed spectrum in the 600 MHz band, can be used to provide broadband service. I have been a strong advocate for unlicensed use of TV White Spaces since we adopted final rules in 2010. This technology, which takes advantage of the excellent signal propagation characteristics of below 1 GHz spectrum, has great potential to provide wireless broadband services in low income communities that are often difficult to serve. There are initiatives such as AIR.U – a partnership between New America Foundation, technology companies, and GIG.U, -- that are finding solutions for universities in rural areas. This past summer, AIR.U worked with West Virginia University to launch a pilot program that provides campus-wide Wi-Fi services, using TV White Spaces. I commend Chairman Wheeler for considering an alternative plan that would provide for more unlicensed spectrum in the 600 MHz band. This is sure to spur new innovations in unlicensed broadband services worldwide.

The Order also provides more protection, for certain services, than the NPRM originally proposed. For example, I have been concerned about the impact that the 2012 statute and this proceeding could have on low power TV stations, or LPTVs, and translators. LPTVs provide diverse and local television programming and translator stations in particular are an important free over-the-air television resource in the most remote of locations. It was important to me that the Commission explored all reasonable options to allow these stations to continue to broadcast, after the auction. The NPRM sought comment on allowing these stations to channel share. This Order goes further by explaining that the Commission will initiate a more comprehensive rulemaking proceeding to explore several other options for LPTVs. In addition to channel sharing, it will explore: (a) allowing these stations to transition to VHF channels; (b) using the repacking software to help LPTVs, find new locations to operate; and (c) extending the September 2015 deadline for converting digital services, so LPTVs do not have to relocate to meet that deadline, and relocate yet again, after the incentive auction. The Order also adopts a rule that would allow these stations to continue, post auction, to serve in a 600 MHz license area until a wireless carrier commences operation. The wireless carrier must notify LPTVs, 120 days in advance, of that date.

I also commend the staff, for working hard to find solutions, for wireless microphones. Broadcasters and other entities, which rely on wireless microphones for late breaking electronic news gathering or live events, need the assurances of reliable, high quality audio. In the Incentive Auction Order, we will permit wireless mics to operate in 4 megahertz of the duplex gap, and in the naturally occurring empty TV channel, in every market. And in the companion wireless microphone Order, we also adopt today, we are granting to professional sound companies and venues that routinely use 50 or more wireless microphones the same rights as low power auxiliary station licensees. This will provide a meaningful benefit to entities that require the protection a license affords without unduly reducing the amount of spectrum available for other uses in the television bands.

This Order marks an important milestone for this proceeding, but as it makes clear, our work is

not over. We must seek comment on auction design and other issues to address important policies before conducting the auction. And we have greatly benefitted thus far, from the input of many in the industry. Still needed, however, is continued participation to ensure that we get the final details right. I thank Gary Epstein, Bill Scher, and Edward "Smitty" Smith for their presentations, and I wish to extend special thanks to all the staff members who spent hours briefing me and working with me to address my questions about the item particularly my Wireless Legal Advisor, Louis Peraertz, who of course, I also wish to thank. I also want to thank Paul D'Ari, Bill Stafford, Brenda Boykin, and Sade Oshinube for their work on the wireless microphone order.

STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL

Re: *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268.

A few weeks ago, during a long road trip, my family pulled off the highway and rolled into a restaurant for dinner. You know the place. The adults get the laminated full-sized menus and the kids get the paper menus with coloring games and puzzles.

Armed with only a cheap crayon and what I like to think is wisdom beyond her years, I watched my daughter whip through a maze on her menu without lifting the crayon off the paper. She accomplished this feat by beginning at the finish line of the maze and ending at the start. It dawned on me that I was watching my child play out the old management maxim: "Begin with the end in mind."

I think that our Report and Order today begins with the end in mind. The Chairman and his hard-charging auction team have focused on the finish line—freeing up more spectrum for mobile broadband, providing more opportunities for broadcasters, and raising funds to support our first responders.

I am also pleased that our Report and Order is largely faithful to the four central building blocks to a successful incentive auction that have guided my thinking since we began this process in 2012: simplicity, fairness, balance, and public safety.

Simplicity is key. Incentive auctions are an undeniably complex undertaking. But at every structural juncture, I believe that a bias towards simplicity is crucial. So I am pleased that we choose simplicity with the descending clock auction rules we adopt today. This design provides a simple onramp to the auction and allows broadcasters to come armed with little more than a willingness to participate, not a bevy of experts and lawyers.

Fairness is essential. This is especially true with regard to the treatment of broadcasters that do not participate in the auction. Fairness demands that we consider how to accomplish repacking by minimizing unnecessary disruption and maximizing the ability of the public to continue to receive free, over-the-air television.

Balance is necessary. None of the three legs of the incentive auction—the reverse auction, the repacking, or the forward auction—can stand on its own. And we must realize that the choices we make in one area have implications throughout the auction.

I am particularly excited, however, that we have found creative ways to strike the right balance between licensed and unlicensed spectrum. This creativity started with ditching the tired notion that we face a choice between licensed and unlicensed spectrum. This is a simplistic relic from the past that we should have long since retired—because good spectrum policy requires both. Moreover, we recognized that other services striving for white space in the 600 MHz band—like wireless microphones, low-power television, and medical telemetry—matter. So by being creative we found ways to expand the duplex gap, find new locations for unlicensed microphones, and provide unlicensed opportunities in channel 37—while also protecting existing users. This approach can increase the value of licensed spectrum without diminishing the number of licenses we sell at auction. It is all-around good.

Finally, public safety is fundamental. Built into the fabric of our upcoming incentive auctions is a recognition that they are intertwined with the future of public safety communications. The revenues we

raise are designated to support a nationwide, interoperable, wireless, broadband network for public safety. This is important.

Although I am pleased with the general framework we put in place today, I would like to suggest a few areas where we should pause and "lift our crayon from the paper" to do more in the name of simplicity and fairness.

Simplicity remains key. As I have said upfront, station owners that operate small-and medium-sized businesses should be able to understand their options without hiring high-priced auction experts. To this end, I am pleased that with the assistance of KCLS and KJLA in Los Angeles we have explored the technical feasibility of channel sharing, which could provide some broadcasters with a new way to operate. As a result, the technical parameters of sharing are now better understood. However, we know too little about the legal and business arrangements that are needed to put sharing into operation. For instance, how do you address property ownership issues between commercial and non-commercial broadcasters? Should we consider developing some "off the rack" templates that assist with putting these sharing arrangements in place? I am concerned that without this kind of groundwork, we risk broadcasters sitting this opportunity out.

Fairness remains essential. We are asking broadcasters to make a fair assessment of the opportunities this auction provides the industry. I have spoken with many broadcasters—large and small—about what the Commission can do to help them make a decision about how to proceed. Every meeting yields the same refrain: "We need a number." This does not need to be difficult or resource intensive. But until the agency can provide broadcasters with a better sense of what price their spectrum might yield, including the tax consequences, broadcasters do not have the tools to make smart and dispassionate decisions about whether or not to participate. This is not just a matter of fundamental fairness; this is a threshold matter that could very well determine whether or not these auctions achieve their lofty goals.

So we have come a long way. Chairman Wheeler deserves tremendous credit. So does our whip-smart auction team. They took the difficult maze of issues involved in incentive auctions and put us on a path to get this done. This is historic. This is exciting. I am pleased to be a part of it and I am pleased that we began with the end in mind.

DISSENTING STATEMENT OF COMMISSIONER AJIT PAI

Re: *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268.

When the Commission adopted its Notice of Proposed Rulemaking (NPRM) in this proceeding twenty months ago, I shared several principles that would guide my deliberations.[1] In particular, I said that we should keep the auction as simple as possible, be fair to all stakeholders, and remain faithful to the statute passed by Congress.

Unfortunately, this item strays from each of these principles. In both the reverse and forward auction, the Commission forsakes simplicity for unnecessary complexity, primarily for the purpose of manipulating the market to suit its chosen ends. The rules that we adopt are not fair to many important constituencies, including taxpayers, public safety officials, broadcasters, rural Americans, and those wireless carriers that have chosen to participate in past auctions. And the Commission at key junctures substitutes its own policy preferences for the direction provided by Congress in the Spectrum Act. For all of these reasons, I respectfully dissent.

I.

Let's start with simplicity. The world's first spectrum incentive auction was always going to be complicated. There are many pieces of the puzzle that have to fit together for this project to succeed, including a reverse auction, a forward auction, and a repacking plan. Doing any one of these things individually would be a significant undertaking for the Commission. Doing all of them in unison is a daunting proposition indeed. The Chairman has aptly compared this to solving a Rubik's Cube.

That's why I thought that it was important for the Commission to keep the incentive auction as simple as possible. We do not need to introduce unnecessary complexities that could lead to failure. But this item makes precisely that error.

A.

Take, for example, the reverse auction. Pursuant to this item, the Commission will be setting individualized prices for each participating broadcast station (keep in mind that there could be over a thousand such stations) through a process known as scoring. How, specifically, will the Commission value each broadcast station's spectrum? That is unclear, to say the least. At one point, the Commission tells us that the price "takes into account objective factors, such as location and potential for interference with other stations, that affect the availability of channels in the repacking process and, therefore, the value of a station's bid to voluntarily relinquish spectrum usage rights."[2] Later on, the item says that "[p]ossible factors include the number of stations that a station would interfere with and block from being assigned channels, the population the station covers, or a combination of such factors."[3]

The Commission's market manipulations don't stop there. It also decides to intervene in the middle of the reverse auction through something called a dynamic reserve price. Specifically, if the

[1] *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Notice of Proposed Rulemaking, 27 FCC Rcd 12357, 12557 (2012) (*NPRM*) (Statement of Commissioner Ajit Pai, Approving in Part and Concurring in Part).
[2] *Report and Order* at para. 450.
[3] *Id*. at para. 451 (footnotes omitted).

Commission concludes that a participating broadcast station's provisionally accepted bid is too high due to a lack of competition, the Commission will unilaterally lower the price offered to that station.

How will the Commission determine when to impose a dynamic reserve price (or what that price will be)? The item leaves that question for another day. But the concept itself is guaranteed to generate considerable consternation, and implementation will be even more challenging. What happens if a bidder refuses to accept a lower price and chooses to exit the reverse auction? The Commission must find a channel placement for that station, creating more impaired spectrum in the forward auction and lowering the revenues it will generate.

It is not the Commission's place to impose a value on particular stations in the reverse auction. An auction should be a market-based mechanism where prices are set through competitive bidding, not centralized planning. We should let prices be set by supply and demand, not a complicated formula—no matter how distinguished the economists who crafted it might be. Market forces are the more likely route to success.

This is why we should adopt a simultaneous multiple round format for the reverse auction, a format with which the Commission is well-acquainted. Such a process would be simple—no scoring, no dynamic reserve pricing. Each participating broadcast station would make its own opening bid. Using those bids, the Commission would calculate the optimal way to meet the spectrum clearing target. Participants would be told which, if any, of their bids are provisionally winning. Losing bidders could then lower their asking prices. This process would repeat itself until no participating broadcast station is willing to lower its bid.

In addition to eschewing the complications of scoring and setting dynamic reserve prices, this proposal has several advantages compared to the Commission's complicated descending-clock format.[4] Most importantly, it would encourage more participation by broadcasters in the reverse auction. Under my plan, broadcasters could name their own price in the opening round. Under the Commission's plan, by contrast, broadcasters may be deterred from entering the auction if they are dissatisfied with their Commission-set score.

My proposal has other advantages. For instance, under my plan, we could optimize the repacking of broadcast stations. Under the Commission's plan, optimization is impossible, and we will be reduced to checking only whether various repacking scenarios are feasible. Under my plan, participants could simultaneously place bids on different options, such as relinquishing spectrum and moving to VHF. The Commission has no plan for handling multiple bids. Under my plan, bids in the reverse auction could carry over from one stage to the next. The Commission hasn't decided how that would work. My plan would also minimize the cost of clearing each spectrum target, thus producing more net revenues and increasing the amount of spectrum that could be cleared. The Commission's plan will not.

[4] Simple clock auctions (as adopted herein) are designed to efficiently allocate multiple copies of homogeneous goods among multiple bidders. *See, e.g.*, Lawrence M. Ausubel, *An Efficient Ascending-Bid Auction for Multiple Objects*, 94 American Economic Review 1452 (Dec. 2004). By contrast, clock auctions of heterogeneous goods must include dynamic price vectors that can increase or decrease to be efficient. *See* Lawrence M. Ausubel, *An Efficient Dynamic Auction for Heterogeneous Commodities*, 96 American Economic Review 602 (June 2006). A simple clock auction cannot adequately account for the fact that each broadcaster offers a unique good—the value of which depends not only on that broadcaster's interference patterns and estimated repacking costs but also on the constantly-evolving bids, interference patterns, and estimated repacking costs of every other broadcaster in the country. Nor can the scoring and dynamic reserve prices adopted today remedy this underlying design flaw.

B.

In the forward auction, there are yet more rules designed to manipulate the market. In my statement on the mobile spectrum aggregation item, I will set forth in detail why I believe that the bidding restrictions placed by the Commission on wireless carriers in the forward auction are unnecessary, will depress revenues, and will delay build-out to the detriment of consumers. Here, I will just focus on the issue of complexity.

My vision of the forward auction is as straightforward as eBay's. Let *anyone* bid on *any* block of spectrum and let the highest bidder win. This system has served the Commission well in past auctions, and I am confident that it would work here as well.

The Commission's vision is more difficult to explain. Bidding in the forward auction will start off on the right foot. But once bids reach a certain amount, a complex set of restrictions will kick in. Specifically, certain blocks of spectrum in a given Partial Economic Area (PEA) will be reserved for nationwide carriers with less than one-third of low-band spectrum in that PEA or non-nationwide carriers, while other blocks of spectrum will be open to all bidders. And that's not all. Should there be insufficient demand for so-called "reserved spectrum," then some or all of it could become unreserved once again.

This complicated scheme provides the Commission with at least three levers for manipulating the market in order to pick winners and losers. First, the Commission must choose at which point spectrum will be divided into reserved and unreserved blocks. Second, the Commission must decide how much spectrum will be placed in the reserved and unreserved spectrum buckets for each clearing target. Those seemingly arbitrary decisions are made in the mobile spectrum aggregation item. And third, the Commission must decide when formerly reserved spectrum will become unreserved due to a lack of demand.

This scheme does not reflect faith in the market. And I fear it will take us down a road the Commission has traveled before. In the 700 MHz auction, for example, the Commission drafted elegant and well-intentioned rules for the D-Block, designed to facilitate the construction of a nationwide, interoperable public-safety broadband network. And what did these complicated rules produce? Nothing other than a failed D-Block auction—and, ironically, a 2012 statutory mandate to conduct an incentive auction partly to fund construction of that same network.

II.

Turning from simplicity to fairness, I have indicated repeatedly that the Commission must treat all stakeholders in a just manner. Unfortunately, today's order also fails this critical test.

A.

Most importantly, this item is unfair to taxpayers and public safety officials. Congress charged the FCC with the twin goals of pushing new spectrum into the commercial marketplace and raising $27.95 billion for two critical national priorities: public safety and deficit reduction. Regarding the former, a successful auction will deliver not just the $7 billion in funding Congress specified for FirstNet but also the $135 million it marked for state and local public safety officials, the $300 million it identified for the research and development of wireless public safety communications, and the $115 million it sought for the deployment of Next Generation 911.[5]

[5] *See* Spectrum Act § 6413(b)(2), (4), (6), & (7).

As for deficit reduction, our upcoming auctions, including the incentive auction, hold the promise of raising more than $20 billion to help reduce our national debt.[6] Just yesterday, Senators John Cornyn, Charles Schumer, John Thune, and Sherrod Brown called these funds a "critical return for the sale of a valuable taxpayer asset."[7] Indeed, Congress counted on us meeting this target when it passed the Spectrum Act, so much so that it already spent those funds. If we don't meet it, the Commission will be responsible for increasing the budget deficit above the Congressional Budget Office's current projections.

I am therefore disappointed that the Commission is not structuring the incentive auction to maximize net revenues. To be sure, the item does attempt to raise money for FirstNet, and in some ways this is an improvement over the proposal set forth in the NPRM. But what about deficit reduction? What about the deployment of Next Generation 911? What about wireless public safety communications research and development? The unmistakable message of today's item is that these priorities don't matter.

It would have been easy for us to establish auction rules that would have maximized net revenues. The incentive auction would contain a minimum of two stages, and the auction would continue until a stage raised less net revenues than the preceding stage. At that point, the outcome of the preceding stage would yield the final results of the auction. By contrast, the rules contained in this item will end the auction after any stage where we can cover necessary funds for FirstNet, pay broadcasters in the reverse auction, and deposit $1.75 billion into the relocation fund.

My approach would have raised more money for the important national priorities contained in the Spectrum Act. In particular, it would have been better for FirstNet. Suppose, for example, that we head into this auction still needing to raise $4 billion for FirstNet, but no stage of the auction is able to produce more than $3 billion in net revenues. Under the Commission's approach, the incentive auction would fail and produce no money for FirstNet. Under my approach, the auction would succeed and FirstNet would receive $3 billion. As they say, a bird in the hand is worth two in the bush.

Maximizing net revenues is also the right call from an economic perspective. Spectrum should be directed to its highest value use. In some ways, that is what the concept of an incentive auction is all about. So if we must pay broadcasters $500 million to clear a channel for which wireless carriers are prepared to pay $1 billion, that's not just a win for the taxpayers but also an efficient allocation of resources. However, once we reach the point where we are paying broadcasters $1 billion to clear a channel for which wireless carriers are only prepared to pay $500 million, that's a loss to the taxpayers and an inefficient allocation of resources. But that's precisely what could happen under the rules adopted by the Commission today.

B.

This order also treats unfairly those broadcasters that choose not to participate in the auction. Congress established a $1.75 billion fund to reimburse the relocation expenses of broadcasters that choose to stay in business and will be required to relocate as a result of the incentive auction.[8] And, in my view, the Commission should have adopted a $1.75 billion budget for any repack.[9] But the Commission

[6] *Id*. § 6413(b)(5).

[7] Letter from Hon. John Cornyn, et al. to Hon. Thomas Wheeler, Chairman, FCC (May 14, 2014).

[8] *See* 47 U.S.C. § 309(j)(8)(G)(iii)(I). This fund will also reimburse multichannel video programming distributors for expenses incurred in order to continue carrying repacked broadcast television stations. *See* Spectrum Act § 6403(b)(4)(A)(ii).

[9] Because it will not be possible beforehand to calculate precisely the cost of the repack, I would have adopted a $1.75 billion budget for the estimated costs.

declines to establish any limit on estimated repacking costs. As a result, the incentive auction may produce a repacking plan that will cost $2 billion or $3 billion to implement, with repacked broadcasters stuck footing much of the bill.

This outcome would be unfair. Broadcasters that do not participate in the incentive auction are not asking for special treatment. They are not asking to be among the many winners of a successful incentive auction. Whereas wireless carriers will obtain beachfront spectrum for mobile broadband and participating broadcasters may receive substantial amounts of money, non-participating broadcasters are simply asking to be held harmless rather than being made losers. This is a reasonable request, and we should have granted it.

Indeed, I believe that this was Congress's intent. Remember that Congress specifically provided that participation in the incentive auction would be voluntary.[10] But if broadcasters that stay in business cannot recover their relocation costs, is the incentive auction truly voluntary? Think about the following scenario. I inform you that you aren't going to be allowed to stay in your house and give you a choice. Either you sell me your house or I'll seize it but give you a replica of your house for free on the lot next door. Now imagine that I present you with a different choice: Either you sell me your house or I'll seize it and give you a replica of your house on the lot next door so long as you kick in $40,000 to help defray the construction costs. Under the second scenario, am I not coercing you into selling your house?

C.

I am also concerned that today's order is unfair to rural Americans. Those who live in rural areas often rely on translators for free, over-the-air television service. The incentive auction will require many of these translators to relocate, and some may disappear entirely because there will not be room for them once spectrum is reallocated and television stations are repacked.

There is nothing that the Commission could have done to avoid these consequences entirely. But we could have done more to mitigate their impact. Specifically, when the time comes for the Commission to find room for low-power television stations and translators after repacking, we proposed in the NPRM to give a preference to applicants providing a community with its only local, over-the-air television service.

I am disappointed that the Commission rejects taking even this modest step in today's item. The fair distribution of broadcast stations has been at the core of the Commission's policies for decades, both with respect to radio and television. That policy no more implicates First Amendment concerns than our longstanding preferences for radio stations providing a community with its first or second aural service.[11] But we turn our back on that policy today.[12] As a result, there is a greater risk that some Americans will be left without *any* over-the-air television service after the incentive auction. This is wrong. As is too often the case, rural America may be left behind.

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[10] *See* Spectrum Act § 6403(a)(1).

[11] *See, e.g.*, *Revision of FM Assignment Policies and Procedures*, BC Docket No. 80-130, Second Report and Order, 90 FCC 2d 88 (1982).

[12] To be sure, the item points out that the Commission's policies promoting the fair distribution of broadcast stations have not traditionally applied to low power television stations and translators. *See Report and Order* at note 1867. But that decision was based, in part, on the existence of a full service television allotment scheme that *was* informed by those policies. *See Low Power Television and Television Translator Service*, 2 FCC Rcd 1278, 1281 (1987). And because the incentive auction will change that allotment scheme for full-power stations *without regard* to the Commission's fair distribution policies, it only makes sense to take the relatively minor step of providing a preference for displacement applications filed by low power television stations or translators that would provide a community with its only local, over-the-air television service.

D.

Additionally, I do not believe that the bidding restrictions we adopt today are fair to those carriers that have participated in past FCC auctions for low-band spectrum. The Commission today prevents nationwide carriers with at least one-third of the low-band spectrum in a given PEA from bidding for certain blocks of spectrum in that PEA. But carriers didn't commandeer that spectrum. In many cases, they bought licenses to use it at spectrum auctions.

AT&T and Verizon, for example, spent billions of dollars purchasing spectrum in the 700 MHz auction. Their participation was a good thing. It helped to make the auction a success and raised substantial amounts of money for the Treasury. And that spectrum is being used today to deliver high-speed 4G LTE service to Americans across the country. But today, we are effectively penalizing these carriers for their past participation in that auction by limiting their ability to bid in this auction.

And who do these restrictions benefit? Carriers that chose to sit out the 700 MHz auction. To be clear, that was their decision, and I do not fault them for it. It is certainly not my position to weigh in on corporate strategy. But I do object to rewarding these carriers for their failure to bid in prior auctions, as we are doing here.

To summarize, the Commission is punishing past bidders with new restrictions and rewarding those who have not participated before with set-asides. In my view, this policy creates perverse incentives. Our goal should be to encourage robust participation in *all* of our auctions rather than holding open the prospect that those who forgo participation will qualify for special favors in future auctions.

III.

Shifting from fairness to the rule of law, I do not believe that this item stays faithful to the terms of the Spectrum Act. Most importantly, our rules run afoul of Congress's mandate during the repacking process, to "make all reasonable efforts to preserve, as of the date of enactment of this Act, the coverage area and population served of each broadcast licensee, *as determined using the methodology described in OET Bulletin 69* [OET-69] *of the Office of Engineering and Technology of the Commission*."[13]

In this item, the Commission decides to use, for repacking purposes, *TVStudy* software that departs in several respects from the methodology described in OET-69. To be clear, from a policy perspective, I generally agree with the Commission's decisions in this regard. For the most part, these departures from the OET-69 methodology appear to be changes for the better. I fear, however, that they will be all for naught if a court postpones or invalidates the incentive auction having found these changes to be unlawful.

To be sure, the item spends about fifteen pages explaining why the Commission is not straying from the OET-69 methodology and thus is complying with the Spectrum Act. I know firsthand that the attorneys in our Office of General Counsel are extremely talented, and they have certainly done yeoman's work here in developing arguments to support the Commission's position. But at the end of the day, they are trying to fit a square peg into a round hole.

For the most part, the item posits that the Commission is changing "input values" rather than the OET-69 "methodology." But it is unable to point to any Commission precedent distinguishing between the two. Indeed, this argument stands in stark contrast to prior Commission pronouncements.

Consider, for example, the issue of census data. The item maintains that census data represents an input value rather than part of the OET-69 methodology. Accordingly, we are free to substitute 2010

[13] *See* Spectrum Act § 6403(b)(2) (emphasis added).

census data for 2000 census data. But this contradicts the position taken by the FCC in 2007 before the DTV transition. Then, the Commission stated as follows: "We will revise the OET 69 interference analysis *methodology* to make the results more accurate and ensure consistent methodology. Specifically, we adopt the use of 2000 census data for use in all applications . . . ."[14] In other words, we have previously recognized that switching census data means revising the OET-69 methodology.

Or take the default vertical antenna patterns set forth in Table 8 of OET-69. In 2006, the Commission described these default vertical antenna patterns as "inherent in the OET-69 methodology."[15] In this item, however, the Commission decides to use the actual beam tilt value contained in our Consolidated Database System rather than the default patterns, criticizing the latter as "using the same electrical beam tilt for every location, regardless of the actual beam tilt value." This might very well be a positive change. But the Commission's own words, it is not only a change to the OET-69 methodology, but something inherent in that methodology.

Indeed, the Commission considered making a similar change just before the DTV transition. In 2007, it considered whether to "retain the existing OET 69 vertical pattern" or use "actual vertical patterns" that "would result in more accurate modeling of station coverage."[16] And it rejected making such a change in a section with the following heading: "Post-Transition Interference Standards and Analysis *Methodology*."[17]

Given that Congress specifically instructed the Commission to use a discrete methodology (the OET-69 methodology) for a discrete event (the incentive auction), the item understandably does not claim that we have the authority to depart from the OET-69 methodology explicitly. But neither do we have the authority to do so through sleight of hand. We can't take elements that were part of the OET-69 methodology at the time the Spectrum Act was passed and simply assert by fiat that they are no longer part of that methodology but merely inputs.

But even absent Commission precedent, I would still reach the conclusion that many of the changes made in this item are unlawful. For instance, take the issue of whether to use three arc-second terrain elevation data or one arc-second terrain elevation data. The methodology described in OET-69 clearly involves the use of three arc-second data. OET-69 states that "[t]he FCC computer program is linked to a terrain elevation database with values every 3 arc-seconds of latitude and longitude."[18] Today,

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[14] *Third Periodic Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television*, MB Docket No. 07-91, Report and Order, 23 FCC Rcd 2994, 3067, para. 155 (2007) (*Third Periodic Review*).

[15] *Qualcomm Incorporated Petition for Declaratory Ruling*, WT Docket No. 05-7, Order, 21 FCC Rcd 11683, 11690 (2006) (*Qualcomm Declaratory Ruling*). The Commission seeks to distance itself from its prior description of default vertical antenna patterns as being "inherent in the OET-69 methodology" by arguing that this phrase was simply used to summarize reply comments. *See Report and Order* at note 512. However, the critical sentence, read in its entirety, makes clear that the relevant characterization was being made by the Commission, not a commenter: "As for the vertical patterns that Qualcomm will actually use, compared with the default vertical antenna patterns inherent in the OET-69 methodology, Qualcomm asserts that it re-computed its sample analyses using the actual MediaFlo antenna patterns and the results are identical under either condition." *See Qualcomm Declaratory Ruling*, 21 FCC Rcd at 11690. Moreover, the Qualcomm reply comments under discussion nowhere characterized default vertical antenna patterns as being part of the OET-69 methodology, let alone as being inherent in that methodology, again making clear that the description at issue was that of the Commission. *See* Qualcomm Inc. Reply Comments, WT Docket No. 05-7 (filed Mar. 25, 2005).

[16] *Third Periodic Review*, 23 FCC Rcd at 3071, para. 166.

[17] *Id.* at 3067 (emphasis added).

[18] OET Bulletin No. 69, at 6 (Feb. 6, 2004) (OET-69), *available at* http://go.usa.gov/84A5.

however, the Commission adopts the use of one arc-second terrain elevation data instead. The item justifies this change by arguing that OET-69's reference to three arc-second data "is a descriptive statement about an input database . . . not a prescriptive element of the OET-69 methodology."[19] This, however, is too cute by half.

For one thing, the statute requires the Commission to use the "methodology *described* in OET Bulletin 69" so calling the statement in question "descriptive" actually undermines the Commission's case. Moreover, the distinction between "an input database" and "the OET-69 methodology" is an artificial one.[20] Pursuant to the OET-69 methodology, a television station's service is evaluated at one-kilometer increments.[21] That service determination, in part, depends upon the elevation of terrain between the transmitter and each point,[22] and that elevation is determined by a terrain elevation database with values every 3 arc-seconds of latitude or longitude.[23] So the database, in reality, is part of the methodology.

Also, consider the implications of the Commission's position. For example, would it constitute a change to the OET-69 methodology to replace a terrain elevation database of the United States with a database where terrain elevations were randomly generated for each geographic location? Surely, the answer to this question must be yes. But according to the Commission's logic, the answer must be no since all that is being changed is an "input database."

Stepping back from the trees to examine the forest, there is a larger question that needs to be asked: Why is all of this being done? To be sure, the Commission maintains that certain changes had to be made to our computer software so that it could successfully support the incentive auction. And I do not object to those changes since they do not alter the OET-69 methodology. But the changes discussed above do not fall into this category. They are luxuries, not necessities. They might be nice to have, but they are not must-haves. And they certainly aren't worth the risk that a court will delay or invalidate the incentive auction because of our failure to comply with the Spectrum Act.

Turning from questions of substance to those of process, I am also troubled by the manner in which this issue has been handled. These changes should have been the subject of a notice-and-comment rulemaking. They were not. Instead, the Office of Engineering and Technology simply sought input through a Public Notice.[24] This stands in stark contrast to the last time the Commission considered

[19] *Report and Order* at para. 151.

[20] Neither of the two orders cited by the Commission, *see Report and Order* at note 453, distinguishes between an "input" and a part of a "methodology." Indeed, both of those orders were issued a decade prior to the publication of OET-69 and consequently lend no insight into what elements comprise the OET-69 methodology.

[21] *See* OET-69 at 6–7.

[22] *See Qualcomm Petition for Declaratory Ruling*, 24 FCC Rcd 13392, 13393 (2009) ("OET-69 is an engineering methodology developed to evaluate TV coverage and interference, using predictions of radio field strength at specific geographic points while accounting for the terrain between the transmitter and each specific reception point"); *Study of Digital Field Strength Standards and Testing Procedures*, ET Docket No. 05-182, Report to Congress on the Satellite Home Viewer Extension and Reauthorization Act of 2004, 20 FCC Rcd 19504, 19562 (2005).

[23] *See id*.

[24] *See Office of Engineering and Technology Releases and Seeks Comment on Updated OET-69 Software*, ET Docket No. 13-26, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 950 (Off. Engineering & Tech. 2013).

making changes to OET-69 right before the DTV transition. There, the Commission issued an NPRM and engaged in a by-the-book administrative process.[25]

I will leave it up to the courts to decide whether the process here violates the Administrative Procedure Act. I'll simply note that I don't believe that excluding the Commissioners from the deliberative process until today's vote was the right thing to do. Moreover, it is not even clear to me what today's vote means. In the item, the Commission states that it will "use *TVStudy* . . . in the incentive auction."[26] But what version of *TVStudy* will we use? We don't know because OET has been regularly releasing updated versions of the software and apparently will continue to do so even after today.

I am also disturbed by the continued confusion over whether the *TVStudy* software is operating properly. Last week, for instance, the National Association of Broadcasters (NAB) told the Commission that *TVStudy* "has yet to be capable of replicating OET-69's results. Holding the OET-69 methodology constant (i.e., using all of the calculations as they exist in OET-69 pre-TVStudy), *TVStudy* inexplicably results in a loss of coverage area for approximately 88 percent (1978 stations out of 2232)."[27] According to NAB, these findings suggest either that there are errors in our new software or that changes have been made to OET-69 that no one has been told about. The item attempts to rebut NAB's assertions, and I don't claim to have the technical expertise to know whether one side is right or the truth lies somewhere in middle.[28] Whatever the case, I would urge OET and NAB to work together collaboratively to resolve these issues. The last thing we need is another major government project going awry because of IT failures.

IV.

A year ago, I spoke of an additional principle that should guide our decision-making in this proceeding: respect for the laws of physics. As I said at the time, "we must deal with the world the way that it is, not as we might wish it were. The laws of physics aren't liberal or conservative, Democratic or Republican; they are immutable."[29]

I therefore am pleased that the band plan adopted by the Commission is consistent with this principle. It embraces the "Down from Channel 51" approach that I endorsed last May and contains guard bands and a duplex gap that are technically reasonable.[30] The journey to this band plan has been a bumpy one.[31] But I'm glad that we ended up in the right place.

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[25] *See Third Periodic Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television*, MB Docket No. 07-91, Notice of Proposed Rulemaking, 22 FCC Rcd 9478 (2007).

[26] *Report and Order* at para. 130.

[27] *See* National Association of Broadcasters Comments, ET Docket No 13-26, GN Docket No. 12-268, at 4 (May 8, 2014).

[28] *See Report and Order* at para. 161. I am nevertheless troubled that by item's statement that "*TVStudy* is not designed to produce the identical results produced by earlier software," *id.*, to the extent this means that *TVStudy* is not designed to replicate the earlier software's output of coverage area and population served for each station even if both programs are given the same inputs.

[29] Opening Remarks of Commissioner Ajit Pai at CTIA 2013's Panel on the Spectrum Incentive Auctions: Step Right Up!, Las Vegas, Nevada, at 1 (May 22, 2013).

[30] *See id*.

[31] *Wireless Telecommunications Bureau Seeks to Supplement Band the Record on the 600 MHz Band Plan*, GN Docket No. 12-268, Public Notice, 28 FCC Rcd 7414 (Wireless Telecommunications Bur. 2013); Statement of Commissioner Ajit Pai on the Public Notice of the Wireless Telecommunications Bureau to Supplement the Record on the 600 MHz Band Plan at 2 (May 17, 2013) (criticizing Public Notice for "refocus[ing] the agency's and the public's attention on a variety of band plans with little or no support in the record").

Going forward, however, I am concerned by our proposal to make available six megahertz in the duplex gap for unlicensed broadband device operations without any analysis that doing so is technically possible without harming the licensed services surrounding that gap. We should have sought comment in a neutral manner on whether the duplex gap should be available for unlicensed operations, wireless microphones, or any use at all. I am all in favor of making more spectrum available for unlicensed use. If we can do so here without causing interference to the licensed spectrum we will be auctioning, that is something we should seriously consider. But I am worried that we may be making promises that the laws of physics won't allow us to keep.

V.

Last but not least, a brief word about delegation. I do not dispute that for the incentive auction to be a success, we must delegate certain tasks to the Commission's talented staff. But today's item moves too much responsibility away from the five Commissioners who have been appointed by the President and confirmed by the Senate, and who theoretically "direct[]" the agency.[32]

I objected to no fewer than ten such delegations of authority. I'll mention just three of them here. First, the Commission delegates to the Media Bureau the authority to decide how to allocate money if the expenses incurred by broadcasters and MVPDs are greater than the $1.75 billion contained in the relocation fund.[33] In my view, this issue implicates policy judgments that should be made by the Commission. Second, we delegate to the Media Bureau the authority to establish a set of construction deadlines for relocated broadcast stations.[34] Once again, I believe that such decisions are important enough to be made by the Commission. And third, we delegate to a broad range of Bureaus and Offices the authority to change the rules adopted in this item as necessary to conform them to the text of the Order.[35] This last delegation, in particular, I find curious. I had always thought that the Commission's orders were designed to explain the rules that we adopt and intend to publish in the Code of Federal Regulations, not the other way around.

* * *

To conclude, I am disappointed with where we find ourselves today. Conducting the incentive auction is one of the FCC's most prominent responsibilities, and it would have been ideal to move forward on a bipartisan basis. But fundamental decisions about the shape of this item were made long ago, and while I cannot speak for my colleagues, they were made without my input. I cannot, in good conscience, endorse those decisions when I believe that they: (1) will produce an incentive auction that is unnecessarily complicated; (2) are not fair to all stakeholders; and (3) are not faithful to the terms of the Spectrum Act. For all of these reasons, I must respectfully dissent.

[32] "What We Do," http://www.fcc.gov/what-we-do (last visited May 14, 2014).

[33] *See Report and Order* at para. 650.

[34] *Id*. at para. 560.

[35] *Id*. at para. 811.

DISSENTING STATEMENT OF
COMMISSIONER MICHAEL O'RIELLY

Re: *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268.

Let me start by thanking the Incentive Auction Task Force and all of the Commission staff who worked long hours to get us to this point. I appreciate your incredible efforts to consider the many complex legal and technical challenges posed by this Broadcast Incentive Auction. I took my obligation to dig deeply into the voluminous item before us very seriously, and I am immensely grateful for the numerous briefings provided to me and my staff, some of which went late into the evening.

Unfortunately, I must dissent from the order. Although the bidding restrictions are embedded in the separate Mobile Spectrum Holdings item that the Commission also adopts today, these two orders are inextricably linked. Bifurcating them does not allow me to ignore Congressional intent or my own principles. Establishing a spectrum set-aside for well-capitalized companies is so fundamentally harmful that it taints the entire Incentive Auction process and I genuinely fear the auction may fail as a result. Separately, I have a number of other fundamental concerns about the Incentive Auction structure itself that should have been addressed.

First, I disagree with the item's "final stage rule," which will determine whether the auction can successfully close. In the order, the auction can end once enough revenue is raised to cover the payout to the participating stations, the Commission's administrative expenses, the $1.75 billion repacking budget for the remaining broadcasters, and any remaining amount that is needed to pay for the First Responder Network Authority (FirstNet). While I strongly support meeting the statutory funding target for FirstNet, I do not believe the Commission has the right to pick and choose which of the Congressional funding priorities it is going to favor. The simple fact is Congress has already allocated the funding expected from a successful Incentive Auction for many purposes. Accordingly, the final stage rule should continue the auction until it has raised as much revenue as it can beyond the payments to effectuate the reallocation of broadcast spectrum to wireless broadband use—with the remaining revenues going to the list of Congress' priorities. Or it should incorporate all of the items, including deficit reduction, into the final stage rule. Choosing just one program for guaranteed funding smacks of politics and tarnishes the agency's credibility.

Second, I am concerned about the extent to which the order delegates authority to various bureaus to make important decisions to implement the statute. As I have stated before, such decisions should be voted on at the Commission level. For example, the Media Bureau is given broad authority to determine how the Commission reimburses repacking costs, including how to prioritize allocation of funds if $1.75 billion does not cover all repacking expenses. The Media Bureau will also decide the specific construction deadlines for individual stations, what service rule waivers will be allowed in lieu of reimbursement of repacking costs, and the priority in which the Commission will consider certain broadcaster requests to change channels following the repacking process. At least, as of now, the Auction Comment and Procedures Public Notices—normally done by the Wireless Telecommunications Bureau—will be considered and voted on by the Commissioners.

Third, although the Commission is adopting rules now, it defers to future rulemakings or public notices specific details about how many of these rules will work. For instance, the Commission acknowledges that it needs additional information on how to set prices for the reverse auction. Further consideration will also occur on the extended round rule, which can be used to continue the auction if the revenue raised to clear a certain spectrum target is close but not quite enough to meet the final stage rule. The item also defers deciding the methodology for preventing adjacent and co-channel interference

between wireless and broadcasting services in impaired markets and determining an aggregate interference cap for broadcasters. Too many important pieces are punted to a later day, especially since the item admits that decisions made today may be "refined" in the future. So, instead of establishing a solid framework with a firm foundation, these may be, at best, temporary decisions.

Fourth, I have serious concerns about the questionable dynamic reserve price mechanism whereby broadcasters could accept the Commission's offer to cease broadcasting only to have the Commission request to lower that amount afterwards if there is a lack of competition. Although the specifics must be worked out, I worry about establishing a mechanism that could cause more market impairments, thereby lowering auction participation and revenues. We should do all we can to avoid market impairments, except in very extreme circumstances.

Fifth, I am worried that the adoption of a standardized 11 megahertz duplex gap, instead of 6 to 11 megahertz depending on the spectrum clearing target as originally contemplated, was an unnecessary change, not a decision grounded solely on what is technically reasonable to prevent harmful interference. I am a strong proponent of unlicensed services and have backed up my words with actions, but I have very real concerns that the uniform duplex gap is a political solution, potentially exposing the American taxpayers to a significant loss of revenue in any auction except one that clears 84 megahertz of spectrum.

Finally, I will suggest that there are legitimate questions as to whether this item complies with the requirement in the statute to protect the broadcasters who chose not to participate in the auction and their corresponding viewers. The item seems to skid across the line in a couple of instances and I expect a court may find difficulty in supporting the Commission here, notwithstanding any normal deference given. Congress was abundantly clear that it wanted to hold harmless non-participating broadcasters in their ability to serve their over-the-air viewers. I am disappointed to see this directive not sufficiently honored.

Although I respectfully dissent on today's item, I recognize that this auction is of utmost importance. Americans will benefit from putting the spectrum to its highest valued use, the construction of a public safety network and deficit reduction. I hope to collaborate with my colleagues and the entire Incentive Auction Team going forward to ensure that this auction has the greatest chance at success. A lot of uncertainty remains and many details still need to be finalized, but I am hoping for the best.

EXHIBIT GS-40

Spectrum Limits and Auction Revenue: the European Experience

Martin Cave & William Webb[1] [2]

July 29, 2013

Summary of the main points

- Sub-1 GHz spectrum has attractive propagation characteristics, enabling a degree of coverage that would be difficult to replicate without it. Accordingly, a wireless operator without proper access to such spectrum will be weakened, and possibly severely weakened.
- There is evidence that robust competition among wireless operators benefits both customers and the wider economy by spurring innovation and lowering prices.
- In recognition of this, governments and regulators in Europe have worked to design auctions in ways which maintain competitive pressures. This effort has led them in many cases to impose spectrum-aggregation limits on the amount of sub-1 GHz spectrum which any operator can acquire.
- The regulators' common goal has been to ensure that a sufficient number of operators have enough spectrum of the right kind to generate effective infrastructure competition. The resulting auctions have not excluded the largest operators from bidding, but have been designed to ensure smaller operators' access to some of the spectrum being auctioned.
- Auction designers must balance their desire to promote competition and maximise the economic impact of the use of spectrum with the need to raise revenues for important public purposes. The limited available evidence from European auctions is consistent with spectrum limits *not* having reduced revenues.
- The wireless market in the USA is structured in a manner which would probably lead European regulators to give careful consideration to the imposition of sub-1 GHz limits. However, any such limitation should be calibrated to achieve the desired outcomes at the minimum level of intervention.

[1] Mr. Cave and Mr. Webb are internationally-renowned experts on spectrum regulatory policy. Cave is a visiting professor at Imperial College Business School and a deputy chair of the UK Competition Commission; Webb is a visiting professor at Surrey University, Deputy President of the Institution of Engineering and Technology and formerly worked at Ofcom, the communications and spectrum regulator for the United Kingdom. Fuller biographical information is available at the end of this paper. This paper was prepared, at the request of Sprint Corporation, to document how the results of spectrum regulatory policies and auctions in Europe might inform US policy decisions surrounding the upcoming 600 MHz incentive auctions.

[2] The views expressed belong to the authors alone.

1. Introduction

The question of spectrum-aggregation limits in auctions has attracted a lot of predictable controversy – predictable because larger incumbents have an interest in opposing them, while smaller operators or entrants take the opposite view.

Onlookers also disagree on the merits of spectrum-aggregation limits. This disagreement is illustrated in the present case by the interchange between the Department of Justice (DoJ), which has favoured some form of spectrum-aggregation limits in its *ex parte* submission to the FCC Notice of Proposed Rulemaking,[3] and direct responses to this by AT&T's General Counsel[4] and a group of senior Congressional House Republicans.[5]

In essence, the DoJ argues that imposing a limit on the amount of spectrum which AT&T and Verizon can acquire in the forthcoming forward auction of reclaimed broadcast spectrum in the 600 MHz band will ensure that the smaller nationwide networks can acquire the low frequency spectrum that they need, and that this will improve the competitive dynamic among nationwide carriers and benefit consumers. The Republican House Members and AT&T counter that taking this step will both diminish and distort competition in wireless markets, and will jeopardise one of the goals expressed in the underlying legislation – that of maximising revenue from the auction, to be used for several purposes including construction of a public safety wireless broadband network. The interpretation of the legislation offered by the Republican House Members is itself contested by Democratic House Members.[6]

It is our impression that both sides in this debate recognise that the final decision in this matter involves balancing a number of imponderables, such as how wireless markets will develop with or without a spectrum-aggregation limit, and how such limits might affect revenues, for instance, by altering the number of parties that participate in the forthcoming auction.

It is our goal to address the question from the standpoint of participants in parallel debates on the role of spectrum-aggregation restrictions in Europe, where limitations on spectrum acquisition were present in the 3G spectrum auctions which took place in 2000/01, and also, in most countries, in the so-called 4G or 'digital dividend' auctions which have taken place in the past three years.

We attempt to explain some of the thinking which has underpinned regulators' decisions, and we also comment on the evidence of the impact of aggregation limits in Europe, recognising that the available data is only capable of providing indicative, rather than definitive, answers to this question.

Accordingly, we first set out briefly in section 2 the history of the adoption (or non-adoption) of aggregation limits in Europe; we then describe in section 3 the reasoning adopted in making decisions about aggregation limits, based upon the expected impact of such rules on competition in the wireless sector, and briefly the resulting consequences for economic growth. Section 4 contains

[3] US Department of Justice, Ex parte *Submission of the United States Department of Justice,* Docket No. 12-269 (filed April 11, 2013).
[4] Letter from W Watts to Chairman Genachowski and others, dated April 24, 2013.
[5] Letter from the Honorable Fred Upton and others to Chairman Julius Genachowski and others, dated April 19 2013.
[6] Letter from Honorable Henry Waxman and others to the Honorable Julius Genachowski, dated May 16, 2013.

some case studies of the impact of individual firms which auction design has encouraged to challenge the market leaders in the wireless sector. Section 5 discusses the apparent impact of aggregation restrictions on auction revenues, as illustrated by the results of recent European auctions. Section 6 summarizes our findings.

2. Spectrum-aggregation limits in Europe

2.1 Introduction

Prior to 2000, the standard method of licensing wireless operators in Europe was to issue a predetermined number of wireless communications licences, each associated with a licence to use a specified component of the chosen frequency band. This method was used to issue national GSM licences in the 1980s, and the method of assignment was a comparative evaluation of applicants against a predetermined set of criteria, or "beauty contest." Initially, only one or two licences were issued, but in the 1990s more spectrum was identified for commercial use and assigned in the same fashion to additional operators. The spectrum was tied to a particular use and a particular technology and was not tradable. Each licensee was thus subject to a spectrum limit. If one licensee merged with another, the combined entity would typically be required to hand back some of the assigned spectrum.

This rigorous form of control of operators' spectrum was carried forward into the 3G licensing process which was accomplished in Europe in 2000/1.[7] The government typically chose the number of licences to be made available, and associated an assignment of spectrum with each. The method of assignment was now an auction, typically a simultaneous ascending auction, for the specified number of licences. In Germany and Austria, six blocks of spectrum were made available and the auction was designed to ensure that they went to at least four operators. These designs permitted new entrants in several markets.

By the time the next major round of spectrum auctions occurred, often known as the digital dividend because of its association with the switch-off of analogue terrestrial television, European licensees typically held portfolios of spectrum holdings, acquired at various rounds of awards going back up to twenty years, at 900 MHz, 1800 MHz, 2.1 GHz, 2.3 GHz and more. In many countries, earlier licences had been renewed or retendered. Several countries chose to conduct simultaneous auctions of spectrum at multiple frequencies, most of them using combinatorial clock auction techniques. For this purpose, spectrum at the various frequencies was divided into blocks, and bidders made bids for combinations of blocks at different frequencies. In other words, bidders could choose the combination of licences which they wanted, rather than having them predetermined by the auction designer.

This required governments or regulators expressly to decide whether to impose spectrum-aggregation limits. We discuss below how these decisions were made, but note here that in imposing such limits, governments took into careful consideration the differences in the attributes of different frequency bands.

[7] See Paul Klemperer, Auctions: Theory and Practice, Princeton University Press, 2004, Ch. 5.

Radio frequencies have differing properties. In particular, lower frequencies have greater range and an associated ability to penetrate buildings more effectively. The actual range achieved depends on many factors including base station height, power, topography, handset efficiency and much more, but Table 1 gives some approximations as to the range that might be achieved in different mobile bands.

Frequency band	Exemplar range (km)	Comments
600 MHz	7.7	US incentive auction band (expected)
700 MHz	6.9	US recent auction
800 MHz	6.2	European recent auctions
900 MHz	5.8	2G band in Europe
1.8 GHz	3.5	Additional 2G band
2.1 GHz	3.1	3G band
2.6 GHz	2.6	Used by Clearwire

Table 1: Frequency range with frequency based on Hata model with 20 m base station height and 160 dB allowed path loss

For a system built to maximise coverage, the range has a major impact on deployment costs. A base station coverage area is related to the square of the range. Hence, for example, a 1.8 GHz network would need 4.8 times as many cells as a 600 MHz network for equivalent coverage.[8] As the cost of a network is roughly proportional to the number of base stations, operators with lower-frequency spectrum can have a major cost advantage over those without. As can be seen from the table, there is a large gap between 600-900 MHz and 1.8 GHz, with no intervening frequencies currently being used for cellular. Hence, simplistically, spectrum splits into sub-1 GHz and above-1 GHz, with material range advantages to the sub-1 GHz bands. This is why regulators and policymakers have paid particular attention to the distribution of this spectrum.

For example, Ofcom[9] has noted:

> *"Particular importance of sub-1 GHz spectrum*
>
> *5.40 Sub-1 GHz spectrum gives advantages over higher frequencies in terms of coverage. It allows a significantly greater geographical area to be served than higher frequency bands*

[8] There is an important caveat here. Some networks are "capacity limited" rather than "coverage limited". This means that the cell range has been deliberately reduced in order to increase network capacity by allowing the introduction of additional cells. Networks tend to be capacity limited in urban areas but coverage limited in rural areas. In capacity-limited situations, the advantage of greater range is diminished or even removed completely; however, low-frequency spectrum *can* serve the capacity functions more typically associated with high-frequency spectrum (for example, by lowering power, increasing antenna downtilt, etc.), but the physical properties of high-frequency spectrum make it much more costly and much less practical to serve the coverage functions associated with low-frequency spectrum. *See, .e.g.,* Jonathan B. Baker, "Spectrum Auction Rules that Foster Mobile Wireless Competition," at 15, Exhibit B, Reply Comments of T-Mobile USA Inc., Docket No. 12-268 (filed March 12, 2013).

[9] Ofcom, Consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues, 22 March 2011. In its 2013 auction design which incorporated a spectrum floor for a fourth bidder, Ofcom effectively guaranteed that bidder a choice among several spectrum bands. From those available, the fourth bidder elected to acquire 800 MHz spectrum; see section 4.1 below.

would, for the same number of sites (because signals travel further at lower frequencies). It also tends to provide substantially better signal quality and higher download speeds (throughput) within buildings than higher frequencies since lower frequency signals are better at penetrating solid objects.

5.41 These advantages could mean that national wholesalers with a large amount of sub-1 GHz spectrum would have an unmatchable competitive advantage over those without any sub-1 GHz spectrum. By an unmatchable competitive advantage we mean that the national wholesalers without sub-1 GHz spectrum suffer a material competitive disadvantage because they are unable to develop their networks to offer services sufficiently similar to national wholesalers with sub-1 GHz spectrum. This would depend partly on technical differences between wholesalers with different spectrum portfolios and partly on how sensitive consumers are to any such technical differences, such as the quality of deep indoor coverage.

5.42 In our technical analysis we have explored the technical scale of these advantages. This analysis is set out in Annex 7. Our preliminary conclusion is that national wholesalers with a large amount of sub-1 GHz spectrum may have an unmatchable technical advantage compared to national wholesalers without any sub-1 GHz spectrum."

The Irish regulator, Comreg, has commented:[10]

- *"the inclusion of the 800 MHz band would almost double the amount of spectrum in the competition;*
- *while there may be short-run differences (e.g. due to equipment availability) between the 800 MHz and 900 MHz bands, ComReg did not believe these to be sufficient to prevent the use of a single cap for the sub-1GHz spectrum; and*
- *while perfect symmetry in sub-1GHz spectrum distribution between competitors is not necessary to facilitate competition, highly asymmetric distributions of sub-1GHz spectrum could be detrimental to competition downstream."*

This has led most European regulators to adopt mechanisms to ensure that holdings of sub-1 GHz spectrum do not become concentrated across a subset of operators as discussed below.

2.2 Spectrum-aggregation limits in Europe

The use of spectrum-aggregation limits is widespread around the world and appears to be becoming an increasing feature of spectrum auctions. In this section, we concentrate on the use of aggregation limits in spectrum auctions below 1 GHz. These are predominantly at 800 MHz in Europe. This practice is an ever changing area as regulators review and change plans and as more auctions are held. Nevertheless, in aggregate, the data paint a picture of limits as a widely employed feature of the spectrum auction process.

Many of these auctions are complex, with unique features or national idiosyncrasies. We have done our best to categorise them appropriately. We have made some assumptions in treating the data – for example the simplification that coverage obligations do not have materially different impacts on

[10] Source: "Multi band spectrum release", doc 11/60a, 24 Aug 2011, Comreg.

auction revenues in different countries. As a result, we do not expect that our analysis is perfect in all respect, or that flaws cannot be found. However, we believe that the results presented here provide useful pointers.

Specific cases

In Germany's auction of the 800 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz bands, the regulator imposed spectrum-aggregation limits[11] which effectively limited two MNOs (T-Mobile and Vodafone) to 2x22.4 MHz and all other potential bidders to 2x20 MHz of sub-1 GHz spectrum. In contrast, it did not impose any limits on the higher frequency spectrum in the auction, indicating their greater concerns regarding excessive concentration in the sub-1 GHz bands and their relative lack of concern with concentration in the higher frequency bands which were more plentiful and conferred less competitive advantage. The outcome[12] was that T-Mobile and Vodafone acquired spectrum up to their cap[13] (which was 2x10 MHz in the 800 MHz band).

Sweden's regulator cited the sub-1 GHz spectrum as being "well suited for area coverage and indoor coverage" and imposed 2x10 MHz caps[14] in its 800 MHz auction which resulted in the three incumbents gaining spectrum.

In Ireland's November 2012 auction of the 800 MHz, 900 MHz and 1800 MHz bands, the regulator proposed a sub-1 GHz cap of 2x20 MHz. It identified sub-1 GHz spectrum as "particularly important for competition in a service market such as this" and cited a technical study which identified the significantly smaller number of sites needed for a 900 MHz network to achieve the same service level as a network using higher frequency spectrum.[15] The outcome was that three of the four operators each purchased 2x10 MHz of the spectrum.

In its 2012 auction of all mobile spectrum bands Switzerland's regulator proposed a sub-1 GHz cap of 2x30 MHz (subsequently revised down to 2x25 MHz[16]), highlighting its relative importance by citing the bands' "good propagation characteristics". The 800 MHz band is the only new spectrum band that has caps imposed on it, with the 2.6 GHz band having no cap.[17] There is a total overall cap of 2x135 MHz per operator. The outcome was that Orange gained 2x10 MHz at 800 MHz and 2x5 MHz at 900 MHz, Swisscom gained 2x10 MHz at 800 MHz and 2x15 MHz at 900 MHz, and Sunrise gained 2x10 MHz at 800 MHz and 2x15 MHz at 900 MHz.[18]

Spain's regulator proposed a 2x20 MHz sub-1 GHz cap for its September 2011 auction of all mobile spectrum bands. Three incumbent operators acquired 2x10 MHz of spectrum at 800 MHz. There

[11] Source: Ofcom: Consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues, published 22 March 2011, see Annex 6, Section 5.
[12] All auction outcome data is sourced from the PolicyTracker Global Spectrum Database, see http://www.policytracker.com/global-spectrum-database
[13] See http://www.tolaga.com/pdfReports/GermanyMegaAuction.pdf where Exhibit 3 shows T-Mobile and Vodafone both had 2x12.4 MHz at 900 MHz prior to the auction.
[14] Source: Ofcom, as above.
[15] Source: Ofcom, as above.
[16] See http://www.ofcom.admin.ch/themen/frequenzen/03569/03901/index.html?lang=en
[17] Source: Ofcom, as above.
[18] See http://www.telegeography.com/products/commsupdate/articles/2012/02/23/trio-snap-up-swiss-spectrum/

were some indications that the caps may have had an impact in some regions in a complex multi-band auction implemented in multiple phases. In particular, caps may have had an impact on the subsequent 900 MHz auction that followed from the 800 MHz auction.

Portugal put in place a 2x10 MHz cap at 800 MHz. Three incumbents all gained 2x10 MHz.

Slovakia decided that no one operator will be allowed to acquire more than 2x10 MHz in the 800 MHz band or more than 2 x 15 MHz in the 1800 MHz band. There are three current operators and the auction is structured to enable a new entrant.

Iceland auctioned 2x30 MHz at 800 MHz in March 2013. A cap of 2x20 MHz was used. In addition 3G licence holders had a maximum gain on their spectrum holdings across all bands of 2x20 MHz. Four bidders all gained spectrum at 800 MHz, although little further information is available about this auction at present.

The Czech Republic will auction 2x30 MHz at 800 MHz and has proposed a cap of 2x15 MHz and obligatory roaming onto the 800 MHz networks for those without 800 MHz spectrum. There are three incumbent operators. The regulator controversially cancelled the first auction attempt, on the ground that bids had reached too high a level, as a result of what appears to be an error in auction design.[19]

The UK held an auction with a complex set of floors and coverage obligations. There was an overall cap of 2x105 MHz per operator and a sub-1 GHz cap of 2x27.5 MHz. To be competitive in a minimum four player wholesale market, Ofcom stipulated that the operators must hold one of the following spectrum portfolios once the auction is over:

- 2 x 5 MHz of sub-1 GHz spectrum plus 2 x 20 MHz or more of 2.6 GHz,
- 2 x 5 MHz of sub-1 GHz spectrum plus 2 x 15 MHz or more of 1800 MHz,
- 2 x 10 MHz of sub-1GHz spectrum plus 2 x 15 MHz or more of 2.6 GHz,
- 2 x 10 MHz of sub-1 GHz spectrum plus 2 x 10 MHz or more of 1800 MHz,
- 2 x 15 MHz or more of sub-1 GHz.

Of the four existing operators, two got 2x5 MHz and two 2x10 MHz at 800 MHz. The sub-1 GHz cap was met for both Vodafone and O2 who had previous holdings of 2x17 MHz at 900 MHz.

Italy has a cap of 2x25 MHz for sub-1 GHz spectrum. Three incumbents all gained 2x10 MHz. These all had between 2x10 MHz and 2x12 MHz previously[20] so two of the three operators were effectively at the caps.

Norway will auction 2x30 MHz at 800 MHz. A cap of 2x10 MHz will apply.

France auctioned its 800 MHz spectrum with a cap of 2x15 MHz. Three of the four incumbents acquired 800 MHz spectrum, the relatively new entrant Free did not (but there are roaming obligations on 800 MHz licenses to allow Free access to their networks).

[19] https://www.policytracker.com/headlines/czech-regulator-cancels-4g-auction
[20] PolicyTracker, op. cit. in footnote 12.

In the Netherlands two 2x5 MHz blocks at 800 MHz were set aside for new entrants. Two incumbents and one new entrant (Tele2) won spectrum at 800 MHz, the other incumbent acquired spectrum at 900 MHz. Tele2 acquired both 2x5 MHz blocks set aside.

Denmark held an auction in mid-2012. There were three bidders of which two were successful (TDC and TT-Networks which was a consortium of Telia and Telenor). A coverage obligation was imposed on one of the blocks.

Table 2 below summarises specific measures regarding sub-1 GHz in recent and upcoming European auctions. Notably, all of the regulators concerned have put in place measures that at least maintain the current number of sub-1 GHz MNOs, whilst in the case of Ireland and Spain efforts have been made to ensure sub-1 GHz spectrum will be available to all national wholesalers.

	Number of national MNOs	Aggregation limit in auction	Sub-1 GHz limit	Outcome
Germany	4	2x20 MHz (2x22.4 MHz Vodafone and T-Mobile) below 1 GHz	Yes	2x10 MHz (O2) 2x10 MHz (T-Mobile) 2x10 MHz (Vodafone)
Ireland	4	2x20 MHz	Yes	2x10 MHz (Meteor) 2x10 MHz (Vodafone) 2x10MHz (O2)
Switzerland	3	2x25 MHz on combined 800 MHz and 900MHz	Yes	2x10 MHz (Orange) 2x10 MHz (Sunrise) 2x10 M Hz (Swisscom)
Sweden	4	2x10 MHz	Yes	2x10MHz (3) 2x10 MHz (Telenor) 2x10 MHz (Sulab)
Spain	4	2x20 MHz	Yes	2x5 MHz (Telefonica) 2x5 MHz (Vodafone) 2x20 MHz (Orange)
Portugal	3	2x10 MHz	Yes	2x10 MHz (Optimus) 2x10 MHz (TMN) 2x10 MHz (Vodafone)
Slovakia	3	2X10 MHz	Yes	Auction due 2H 2013
Iceland	6	2X20 MHz	Yes	Winners were Nova, Vodafone, Simmin and 365 (amounts unknown)
Czech Republic	3	2x15 MHz with roaming provision	Yes	Bidding halted because prices considered too high
UK	4	2X27 MHz below 1GHz plus floor and coverage obligation	Yes	2x5 MHz (EE) 2x5 MHz (3) 2x10 MHz (Vodafone) 2x10 MHz (Telefonica)
Italy	4	2X25 MHz below 1 GHz	Yes	2x10 MHz (TIM) 2x10 MHz (Vodafone) 2x10 MHz (Wind)
Norway	6	2X10 MHz	Yes	Auction expected late 2013
France	4	2X15 MHz with roaming provision	Yes (plus roaming obligations on low-band incumbents)	2x10 MHz (Bouygues) 2x10 MHz (Orange) 2x10 MHz (SFR)
Netherlands	5	N/A (blocks set aside for new entrants)	Yes (via set-asides)	2x10 MHz (Tele2)
Denmark	6	2x20MHz	Yes	2x20 MHz (TDC) 2x10 MHz (TT)

Table 2: Summary of caps in European auctions and outcomes

In summary, the use of spectrum-aggregation limits in auctions is widespread, especially for sub-1 GHz spectrum which is often considered especially valuable and yet has the most supply constraints.

Almost all European countries have implemented some form of spectrum-aggregation limit. In a few countries provision was made for new entrants, but this was relatively rare. Coverage obligations were also used in a few countries, although typically only on a sub-set of the available licenses. The regulators' common underlying goal has been to ensure that a sufficient number of operators have enough spectrum to generate effective network infrastructure competition.

Where auctions have been held, the results are often a near-even distribution of the spectrum across the incumbent operators, sometimes below the level of the limits in place.

2.3 Summary

As the mobile sector has become more complex, restrictions on access to spectrum in Europe have switched from the 'one licence assignment per company' procedure which characterised 3G licensing, to more complex arrangements affecting portfolios of spectrum holdings, but focussed on sub-1 GHz bands. This gives regulators extended opportunities to flex their interventions to achieve particular goals, as the description above shows. In the next section, we discuss further the logic behind decisions to impose caps in recent awards on the acquisition of sub-1 GHz spectrum.

3. Features of mobile markets which may require spectrum-aggregation limits

The diffusion of wireless services was relatively speedy in Europe, and the sector received considerable attention as an attractor of investment and employment, a source of growth, and (for equipment manufacturers) an opportunity for exports. The benefits of an effectively competitive market place were also recognised, and this was evident in governmental decisions to structure spectrum awards to encourage entry.

Given the common view that economies of scale and entry barriers in the wireless industry have produced a tendency towards the concentration of market power in the sector, regulators and competition authorities paid close attention to its evolution. Thus from 2002 to 2007, regulators in European Union Member States had to examine wholesale mobile markets for the presence of significant market power or dominance, and take action when they found it.[21]

Within the European competition law and regulatory frameworks, dominance can be exercised either by a single firm or jointly and collectively by several firms.[22] The presence in mobile markets of substantial regulatory and other barriers to entry create the risk of adverse outcomes for consumers resulting either from the unilateral conduct of a single firm or from tacitly co-ordinated behaviour by several firms, which could harm consumers by raising prices and stifling innovation.

[21] COMMISSION RECOMMENDATION of 11 February 2003 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services (2003/311/EC).

[22] In addition, there are prohibitions on explicit price-fixing agreements. Mobile operators in France were convicted of this in 2005. See the press release issued at the time by the French Competition Authority, available at http://www.autoritedelaconcurrence.fr/user/standard.php?id_rub=160&id_article=502

In particular, the necessary conditions for tacit co-ordination which are suggested by economic theory seem to be present in mobile markets:[23]

- pricing is a possible focal point for co-ordination, and is transparent to all;
- if one operator departs from a tacitly agreed price point, others can detect the deviation and punish it;
- if market shares are asymmetric and barriers to entry are high, there is limited external competitive constraint on the co-ordinating group.

European merger policy also recognised the importance of keeping competition alive, especially in the form of operators, which are capable of breaking the constraints of existing modes of competition.[24] The departure of such an operator can have an effect on subsequent prospects for co-ordination, and it can also have non co-ordinated effects. These issues came up in the European Commission's decision over whether to allow T-Mobile in Austria to take over a smaller Austrian operator, tele.ring.[25] As a European Commission Competition Directorate official later explained, the Commission's Horizontal [Merger] Guidelines expressly state that "some firms have more of an influence on the competitive process than their market shares would suggest. A merger involving such a firm could change the competitive dynamics in a significant anti-competitive way, in particular when the market is very complicated."[26]

These concerns about mobile competition do not expressly concern spectrum aggregation, but it is easy to see how spectrum-aggregation limits can be employed to deal with them. Allowing the largest operators to acquire the predominant proportion or even all the highest value spectrum available at a major spectrum award risks triggering several effects:

- weakening the competitive constraint provided by smaller operators;
- creating more fertile conditions for the exercise of single firm dominance or co-ordination between a small group of the larger operators.

These motives may lead operators in that small group to use their deep pockets to acquire all the spectrum, even if it has for a time to be 'warehoused', on the footing that the benefits of depriving rivals of the spectrum outweigh the costs of acquiring the additional investment ahead of need.

These issues are alluded to in two of the documents which we referred to at the start of this paper. Thus the DoJ argues that "carriers do have the ability and, in some cases, the incentive to exercise at least some degree of market power, particularly given that there is already significant nationwide concentration in the wireless industry". The Department also refers to the 'foreclosure value' of additional spectrum to large operators, which arises because their acquisition of extra spectrum prevents rivals form improving their services and thus eroding the rents available to the larger

[23] See L Cabral, Introduction to Industrial Organisation, 2000, Ch. 8. Note that these are necessary, not sufficient, conditions.
[24] See section 4 below for some case studies.
[25] For more details, see section 4.3 below.
[26] J Luebking, 'T-Mobile Austria/tele.ring: remedying the loss of a maverick', Competition Policy Newsletter, 2, 2006, p.49.

operators.[27] Conversely, the House Republicans argue that "creating unbridled competition in an open and fair auction is the only way to maximize auction revenues and ensure that spectrum is put to its highest and best use."[28]

We understand that the approximate market shares of wireless subscribers in the USA are currently:[29]

	Market share
AT&T	32.3%
Verizon	34.3%
Sprint	15.8%
T-Mobile	9.7%
Others	8%

Table 3: Current US wireless market shares

In our view, this configuration would be likely to cause European regulators to give serious consideration to imposing spectrum-aggregation limits, for the following reasons. A small 'leading group' of two operators has emerged, accounting between them for 67% of subscribers, followed by two much smaller operators, and a 'tail' of other operators. Each of the larger operators might be able to exercise some unilateral market power. In addition, the shares of AT&T and Verizon are similar, and such symmetry is often (but not invariably) said to facilitate co-ordination.

Finally, competition issues in wireless acquire particular salience in Europe because of the impact which the spread of wireless voice is said to have exercised on economic growth, and because of the effect which the spread of wireless data services is expected to have.[30] Cisco forecasts that mobile data traffic in Europe (as elsewhere) will increase 20-fold between 2012 and 2017.[31] It is widely believed that this will have both a direct effect on investment and employment in the wireless sector, and that it will have a spill-over effect in the rest of the economy. It is also widely recognised that a competitive market structure which keeps prices low and encourages innovation provides a better platform for investment, employment and growth than a market structure characterised by limited competition, higher prices and lower output levels. Ensuring that the mobile market will function competitively is thus a regulatory priority.

4. Case studies of competitive effects in mobile markets

We pointed out in section 2 that there have been two 'waves' of the use in Europe of restrictions in auctions on spectrum aggregation. The first occurred in 2000/01, and took the form of the identification of a set number of licences, with the restriction that a firm could hold one licence only. The second wave of restrictions, which mostly take the form of limits on the sub-1 GHz spectrum

[27] Op. cit. in footnote 3, pp. 8 and 11.
[28] Op. cit. In footnote 5, p. 3.
[29] Source: FCC, "Sixteenth Report", FCC 13-34, 21 March 2013: http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0321/FCC-13-34A1.pdf
[30] See for example C Qiang et al. 'The economic impact of broadband', Information and Communication for Development, World Bank, 2009, pp. 43-69.
[31] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017.

which each firm may acquire, possibly combined with an overall cap on any firm's aggregate spectrum holdings, came into effect in the 'digital dividend' auctions from 2010 onwards.

In our view, the period of time which has elapsed since implementation of this second set of pro-competitive rules is not extensive enough for their effects (or absence of effects) to be clearly visible. This is because there is a relatively large timing lag affecting use of the new spectrum at 800 MHz in Europe, resulting from the fact that the band is being used almost exclusively by operators for the deployment of new 4G networks. New wireless technologies take some time to have market impact because the following stages are needed:

1. The technology needs to become sufficiently mature to deploy in large scale (this can include standards-setting work within international standards bodies such as the 3rd Generation Partnership Project (3GPP)).
2. Networks need to be built with sufficient coverage to be useful.
3. Consumer devices need to be manufactured and introduced into the market.
4. A significant percentage of customers need to acquire these devices such that they can benefit from the new technology.

It took some five years from the 3G auctions of 2000 before 3G networks were having a significant effect on the mobile market. Although some of the above-noted conditions are by now fulfilled for 4G, they have only recently fallen into place, and the diffusion process has a long way to go. In light of these considerations, our three case studies come from the world of 3G rather than 4G. Two of the case studies thus focus on the effects of 3G entrants. To the degree that such effects are reversible by exit, they also speak to the likely consequences of the exit or weakening of a smaller player unprotected by appropriate spectrum-aggregation limits. The third case study shows how a European competition authority responded to the likely exit of a smaller operator through acquisition by expressly ensuring that spectrum holdings were not tilted by the merger in favour of one of the two larger players.

4.1. The impact of "3" in the UK

The 2000 auction of the 2.1 GHz 3G spectrum in the UK marked a clear policy intent to introduce a fifth mobile operator into the market, to add to the two operators originally awarded 900 MHz licences in the 1980s and the two further operators subsequently awarded 1800 MHz licences in the 1990s. (By 2000, the market shares of these four operators were approximately equal.) The 2000 auction was thus structured such that some frequencies were reserved for new entrants. The result was that the existing four operators and H3G, known as "3", all gained 3G spectrum.

Ever since the auction, "3" has been a disruptive influence on the UK market. It was first to roll out 3G services, launching a network in March 2003 and by December 2003 covering over 70% of the UK population – the fastest rollout in European telecoms at the time. From the start they pioneered video telephony and video download over their network. In September 2003 they delivered music videos to mobiles for the first time in Europe and in 2006 they launched the "3 Music Store" giving customers access to 500,000 tracks at 99p per track, at a time when other mobile operators were charging consumers £3 for one track. At one point their music downloads were second only to iTunes.

In 2005 they launched a service called SeeMeTV that was a precursor to YouTube. For every "3" customers that watched a clip, the customer who made the video was paid 1p. By March 2006, SeeMeTV had over 4 million downloads and had earned customers over £100,000.

In March 2006, "3" made a landmark agreement with Skype, which allowed customers to use Skype on their mobiles. This ran counter to the approach of other operators who were blocking access to the service. By December 2006 "3" was offering international Skype calls and in April 2009 "3" launched unlimited free Skype-to-Skype calls and instant messages. In February 2010 the billionth minute of Skype calls was made across the "3" network.

By 2006, "3" had gained more 3G subscribers than the other four networks combined. In 2007 they sought to revolutionise roaming by offering "3 at home" that allowed users roaming onto "3" networks in other countries to pay the same for their calls and data as when at home (this was discontinued in 2009). Its mobile data tariffs were the first ones offering unlimited data (in 2010), and they have constantly been less expensive per gigabyte (GB) than their competitors. For example, when other mobile networks at launch were charging £50 for 1 GB, "3" offered 1 GB for £10. This caused a rapid reduction in the prices offered by other operators.

"3" was also the first UK operator to offer "MiFi" capability where the handset becomes a local Wi-Fi hotspot, using the 3G connection as the backhaul at a time many other operators were banning this usage. They have also lobbied regulators often in a contrary manner to other operators – in the UK pushing for lower termination rates for calls from fixed lines to mobiles and in Europe working with the Commission to reduce mobile data roaming charges.

This is not to say that all of "3"'s interventions were successful. It seems highly likely, however, that the presence of "3" has made the UK mobile market much more competitive and has hastened the deployment of new technologies, services and customer propositions. In particular, prior to "3", the market was evenly distributed across four operators. It could be argued there was little incentive for any of these to upset the status quo with disruptive policies. However, "3" needed to gain market share as a new entrant and believed it could only do so if it could differentiate itself via its services. It clearly had the role of a maverick.

It is this which convinced Ofcom to incorporate in its design of the 2013 'digital dividend' auction certain features which ensured the continuation of competition, which had already been reduced from five to four players by a merger between T-Mobile and Orange in 2011. Ofcom argued that:[32]

> *"UK consumers will be likely to benefit from better services at lower prices in future if following the Auction there continue to be at least four credible national wholesalers of mobile services, Therefore, we would be concerned if as a result of the Auction fewer operators had access to sufficient spectrum to compete credibly at the wholesale level in the future than is currently the case in the UK;*
>
> *It is likely that this would be the case if neither Hutchison 3G UK (H3G) nor a new entrant acquires at least a minimum amount of spectrum in the Auction. Absent intervention, there is*

[32] Ofcom, Assessment of future mobile competition and award of 800 MHz and 2.6 GHz, July 2012, pp. 2-3.

> *a material risk that neither H3G nor a new entrant would acquire this minimum amount of spectrum in the Auction."*

Ofcom went on to examine the question of whether it was likely that a fourth operator which placed a higher intrinsic value on spectrum than other operators might nonetheless be outbid because those other operators would bid strategically to exclude the fourth operator. Ofcom concluded that this was a realistic risk.[33]

Accordingly, Ofcom introduced a procedure which had the effect of favouring the bids of a fourth operator competing for a minimum package of spectrum, including a sub-1 GHz package.[34] In short, absent intervention, there was a material risk that neither "3" nor a new entrant would have acquired the minimum amount of spectrum which it needed to be an effective competitor, ensuring that consumers continued to enjoy lower prices and better, more innovative services.

4.2 Free in France

Our second example is in some respects a time-delayed but accelerated version of the first. France chose to assign its planned four 3G licences by a hybrid process, involving a set fee and a beauty contest. Two licences were issued in 2000 (to France Telecom and SFR), and a third in 2002 (to Bougyes). Many observers have claimed that these three did not compete vigorously, and prices were higher than in Germany and the UK.[35]

In 2009, the fourth licence was assigned to Iliad, a fixed entrant which traded as an ISP under the name of Free. It was the first company in France to offer a fixed 'triple play' product for €30 ($39) per month, and had had a deliberately disruptive effect on the fixed market.[36]

Free Mobile did not start operations until the beginning of 2012, allowing the other three operators time to prepare what they hoped were matching low cost offers. However, Free trumped these by a launch offering of a €20 ($27) a month subscription, including unlimited national calls and calls to 40 countries, unlimited messaging and 3GB per month of internet service. Subscribers to Free's fixed services got a discount. It also offered access to millions of home Wi-Fi nodes for its mobile subscribers through its triple-play home product offering and emerging standards that enable automatic roaming of handsets onto selected Wi-Fi nodes.

Subscriber numbers grew as shown in Table 4.[37]

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[33] Ibid. P. 64.
[34] For details see op. cit. in footnote 30.
[35] http://www.telco2research.com/articles/EB_Free-mobile-disruption-model_Summary
[36] Free also made a temporary roaming agreement with Orange to launch a nationwide service. The French Competition Authority has recommended that, in the interest of encouraging infrastructure competition, the agreement should not be extended. In the same report, the authority refers to the ongoing risk of collusion in the sector. http://www.autoritedelaconcurrence.fr/user/standard.php?id_rub=483&id_article=2062
[37] http://en.wikipedia.org/wiki/Free_Mobile

Date (end of quarter)	Subscribers
Q1 2012	2,610,000
Q2 2012	3,600,000
Q3 2012	4,405,000
Q4 2012	5,205,000
Q1 2013	6,075,000

Table 4: Free Mobile subscriber numbers

The last figure amounts to a market share of about 10%. By this stage overall mobile prices across all operators were down by 16%, and the incumbent operators had lost a considerable share of their subscribers, the largest losing the smallest proportion and the smallest the highest proportion.[38]

There was substantial reaction from all the existing operators to both the prospect of Free and the actual emergence of the operator. Late in 2011, they had all anticipated the Free Mobile launch by starting second brands[39] aimed at the low-cost end of the market. These brands were based on simplified offerings combining SIM-only plans and online activation and support. However, as mentioned above, Free surprised the existing operators with lower than anticipated launch prices. All operators modified their low cost offerings rapidly after Free's launch with 30% to 40% price reductions – although even these reductions were not sufficient to match Free's tariff.[40]

Beyond adding additional brands, the established operators started to make SIM-only promotions available to compete with Free's strategy of not subsidising handsets. They have also begun to trim down their cost structures to adjust to lower revenues - both SFR and Bouygues announced significant cost reduction plans in 2011. Finally, the three established mobile operators have announced they will accelerate their LTE rollout plans with an explicit objective of selling higher quality data connectivity services at premium rates. Conversely, Free's LTE plans are less clear as it will rely on roaming agreements to access LTE networks. It is predicted that the emergence of Free "could also make France a fertile experimentation ground for new carrier business and operational models geared for a post-voice and commoditized-data era."[41]

This example shows the galvanising effect on a market which a new entrant can have. It has to be said that third and fourth entrants in European markets have not always prospered. In France, Free's progress seems to have been helped by its arrival in a market which was rather uncompetitive, allowing it to gain considerable attention and customers. Juxtaposing the British "3" and the French "Free" cases, we see how additional competitive pressure, and the associated consumer benefits, can be generated both by new entry and by securing the supply of spectrum to an existing smaller operator or operators.

[38] http://www.globalpost.com/dispatch/news/afp/130515/french-telecom-iliad-sees-sales-soar-mobile-entry
[39] Sosh for Orange, Red for SFR, B&You for Bouygues.
[40] Sosh from Orange did offer two cheaper plans that include a €9.90 plan with unlimited Facebook and Twitter usage through a dedicated application and a €14.90 plan with 1GB 3G data allowance and throttled speed beyond this allowance. It has also recently added unlimited SMS from any EU country and French Overseas Territories to its €24.90 unlimited plan that directly competes with Free.
[41] http://upnextmobile.com/post/26500503382/how-french-operators-are-adjusting-to-the-new-normal

4.3 tele.ring

The previous examples concern the effects of entry. This final example concerns the effects of exit. In 2005, the second largest Austrian operator (T-Mobile) sought to take over the fourth largest, tele.ring. The market shares pre- and post-merger, reported as ranges by the competition authority, were:

Operator	**Market share pre-merger**	**Market share post-merger**
Mobilkom	35%-45%	35%-45%
T-Mobile	20%-30%	
T-Mobile & tele.ring		30%-40%
tele.ring	10%-20%	
One	15%-25%	15%-25%
H3G	<5%	<5%

Table 5: Austrian market shares [Source: European Commission, Case No COMP/M.3916 – T-Mobile Austria/telering 26/04/2006]

tele.ring operated in the lower end of the market and T-Mobile and Mobilkom in the upper end. The authority concluded from switching and price comparison data that in the period 2002-05, "tele.ring was the most active player in the market, and that it exerts considerable competitive pressure on T-Mobile and Mobilkom in particular and plays a crucial role in restricting their freedom on pricing. The price analysis therefore suggests that tele.ring's role in the market has been that of a maverick."[42]

In the absence of tele.ring, the merger authority, the European Commission, expressed concern that "with the elimination of a maverick and the simultaneous emergence of a market structure with two leading, symmetrical network operators, it is probable that the proposed merger will have a tangible effect on prices in the market. Even if prices do not rise in the short term, the weakening of competitive pressure as a result of tele.ring's elimination from the market makes it unlikely that prices will continue to fall significantly as in the past."[43]

It noted that the creation of two symmetrical operators with a combined market share of 60-80% might lead to a weakening of competitive pressures as a result of co-ordination, but did not conclude on this point.[44]

The measure which it took to deal with his problem was to accept commitments by the merging parties to sell one block of spectrum to H3G and another to another operator, which could be H3G or an operator with a small market share.[45]

[42] European Commission. Case No COMP/M.3916 – T-Mobile Austria/Telering 26/04/2006, para 72. It is noteworthy that in opposing the merger between AT&T and T-Mobile USA, the Department of Justice characterised T-Mobile USA as an 'aggressive competitor' or a 'challenger brand' – terms broadly equivalent to a maverick. See http://www.justice.gov/opa/documents/Justice-ATT-TMobile-Complaint.pdf
[43] Op. cit. In footnote 38, para 125.
[44] Ibid. paras. 127-9.
[45] Ibid. para. 132.

In the present context, part of the interest of this episode is that the competition authority is expressly concerned about the elimination of a competitor, and responds to this eventuality by ensuring that other smaller operators are not starved of spectrum. In the context of a merger, this is designed expressly to prevent a loss of competitive constraint. The more general proposition is that it is necessary to ensure that competitors have adequate access to the spectrum resources without which they cannot compete and exert pricing and innovation pressure on the market.

4.4 Conclusions

For the reasons given above, our three examples relate not to the effects of spectrum assignment for 4G, but to the effects of the rather more historic 3G assignments. Two of them also concern entry. The arrival of "3" in the UK in 2003 led to a decade of path-breaking innovations, most of which the larger operators were able quickly to follow. This limited "3"'s commercial success, but Ofcom was sufficiently persuaded of the consumer benefits it is still capable of bringing to design its 'digital dividend' auction expressly to ensure the continuation of the 'four operator' market structure. Free's success in France is more recent and spectacular.

It is natural to ask how much we can infer from 'disruptive' entry episodes about the 'dysfunctional' or 'conforming' effects of market exit. Ofcom's views in 2012/13 on this matter are clear. Their concerns were also prefigured by the European competition authority when it intervened in a proposed merger to demand concessions precisely intended to ensure that smaller players in the market would continue to have adequate spectrum holdings to compete.

5. Effects on revenues

An important issue in the evaluation of aggregation limits at auctions is their impact on revenues. Legislatures, governments and regulators (whichever sets the auction goals and rules) almost invariably have ambivalent feelings about the level of auction revenues. On one hand, they recognise that high auction revenues reflect bidders' expectations about the prices they can charge and the profits they can make from selling the spectrum-using service. High revenues may therefore foretell high prices and high profits in the sector, which are bad for customers. On the other hand, in the fiscal circumstances in which many governments find themselves, higher revenue from auctions is welcome.

In European spectrum auctions, the motives of enhancing revenue and enhancing consumer welfare by lower prices can both be observed. Although it would be unlawful for a Member State of the EU to design an auction solely to maximise proceeds, there are quite a few things it could do to enhance them.

Chief among these is to increase participation by the greatest number of potential bidders. It was a feature of the 3G auctions in 2000/01 that as the auctions took place one after another around Europe, the number of bidders diminished.[46] As a result a downward trend can be observed in the standardised prices realised (Euros per pop per MHz).

[46] Paul Klemperer, Auctions: Theory and Practice, Princeton University Press, 2004, p. 164.

A more problematic response to the revenue imperative is to design the auction in a way which permits the successful bidder(s) a degree of market power which can be converted into excess profits, some or all of which is transferred to the state in the course of a competitive auction. This aspect of tendering for exclusive rights has a long history in the hands of absolutist monarchs in Europe, who tendered the right to supply staples such as salt or tobacco at a monopoly price to the population; the high price of salt being one of the causes of, for example, the French Revolution.

The revenue maximising outcome would be for many bidders to compete for a spectrum monopoly. It would be unthinkable for a modern state to sell spectrum monopolies in this fashion. However, for reasons discussed in section 3 above, governments or regulators often have a choice over how far they are prepared to go when setting auction rules to protect against the risk of future use of market power.

This choice will rationally depend upon an empirical estimate of how far aggregation limits will affect revenues. More generally, an optimal spectrum-aggregation limit will seek to balance incremental revenues against the incremental loss of consumer benefits.

Opponents of spectrum-aggregation limits often suggest that any limit will inevitably reduce revenues, on the ground that it reduces the effective demand which is applied in the bidding process and reducing demand will lead to lower revenues. However, the first proposition is not necessarily true. A limit reduces the demand of the affected operators, in the region beyond where the limit operates. But it may also increase the number of bidders, the aggregation of whose demand curves determines total demand. As has widely been noted, the overall effect is the sum of these two effects – an individual bidders' effect and a participation effect.

How might the absence of aggregation limits on large players discourage participation? In a market for spectrum-using services which combines a small number of large players and other smaller players, the latter will easily figure out that the value of spectrum to the large players is greater than its value to them, because those larger players are not only increasing their capacity to supply the market, but also increasing their present and/or future market power. In other words, the smaller operators are aware of the 'foreclosure motive,' and thus conjecture that the larger ones, which are also likely to have the deeper pockets, will outbid them. Accordingly the smaller operators choose not to incur the often quite significant upfront costs of taking part in the auction.[47] This may even enable the larger operators to acquire all of the available spectrum at the reserve price, below the price at which they would have won the licences in the presence of other bidders.

We cannot see how any participant in this discussion can claim on an *a priori* basis that one effect – unrestricted bidding by larger operators – must dominate the other - reduced participation by smaller operators. In any given auction in any country, either may dominate. The auction designer therefore has to take a decision, guided by its statutory duties and the evidence at its disposal.

In such circumstances, it is natural to seek lessons from past auctions. This is difficult in present circumstances for at least two reasons. First, the number of past auctions is limited, and cannot

[47] The smaller players might consider strategies to bid up prices paid by the larger players, but this might be expensive and, depending on auction design, even dangerous. There is also a free rider problem: each small operator will hope that another will do it instead.

support established methods of statistical inference. Second, the process involves a willingness to read across from one country's experience to another's.

However, examination of past experience may furnish some limited help, and we now bring together the experience of recent auctions in Europe, associated with awarding the digital dividend spectrum (790-862 MHz) since 2010.

We use as a source a paper by the consultancy Dot.econ prepared for Ofcom[48] which *inter alia* covers the value of 800 MHz bands auctioned in Europe up until about the end of 2011. Their analysis appears comprehensive, taking into account factors such as the differing length of the licences. However, it does not consider auctions where the 800 MHz was awarded as part of a multi-band auction, so that its value cannot be definitively extracted. The values derived by Dot.econ are shown in Table 6.

Country	Price ($/MHz/pop)
Denmark	0.195
France	0.78
Germany	1.065
Italy	1.02
Portugal	0.765
Sweden	0.375
Spain	0.69

Table 6: Auction values derived by Dot.econ

For each auction, we sought to establish a) whether an aggregation limit on sub-1 GHz spectrum was in operation, and b) whether the limit in question had an impact on the outcome because it was "binding", meaning that but for the presence of the aggregation limit, the bidder in question would have acquired additional spectrum. Neither of these judgements is straightforward. To take the latter first: if an operator subject only to a sub-1 GHz limit buys less than the permitted amount, then it is clear that the limit is not binding. But if it buys exactly the limited amount, then either the limit is binding or the operator's best choice happens coincidentally to be the level of the limit.[49] In the former case the limit is binding; in the latter, it is not. In some auctions, 800 MHz acquisition is coupled with some 900 MHz divestment to stay below sub-1 GHz limit levels; again it is not clear here whether the limit has had an impact on the 800 MHz auction.

The other problem is that of multiple limits. An operator may be subject both to a limit on total holdings and a limit on acquisition in the auction of sub-1 GHz spectrum. It may be restricted by the former limit in bidding up to the latter limit. In that case we would regard it as (indirectly) subject to the sub-1 GHz limit.

[48] http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/spectrum-value.pdf

[49] Since caps tend to be set in round numbers (eg 2x10 MHz) corresponding to technical convenience, such a coincidence is quite likely.

As an example, consider the case of the UK where multiple complex rules applied. One was a limit on sub-1 GHz spectrum of 2x27 MHz. Since Vodafone and O2 already held 2x17 MHz of 900MHz spectrum this effectively applied a limit of 2x10 MHz on their 800 MHz acquisition (unless they chose to divest some 900 MHz spectrum). Spain had a similar situation, made even more complex due some mandatory 900 MHz divestments and a 900 MHz auction that followed on from the 800 MHz auction.

We present in Figures 1 and 2 scatter charts of the prices realised against population and GDP[50] per head. The motivation behind the first association is to see if larger countries appear to show different results than smaller ones. The motivation behind the second association is to see if prices appear to be correlated with national prosperity. Thus if there were no variation with population in the first graph, we would expect to see the same value in terms of $/pop/MHz for all countries, so all points would lie on a horizontal line. Then, if there were a difference between auctions where the bids were below the limit, the "below limit" marker would not be on this line. If a bid which was below limits (so that the limit did not influence bid) resulted in higher auction fees, as some have postulated, then the below limit marker would be above the line of the "at limit" markers.

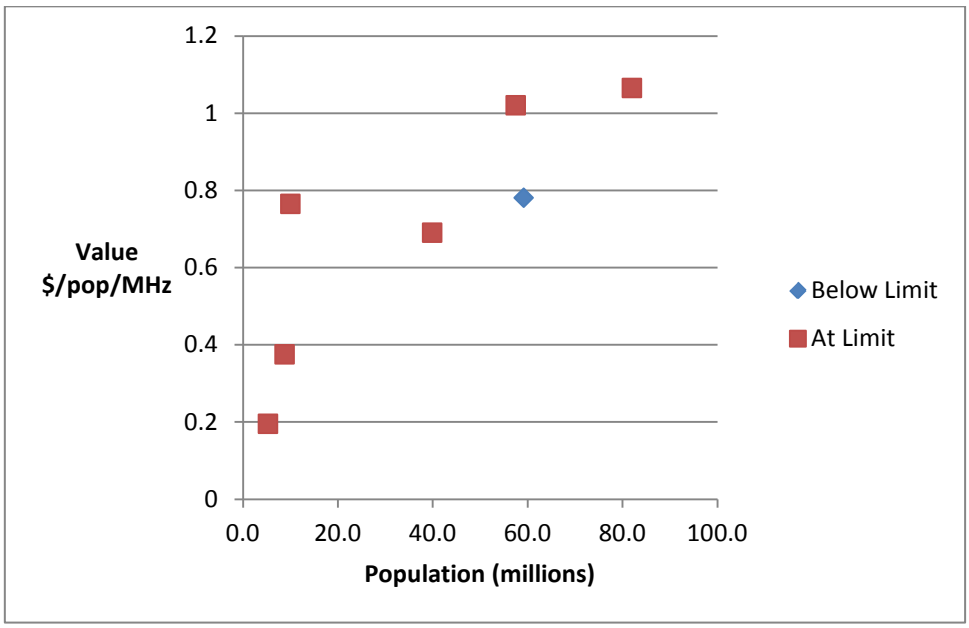

Figure 1: Spectrum award values versus population (Dot.econ)

Inspection of Figure 1 suggests that there is an apparent correlation between population and bid value, with larger countries having a higher auction fee after normalisation. The "below limit" point (where the bidder was unconstrained by limits) appears to sit on or slightly below the trend line, suggesting that in this auction bids were broadly the same as would be expected for a country of its size.

[50] GDP data is sourced from the World Bank – see http://data.worldbank.org/indicator/NY.GDP.MKTP.CD and is based on single year exchange rates.

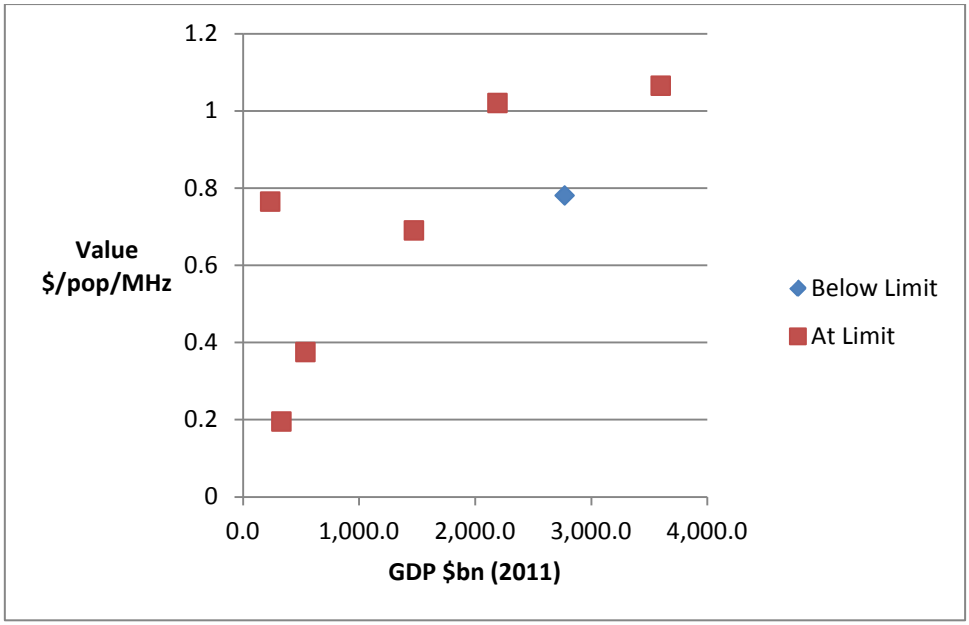

Figure 2: Spectrum award values versus GDP/pop (Dot.econ)

Figure 2 shows that there appears to be a correlation between GDP and normalised bid value. Here again the "below limit" marker appears to be on or even below trend.

How do we interpret these data? First recall the caveats – on the accuracy of the prices, and on whether the limit is actually binding. Then be aware of the small sample. Can anything then be said? The case where the limits were above the actual bids (and so, arguably, did not affect auction revenue) did not result in revenues that show up as materially different from those where the restrictions limited bids.

In these circumstances it seems sensible for the regulator to give careful consideration to proposing a well designed set of limits which balance the benefit of unrestricted bidding by large operators against the benefit of the higher participation by all operators, combined with the competitive advantages which limits are likely to bring.

6. Summary

Radio spectrum is a requirement for providing mobile communication services, but it is a limited resource and for this reason access to spectrum can change the dynamics of the marketplace. Spectrum is managed by legislatures or governments through regulators, and the manner in which it is provided needs to meet multiple objectives. These can include raising revenue from any sale, indirectly raising revenue from downstream taxable activities, promoting competition and innovation, and maximising the economic benefit to the country. Inevitably there can be tension among these objectives.

The European experience suggests that high-revenue spectrum auctions are compatible with limits on spectrum-aggregation. In Europe there have been auctions of approximately equivalent spectrum at 800 MHz over the last three years. Almost all European regulators have balanced the requirements to raise revenue with those to maintain competition through the use of spectrum-aggregation limits. It is important to note that these have not excluded the largest operators from

bidding, but have been designed to ensure smaller operators' access to some of the spectrum being auctioned. In this paper we ask whether the lessons learned from Europe indicate that limits should be applied in the US auction.

In the case of the forthcoming 600 MHz US incentive auction, there is a clear underlying motive to raise revenue to fund a public safety network and also to reduce the budget deficit. However, few would wish to see these objectives met at the expense of substantial reductions in competition and innovation. This is particularly pertinent in the US auction because (1) the frequencies in question have favourable propagation properties making them generally more advantageous than other frequencies; (2) there is an increasing trend towards consolidation in the mobile voice and data services marketplace; and (3) at present, two dominant carriers hold the majority of the competitively advantageous sub-1 GHz spectrum.

The main concern expressed in the US with the use of spectrum-aggregation limits is that they will reduce auction revenue and so prevent some of the key objectives of the auction being met. We have analysed the results of the European auctions to try to assess whether these might inform this issue. We caution that no two auctions are the same, that interpreting the results of any auction is often complex and that differences in auction rules across Europe mean that comparisons require some judgement which are open to debate. On the limited evidence available, we found no difference between auctions where limits were hit and the case where the limit was not. We judge the evidence insufficient to conclude that limits do not affect revenues, but equally there is no evidence that they do materially reduce revenue. But they do appear to have been effective at maintaining the number of mobile operators in the marketplace.

We also cite three case studies that show that increased competition, particularly where one of the competitors applies different strategies, can lead to innovative new services or tariffs. For example, in the UK it seems likely that Skype was introduced to mobile phones years ahead of what might have transpired in the absence of maverick operator.

On the basis of our knowledge of other markets and jurisdictions, we would recommend that serious consideration be given by the FCC to the use of a cautiously and carefully designed spectrum-aggregation limit, to achieve the desired goal of maintaining competition by use of the minimum effective intervention. Thus in relation to the two views of the matter described in the Introduction of this paper - those of the DoJ and those of AT&T and the House Republicans - this conclusion places us, respectfully, closer to the former than to the latter.

Annex - Biographies

Martin Cave

Martin Cave is a visiting Professor at Imperial College Business School and a Deputy Chair of the UK Competition Commission. In 2010/11 he was BP Centennial Professor at the London School of Economics, and from 2002 to 2010 he was a professor at Warwick Business School. He is a regulatory economist specialising in competition law and regulation, especially of the communications sector. He holds bachelor's and master's degree and a D Phil in economics from Oxford University. He has written in the journal literature on spectrum management. He is the co-author of *Understanding Regulation* (Oxford University Press, 2011) and *Essentials of Modern Spectrum Management* (Cambridge University Press, 2007), and co-editor of the *Handbook of Telecommunications Economics* (Elsevier, 2002, 2005) and the *Oxford Handbook on Regulation* (2010).

Cave has conducted two reviews for the UK government on spectrum matters (*Review of Radio Spectrum Management*, 2002, and *Independent Audit of Major Public Holdings,* 2006*).* He has taken part in independent reviews of spectrum strategy for the Australian and Canadian governments. He has also advised several regulators on spectrum matters, in countries including Georgia, Germany, Ireland, Moldova and Singapore. He also participated in the FCC's 2002 Spectrum Policy Task Force activities.

William Webb

William has published 12 books and over 100 papers. He is a Visiting Professor at Surrey University, a member of Ofcom's Spectrum Advisory Board (OSAB), other oversight Boards and a Fellow of the Royal Academy of Engineering, the IEEE and the IET (the Institution of Engineering and Technology) where he is a Deputy President. His biography is included in multiple "Who's Who" publications around the world. William has a first class honours degree in electronics, a PhD and an MBA.

William is one of the founding directors of Neul, a company developing machine-to-machine technologies and networks, which was formed at the start of 2011. Prior to this William was a Director at Ofcom, the independent communications and spectrum regulator in the United Kingdom, where he managed a team providing technical advice and performing research across all areas of Ofcom's regulatory remit. He also led some of the major reviews conducted by Ofcom including the Spectrum Framework Review, the development of Spectrum Usage Rights and most recently cognitive or white space policy. He consulted with US regulators on numerous occasions, and participated in multiple Aspen Institute roundtable events on spectrum issues in the US. Previously, William worked for a range of communications consultancies in the UK in the fields of hardware design, computer simulation, propagation modelling, spectrum management and strategy development. William also spent three years providing strategic management across Motorola's entire communications portfolio, based in Chicago.

EXHIBIT GS-41

The Rationale for Spectrum Limits and Their Impact on Auction Outcomes

Peter Cramton[1]

September 2013

Summary

I have been asked by T-Mobile USA, Inc.[2] to comment on spectrum auction aggregation limits. I focus on the rationale for limits, the overall experience with spectrum limits, and the suitability of such limits in the FCC's upcoming incentive auction.

Well-crafted spectrum aggregation limits can increase competition both in the market for mobile broadband services and in the spectrum auctions in which they are applied. The increased competition leads to consumer benefits such as increased innovation, accelerated deployment of advanced mobile services, and expanded consumer choice.[3] It also can lead to improved auction efficiency and higher auction revenues.[4]

Regulators commonly use spectrum aggregation limits to encourage competition.[5] There are many instances where the limits appear to have been effective at increasing competition in the market for mobile services and in the auction.[6] The U.S. PCS auctions of 1994-96 are a vivid example. Limits in these

[1] I am a Professor of Economics at the University of Maryland and Chairman of Market Design Inc. My specialty is the design of complex auction markets. Since 1993, I have contributed extensively to the development of spectrum auctions. I have advised ten governments on spectrum auctions, including the United States. Most recently, I advised the United Kingdom, Canada, and Australia on their 4G auctions. I have advised 36 bidders in major spectrum auctions around the world. I have written dozens of widely-cited practical papers on spectrum auctions. This research is available at www.cramton.umd.edu/papers/spectrum.

[2] T-Mobile USA, Inc. is a wholly-owned subsidiary of T-Mobile US, Inc., a publicly traded company.

[3] Comments of T-Mobile, GN Docket No. 12-268, at iv, 23 (Jan. 25, 2013).

[4] Peter Cramton, Lessons from the United States Spectrum Auctions: Testimony Before the United States Senate Budget Committee (Feb. 10, 2000), *available at* http://www.cramton.umd.edu/papers2000-2004/00-02-10-cramton-senate-testimony-on-spectrum-auctions.pdf (last accessed Aug. 12, 2013).

[5] *See, e.g.,* Competitive Carriers Association Notice of *Ex Parte*, GN Docket No. 12-268 & WT Docket No. 12-269, at 6 (Sept. 4, 2013); *see also*, Peter Cramton et al., *Using Spectrum Auctions to Enhance Competition in Wireless Services*, 54 J. L. & Econ. S167, S178-S180 (2011) (hereinafter "Cramton, *Using Spectrum Auctions*").

[6] *See, e.g.*, *id.*; Martin Cave & William Webb, "Spectrum Limits and Auction Revenue: the European Experience," (hereinafter "Cave & Webb") attached to *Ex Parte* Presentation of Sprint Corporation, GN Docket No. 12-268 & WT Docket No. 12-269 (July 29, 2013). As discussed below, the German auction of 800 MHz included caps of 2x10 MHz, and the amount paid for that spectrum totaled over 80 percent of the entire proceeds of the auction, even though it made up only sixteen percent of the spectrum auctioned. *See* ITU, EXPLORING THE VALUE AND ECONOMIC EVALUATION OF SPECTRUM (Apr. 2012), 24, *available at* http://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_SpectrumValue.pdf (last accessed Aug. 13, 2013); see also Arthur D. Little, "Mobile Broadband, Competition and Spectrum Caps," GSMA, at 10-11 (2009), *available at* http://bit.ly/17vb9L2 (last accessed Aug. 16,

auctions led to robust competition, innovative services, and rapid price declines.[7] In recent auctions, for example in the 4G spectrum auctions in Europe, regulators have especially focused on limits with respect to low-band spectrum (below 1 GHz).[8] There is little evidence that these limits have harmed auction revenue.[9]

The market structure for mobile services in the United States is such that the FCC should carefully consider low-band spectrum limits in the incentive auction.[10] However, caution should be taken in setting limits to avoid harming auction revenues and the attainment of a clearing target.

Rationale for spectrum limits

Spectrum is an essential input in the provision of wireless services.[11] Excessive concentration of this essential input undermines competition for wireless services, harming consumers. Spectrum aggregation limits can prevent excessive concentration of spectrum. This is the primary motivation for spectrum limits in auctions.

Critics of spectrum limits argue that the limits harm both auction efficiency and revenues, and ultimately are unsuccessful in promoting competition.[12] Limits that are too stringent may have these undesirable effects, but regulators can and often do design the limits to enhance competition and improve auction efficiency and revenues.[13]

2013) (discussing results of various auctions that included spectrum aggregation limits and resulted in both new entrants and high revenues).

[7] *See, e.g.*, *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, Fourth Report, 14 FCC Rcd 10145, 10150-51 (1999) (discussing market and consumer benefits following the PCS auctions) (hereinafter "*Fourth Mobile Competition Report*"); *see also* below for discussion of post-PCS auction marketplace.

[8] Cave & Webb at 5-10.

[9] *See, e.g.*, Ken Binmore and Paul Klemperer, *The Biggest Auction Ever: The Sale of the British 3G Telecom Licenses*, 112 ECON. J. C74, C90 (2001); Veronika Grimm, Frank Riedel, & Elmar Wolfstetter, *The Third Generation (UMTS) Spectrum Auction in Germany* 3 (CESifo Working Paper No. 584, 2001).

[10] *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Sixteenth Report, 28 FCC Rcd 3700, ¶¶ 52-53 (2013).

[11] *See Ex Parte* Submission of the United States Department of Justice, WT Docket No. 12-269 (Apr. 11, 2013).

[12] *See, e.g.*, Robert Earle & David Sosa, *Spectrum Auctions Around the World: An Assessment of International Experiences with Auction Restrictions*, Analysis Group, Inc. (July 2013) (hereinafter "Earle & Sosa") attached to *Ex Parte* Presentation of Mobile Future, GN Docket No. 12-268 & WT Docket No. 12-269 (July 31, 2013).

[13] *See* Peter Cramton, *Spectrum Auctions*, *in* HANDBOOK OF TELECOMMUNICATIONS ECONOMICS (Martin Cave, Sumit Majumdar, & Ingo Vogelsang, eds., 2001), *available at* http://bit.ly/13MaV3l (last accessed Sept. 9, 2013); *see also* Peter Cramton, Evan Kwerel, Gregory Rosston, & Andrzej Skrzypacz, *Using Spectrum Auctions to Enhance Competition in Wireless Services*, 54 CHI. J. L. & ECON. 167, 187 (2011).

At first glance, it may seem that a spectrum limit necessarily reduces auction revenues. A binding limit means that a bidder's demand has been reduced from what it would be absent the limit. Doesn't this reduced demand imply lower auction revenues? The answer would be yes, but for a countervailing force that often is decisive: the spectrum limit can motivate participation in the auction and thereby increase auction revenues.[14] Auction revenues are quite sensitive to the level of competition. Adding one or more bidders can have a pronounced impact in increasing revenues.

Consider an example with two incumbents in a symmetric duopoly. A spectrum auction creates the possibility that entry will occur and disrupt the duopoly. But the duopolists have a strong incentive to bid aggressively in the auction and acquire the entire award. Doing so prevents entry and preserves the higher duopoly profits. Potential entrants who anticipate this outcome will choose not to participate in the auction and avoid significant participation costs. As a result, only the two incumbents compete and they can coordinate to split the spectrum equally. The auction ends near the reserve price—well below the competitive price.

Now suppose the regulator imposed a spectrum limit that prevented the duopolists from winning the entire award. This fundamentally alters the participation decision. Potential entrants know that at least one entrant must be successful. This certainty motivates participation. The strongest potential entrants decide to participate. Prices in the auction get bid up as a result of competition among the expanded set of bidders.

The spectrum limit can also enhance auction efficiency. More societal value may come from awarding a small bidder, rather than a large bidder, a spectrum lot. Yet in an auction without limits, the large bidder may nevertheless win. The reason is that the large bidder's value is inflated by the benefits the large bidder enjoys from reduced competition in the wireless market in the event the small bidder fails to acquire spectrum. The spectrum limit lets the large bidder win some spectrum, but not so much that competition for wireless services is harmed.

These arguments certainly do not imply that spectrum limits necessarily improve auction outcomes. Overly stringent limits may allocate spectrum to less efficient providers who are unable to build out their spectrum, provide services, or increase competitive pressures.[15] The conclusion instead is that the regulator must carefully design spectrum limits to best achieve the auction objectives. Spectrum limits may be undesirable in settings with robust competition and little spectrum concentration; however, spectrum limits are desirable in settings with concentrated markets and concentrated spectrum holdings.

[14] Nor is there any reason to suspect that well-crafted spectrum limits in the upcoming incentive auction will reduce broadcaster participation in the reverse auction. Broadcasters are able to set their prices and withdraw if revenues are insufficient.

[15] Cramton, *Using Spectrum Auctions* at S180.

Experience with spectrum limits

The regulator faces difficult tradeoffs in designing spectrum limits. Fortunately, the regulator can draw on experience with spectrum limits over the last twenty years in spectrum auctions worldwide.

One of the important early uses of spectrum limits was in the U.S. PCS auctions from 1994 to 1996.[16] At the time of the first PCS spectrum auction, the market structure was quite close to the duopoly example above—in every region of the country there were two cellular carriers, each with one-half of the available spectrum.[17] Were the PCS auctions conducted without limits, the outcome likely would have been much less competitive. The spectrum limit implied that there would be at least five spectrum holders in each market.[18] The limit motivated robust competition both in the auctions and in the market for wireless services.[19] The market experienced rapid innovation and U.S. consumers enjoyed better services and lower prices. This progress is well-documented in the FCC's annual reports on wireless competition from 1995 to 2003. Since the elimination of spectrum caps in 2003, however, market concentration has increased.[20]

The PCS auctions also revealed that some policies distinct from the spectrum limits were mistakes. The largest mistake was providing small businesses with excessively attractive installment payment terms.[21] This policy led to rampant speculative bidding.[22] The majority of the winners defaulted on payments and many of the spectrum licenses got tied up in bankruptcy court. The FCC learned from this mistake. Installment payments were dropped from consideration in future auctions. Some critics point to this

[16] Arthur D. Little, MOBILE BROADBAND, COMPETITION AND SPECTRUM CAPS, 5 (2009), *available at* http://www.gsma.com/spectrum/wp-content/uploads/2012/07/Spectrum-Mobile-broadband-competition-and-caps-report-2009.pdf (last accessed Aug. 12, 2013).

[17] *Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, First Report, 10 FCC Rcd 8844 (1995).

[18] *Amendment of the Commission's Rules to Establish New Personal Communications Services*, Memorandum Opinion and Order, 9 FCC Rcd 4957 (1994).

[19] Cramton, *Using Spectrum Auctions* at S182. Even parties otherwise critical of spectrum aggregation limits concede that, after the FCC adopted limits in the PCS auction, the "wireless industry grew rapidly through the entry of facilities-based providers," such as Sprint, Leap, MetroPCS, and VoiceStream Wireless. *See* Earle & Sosa at 7.

[20] Peter Cramton, Andrzej Skrzypacz, & Robert Wilson, "The 700 MHz Spectrum Auction: An Opportunity to Protect Competition In a Consolidating Industry" (Nov. 13, 2007), *available at* http://www.cramton.umd.edu/papers2005-2009/cramton-skrzypacz-wilson-competition-in-700-mhz-auction.pdf (last accessed Aug. 16, 2013).

[21] Peter Cramton, Lessons from the United States Spectrum Auctions: Testimony Before the United States Senate Budget Committee (Feb. 10, 2000), *available at* http://www.cramton.umd.edu/papers2000-2004/00-02-10-cramton-senate-testimony-on-spectrum-auctions.pdf (last accessed Aug. 12, 2013).

[22] *Id.*

experience as a reason to avoid spectrum limits,[23] but the mistake with installment payments has nothing to do with the successful policy of spectrum limits.

Nearly all of the European spectrum auctions had spectrum limits.[24] My overall assessment is that the limits often were effective in promoting competition both in the auction and in the market for wireless services. I discuss some relevant examples.

The United Kingdom 3G auction of 2000 illustrates well how the auction structure and spectrum limits can enhance competition. At the time of the auction the U.K. had two large incumbents and two smaller incumbents.[25] The regulator packaged the 3G spectrum into five licenses, two large licenses and three smaller licenses. No bidder could win more than one license.[26] Thus, with four incumbents and five licenses, one new entrant was guaranteed to win. The incentive for entry was further strengthened by designating one of the two large licenses for a new entrant.[27] This structure provided strong motivation for new entrants to participate. In fact, thirteen bidders including nine potential entrants competed in the auction.[28] The structure also created a battle for the one remaining large license between the two large incumbents. Revenues were £22.5 billion ($34 billion), or approximately 2.5% of the United Kingdom's Gross National Product – substantially higher than anticipated.[29] At the time, the auction was widely described as the biggest auction in history.[30]

Strictly in terms of revenues produced, the U.K. 3G auction experience contradicts claims that reasonable, pro-competitive spectrum limits always or even often reduce auction revenues.[31] On the contrary, the U.K. case illustrates the role that spectrum limits can play in enhancing revenues by motivating participation and thereby encouraging auction competition. Had the regulator instead packaged the spectrum to be consistent with the existing market structure, two large licenses and two smaller licenses without any spectrum limits, then I would expect the outcome to be dramatically different, including a significant possibility of no participation by potential entrants and the auction quickly concluding at low prices with the two large incumbents each winning a large license and the two

[23] Earle & Sosa at i-ii, 7-8.

[24] For a further discussion of the European experience see Cave & Webb.

[25] *See* Tilman Börgers and Christian Dustmann, *Rationalizing the UMTS Spectrum Bids: The Case of the UK Auction*, 5 (CESifo Working Paper No. 679 (9), 2002).

[26] Cramton, *Using Spectrum Auctions* at 179.

[27] *Id.*

[28] Ken Binmore and Paul Klemperer, *The Biggest Auction Ever: The Sale of the British 3G Telecom Licenses*, 112 ECON. J. C74, C90 (2001).

[29] *Id.* at C74.

[30] *Id.*

[31] *See, e.g.,* Gregory J. Vogt, Free State Foundation, Achieving Unanimity: Getting to "Yes" for Incentive Auctions (Aug. 13, 2013), http://freestatefoundation.blogspot.com/2013/08/achieving-unanimity-getting-to-yes-for.html (last accessed Sept. 9, 2013) (claiming that spectrum aggregation limits "almost certainly" diminish revenues).

smaller incumbents each winning a smaller license, much like in the duopoly example. In this low-revenue outcome, the ability of the large incumbents to bid for multiple licenses is what can keep the smaller incumbents from bidding on the large licenses, since the smaller incumbents are then vulnerable to retaliation should they bid for the large licenses.

In addition to the record-setting auction revenues, the U.K. 3G auction gave rise to the operator "3," which has had a disruptive influence on pricing, service, and innovation in the market.[32] 3UK was the first operator to roll out 3G in the U.K. and it pioneered video telephony and video download.[33] It was also the first operator to offer unlimited data and the first to offer MiFi capability.[34]

The German 3G auction came shortly after the U.K. 3G auction.[35] The market structure in Germany was quite similar to the U.K. with four incumbents: two larger and two smaller.[36] The regulator chose the same 2x15 MHz spectrum limit, but the available spectrum was split into twelve 2x5 MHz lots.[37] A bidder could win either two or three lots, which meant that there would be between four and six winners.[38] Two outcomes appeared especially likely: (1) five winners with the two larger incumbents each winning three lots and (2) six winners with each winning two lots, including two new entrants.[39] Seven bidders participated in the auction.[40] The larger incumbents fought furiously for three lots and the five-winner outcome, but the two strongest potential entrants refused to exit the auction. Ultimately, facing pressure from capital markets, the larger incumbents acquiesced, reducing their demands from three to two lots and ending the auction with two new entrants.[41] At the same time, the auction raised record revenues of €50.5 billion ($45.8 billion), or 35% more than the United Kingdom's 3G auction and some five times more than had been expected.[42]

In the case of Germany, the spectrum limits did not bind in the final outcome, so it is possible that the limits played no role in the outcome. However, the limits may have motivated the participation of three well-capitalized potential entrants and that participation made for a highly competitive auction.

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[32] Cave & Webb at 13.

[33] *Id.*

[34] *Id.* at 14.

[35] Veronika Grimm, Frank Riedel, & Elmar Wolfstetter, *The Third Generation (UMTS) Spectrum Auction in Germany* 3 (CESifo Working Paper No. 584, 2001).

[36] *Id.* at 7.

[37] *Id.* at 5.

[38] *Id.* at 3.

[39] *Id.* at 5.

[40] *Id.* at 4.

[41] *Id.* at 7-10.

[42] *Id.* at 2; Nigel Deighton, Gartner, Inc., German Auction of 3G Mobile Phone Licenses Raises 50.5 Billion Euros (Sept. 1, 2000), *available at* http://www.gartner.com/id=314369 (last accessed Aug. 12, 2013).

After paying many billions of euros to the German government for the 3G licenses, both new entrants ended up returning the licenses.[43] The spectrum went unused until the 4G auction. Earle & Sosa point to this outcome as a failure of spectrum limits,[44] but this is incorrect. The new entrants did not win spectrum because of the limits; they won because they outbid incumbents who were *not* constrained by the limit. Stated differently, the spectrum aggregation limits did not prevent incumbents from outbidding new entrants, but rather promoted so much participation and enthusiasm that the new entrants outbid the incumbents. The failure of the auction had nothing to do with limits, which had no effect, but rather rested on the entrants assigning too high a value to being a new entrant in a six-carrier German market, perhaps in part because of continued fallout from the dot com bubble.

Given the experience of the German 3G auction and the subsequent bursting of the dot com bubble, it is not surprising that the Austrian 3G auction had a much different outcome despite having essentially the same market and auction structure (12 lots with a 3-lot limit). The government set a very low reserve price that was one-eighth of the reserve set in the German auction, and the auction ended quickly with each of the six bidders winning two lots.[45] With only six bidders, this low-price equilibrium was focal. The two strongest incumbents knew that they could end the auction quickly by reducing demand from three lots to two lots early in the auction, while trying for a third lot would require much higher bidding to drive out another bidder. The incumbents therefore did not bid at their limits and so this low-price outcome with six winners had nothing to do with the spectrum limits.

Limits in the Canada AWS auction of 2008 set aside 40 MHz of AWS spectrum exclusively for new entrants.[46] The limits motivated the participation of nineteen potential new entrants.[47] The result was a highly competitive auction that generated $4.25 billion in revenue, nearly three times initial revenue expectations.[48] Canada represents another clear case where the spectrum limits (in this case a set-aside for new entrants) increased auction revenues.

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[43] German Regulatory Authority for Telecommunications and Posts, ANNUAL REPORT 2004, 57 (2004), *available at* http://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/BNetzA/PressSection/ReportsPublications/2004/AnnualReport2004Id2043pdf.pdf?__blob=publicationFile (last accessed Aug. 12, 2013); Andreas Grünwald, International Spectrum Review, German Court confirms 3G license revocation with no fee refund (Aug. 28, 2011), *available at* http://www.hlspectrumreview.com/2011/08/articles/mobile-and-fixed-wireless/german-court-confirms-3g-license-revocation-with-no-fee-refund/ (last accessed Aug. 12, 2013).

[44] Earle & Sosa at ii.

[45] Paul Klemperer, *How (not) to run auctions: The European 3G telecom auctions*, 46 EUROPEAN ECON REV. 829, 837-838 (2002).

[46] Kyle Hyndmany and Christopher F. Parmeter, EFFICIENCY OR COMPETITION? A STRUCTURAL ECONOMETRIC ANALYSIS OF CANADA'S AWS AUCTION AND THE SET-ASIDE PROVISION 4 (2013), *available at* http://www.hyndman-honhon.com/hyndman/HP-AWS-Auction.pdf (last accessed Aug. 12, 2013).

[47] *Id.*

[48] *Id.*

The Canada AWS auction has also resulted in a reinvigorated challenger, Wind Mobile, to the three Canadian incumbents. Wind, a carrier with more than 600,000 subscribers, has been rumored to be in talks with Verizon and may emerge as an even stronger competitor.[49]

The most recent wave of spectrum auctions was the 4G auctions in Europe and elsewhere beginning in Germany in 2010. These typically were multiband auctions involving both low-band (below 1 GHz) and high-band (above 1 GHz) spectrum.[50]

To provide service in a market, carriers require a portfolio of spectrum together with network infrastructure (cell sites, backhaul, etc.) that provides both coverage and capacity.[51] Low-band spectrum has propagation characteristics that make it ideally suited to provide coverage in less populated areas as well as within buildings.[52] High-band spectrum is better suited to provide capacity in more densely populated areas.[53]

Low-band spectrum is especially scarce and as such regulators are concerned that excessive concentration of the low-band spectrum may adversely impact competition for wireless services.[54] For this reason, regulators typically have set spectrum limits for low-band spectrum in the recent auctions.[55] Low-band auction prices were high in several countries despite the limits, for example in Germany and Italy. In many countries, a combinatorial clock auction was used, which does not give prices for individual lots. The U.K. 4G auction included both low-band spectrum limits and a spectrum floor that

[49] Hugo Miller, Scott Moritz, & Serena Saitto, *Verizon Says It's Considering Deal for Canada's Wind Mobile*, Bloomberg (June 18, 2013), *available at* http://bloom.bg/14fd1X5 (last accessed Aug. 12, 2013).

[50] GSMA, Digital Dividend: Auctions Summary, http://www.gsma.com/spectrum/wp-content/uploads/DigitalDividend/DDtoolkit/auctions-summary.html (last accessed Aug. 7, 2013); Mark Colville, "Bidding Halted in Czech Republic's LTE Auction: Can Spectrum Auctions Raise Too Much Money?," Analysys Mason (Mar. 15, 2013), *available at* http://www.analysysmason.com/About-Us/News/Insight/Czech-LTE-auction-Mar2013/#.UgKZ6dLql8F (last accessed Aug. 13, 2013).

[51] *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Sixteenth Report, 28 FCC Rcd 3700, ¶ 127 (2013).

[52] *Id.* ¶¶ 121-22; *see also* Competitive Carriers Association Notice of *Ex Parte*, GN Docket No. 12-268 & WT Docket No. 12-269, at 3-4 (Sept. 4, 2013).

[53] *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Sixteenth Report, 28 FCC Rcd 3700, ¶ 126 (2013).

[54] *See id.* ¶ 124; Cave & Webb at 4-5.

[55] *See, e.g.,* GSMA, Digital Dividend: Auctions Summary, http://www.gsma.com/spectrum/wp-content/uploads/DigitalDividend/DDtoolkit/auctions-summary.html (last accessed Aug. 7, 2013); Mark Colville, "Bidding Halted in Czech Republic's LTE Auction: Can Spectrum Auctions Raise Too Much Money?," Analysys Mason (Mar. 15, 2013), *available at* http://www.analysysmason.com/About-Us/News/Insight/Czech-LTE-auction-Mar2013/#.UgKZ6dLql8F (last accessed Aug. 13, 2013).

guaranteed that at least four companies would win a sufficient portfolio of spectrum for effective operation in the U.K. wireless market.[56]

Earle & Sosa argue that limits ultimately have been ineffective in increasing the number of competitors in a market and therefore limits are both ineffective and costly.[57] I disagree. Spectrum limits have played an essential role in creating competition and fostering innovation in wireless communication. Moreover, the overall impact on auction revenues has been positive. While it is true that there has been some consolidation in recent years as the wireless industry has matured, this is a natural tendency in most industries. The process of competition inevitably involves entry of some companies who succeed and grow and other companies who fail and exit or merge with successful rivals. As the industry matures, entry and exit become less common.[58] The competition shifts to fights over market share.[59] In these more mature markets, spectrum limits still may have a role in avoiding excessive concentration.

Spectrum limits in the incentive auction

The U.S. mobile market consists of four national carriers, two large carriers (Verizon and AT&T) and two smaller carriers (Sprint and T-Mobile), and a number of regional carriers serving a small segment of the market.[60] Verizon and AT&T (the "Big Two") have roughly two-thirds of the market in terms of subscribers and a much larger share in terms of earnings.[61] The Big Two also hold the vast majority of the low-band spectrum.[62]

The 700 MHz auction threatened the Big Two's dominance in the low-band spectrum. However, for a number of reasons including the absence of spectrum limits and a fragmented band plan, the Big Two won about 85% of the 700 MHz spectrum.[63] Sprint and T-Mobile did not participate in the auction.[64]

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[56] Geoffrey Myers, "Spectrum Floors in the UK 4G Auction: An Innovation in Regulatory Design," (Aug. 8, 2013), *available at* http://ssrn.com/abstract=2239123 (last accessed Sept. 9, 2013).

[57] Earle & Sosa at 22.

[58] *See, e.g.*, Gordon Walker, MODERN COMPETITIVE STRATEGY 65-94 (2004).

[59] *See, e.g., id.*; J.W. Mullins and O.C. Walker, McGraw Hill Education, Marketing Strategies for Mature and Declining Markets, http://answers.mheducation.com/business/marketing/marketing-strategy/marketing-strategies-mature-and-declining-markets (last accessed Aug. 13, 2013); Michael Kennedy, "Market maturity, competition force service providers to adopt more sophisticated business models," FierceTelecom (Aug. 1, 2011), *available at* http://www.fiercetelecom.com/story/market-maturity-competition-force-service-providers-adopt-more-sophisticate/2011-08-01#ixzz2brfyy6er (last accessed Aug. 13, 2013).

[60] *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Sixteenth Report, 28 FCC Rcd 3700, ¶¶ 52-53 (2013).

[61] *See id*.

[62] *Id.* ¶ 131.

[63] Peter Cramton, *Innovation and Market Design*, *in* INNOVATION POLICY AND THE ECONOMY, VOLUME 9 (Josh Lerner & Scott Stern, eds., 2009), *available at* http://www.nber.org/chapters/c8186.pdf (last accessed Aug. 12, 2013). When analyzing the competitive effects of an auction, simply noting the number of license winners of an auction is

Prices were still bid up to $19 billion, based largely on competition from the small regional providers.[65] The price impact of the small operators was especially great in the B-block, which was offered in small (CMA) service areas, which better fit the small operators' needs and budgets. Although there were 101 winners in the 700 MHz auction, 85 percent of the spectrum value went to two operators—Verizon and AT&T. The auction failed to improve the market structure, but instead reinforced the already high level of concentration in the low-band spectrum holdings.

The incentive auction presents another opportunity to strengthen competition. As in the 700 MHz auction, we can anticipate aggressive bidding by the Big Two to maintain their dominant position in the low-band spectrum and the resulting coverage advantage. To avoid excessive concentration of low-band spectrum and motivate participation in the auction from the smaller rivals, it may be desirable to impose a low-band spectrum limit. This was the conclusion of the U.S. Department of Justice in its submission to the FCC on the incentive auction.[66]

Well-crafted spectrum limits can enhance competition for wireless services and increase competition in the auction. As Earle & Sosa acknowledge, the PCS auction was a success in bringing fresh competition and innovation to the mobile marketplace. Following the initial round of auctions in 1994 and 1995, Earle & Sosa note that "the wireless industry grew rapidly through the entry of facilities-based providers" and companies including Sprint, Leap, MetroPCS, and VoiceStream Wireless entered the U.S. wireless market by acquiring spectrum in these auctions.[67] Similarly in its 1997 Report to Congress on the results of the PCS auctions, the FCC observed that fifty-three percent of the licenses awarded went to small businesses, which had the result of "improving wireless service at lower prices."[68] The FCC also

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meaningless from an economic perspective. *See, e.g.,* Joan Marsh, AT&T Public Policy Blog (Aug. 13, 2013), http://www.attpublicpolicy.com/fcc/why-t-mobiles-dynamic-market-rule-wont-work/. Thus, while there were 101 winners in the 700 MHz auction, two of those winners – Verizon and AT&T – accounted for 85% of the spectrum sold – a result that, analysts note, may have "cemented" these two carriers dominance over the U.S. wireless market for the next decade. J.P. Morgan, *Telecom Services and Towers* 9-10 (Dec. 5, 2012), *attached to* Letter from Trey Hanbury, Counsel to T-Mobile US, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-268 & WT Docket 12-269 (July 26, 2013).

[64] *Auction of 700 MHz Band Licenses; 214 Bidders Qualified to Participate in Auction 73*, AU Docket No. 07-157, Public Notice, Attachment A (2008).

[65] Federal Communications Commission, Auction 63: 700 MHz band, http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=73 (last accessed Aug. 12, 2013). Notably, the failure of the auction to meet the reserve price for the Lower D Block was the result of uncertainty regarding the actual cost of building and maintaining the public safety network. By contrast, spectrum aggregation limits are clear, *ex ante* rules that are not uncertain.

[66] *Ex Parte* Submission of the United States Department of Justice, WT Docket No. 12-269 (Apr. 11, 2013) (recommending the Commission take action to ensure the two smaller nationwide carriers are "are not foreclosed from access to more spectrum, and particularly [not from] low-frequency spectrum." In particular, the Department of Justice recommended adopting "a set of well-defined rules for spectrum acquisitions in auctions.").

[67] Earle & Sosa at 7.

[68] The FCC Report to Congress on Spectrum Auctions, WT Docket No. 97-150, Report, FCC 97-353, at 23-24 (Oct. 9, 1997) (hereinafter "*FCC Report on Spectrum Auctions*").

noted that as a result of the auctions, capital investment in wireless networks increased to $26.7 billion in 1996, up from just $12.8 billion in 1993, while the average cellular subscriber bill decreased 27 percent during the same period.[69] By 1999, the date of the Commission's Fourth Report on Commercial Services, PCS deployment had resulted in the expansion of the mobile market to include at least five mobile telephone providers in each of the thirty-five largest regions of the U.S., and at least three mobile providers in 97 of the 100 largest regions.[70]

Earle & Sosa also acknowledge that the PCS auctions "benefited consumers and competition by providing existing carriers with additional spectrum and new competitors with the spectrum required to enter the nascent wireless market and offer service."[71] These authors nonetheless argue that, despite these and other tangible benefits to consumers, the policy behind the PCS auctions did not encourage the participation of small operators that was the motivation behind the spectrum aggregation limits. In 2004, however, the Commission concluded in its annual assessment of competition in the mobile marketplace that "the auctioning of PCS spectrum produced the significant variation in the number of mobile telephony carriers across different geographic regions" that characterized the contemporary marketplace, and these "market-based policies resulted in significantly greater numbers of mobile competitors entering many regional geographic markets as compared with countries in Western Europe and Asia."[72] Moreover, even a casual student of today's mobile marketplace can observe that many of the wireless providers born of the PCS auction remain active competitors today.

Meanwhile, even two of the authors Earle & Sosa cite for the proposition that spectrum aggregation limits somehow delayed or discouraged entry actually found just the opposite. In their 2009 RAND Journal study, Thomas Hazlett and Robert Muñoz described how expanded spectrum availability resulting from the PCS auction promoted market entry. As evidence for this finding, Hazlett and Muñoz pointed to the "six competing national networks" that existed in 2000 compared to the duopoly structure of the cellular telephone market that existed prior to the PCS auction.[73] And while Hazlett and Muñoz criticized the FCC's installment payment program as ill-advised policy that diminished consumer welfare, the authors pointedly did not extend this critique to spectrum aggregation limits. On the contrary, Hazlett and Muñoz conclude that "[a]uction rules that focus on revenue extraction," which

[69] *See id.* at 24; *see also Fourth Mobile Competition Report*, 14 FCC Rcd at 10150-51 (1999) ("[B]ecause of growing competition in the marketplace, it appears that the average price of mobile telephone service has fallen substantially . . . since the *Third Report* [1998], continuing the trend of the last several years.").

[70] *Id.* at 10150.

[71] Earle & Sosa at 7.

[72] *Implementation of Section 602(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, Ninth Report, 19 FCC Rcd 20597, 20631 (2004).

[73] Thomas W. Hazlett & Robert E. Muñoz, "A Welfare Analysis of Spectrum Allocation Policies," at 12 (Dec. 1, 2008), *available at* http://www.arlingtoneconomics.com/studies/Rand_TH_RM_12_5_08.pdf (last accessed Aug. 16, 2013).

Earle & Sosa cite as an ostensible benefit of an auction without spectrum aggregation limits, "may conflict with the goal of maximizing social welfare."[74]

If well-crafted, spectrum limits can enhance competition for wireless services and increase competition in the auction while generating little risk that the limits would adversely impact the auction outcome. As always, care should be taken in setting spectrum limits. This is especially true in the incentive auction, where revenues play an important role to the success of the auction. Yet in the incentive auction, auction rules can be combined with the spectrum limits to reduce the possibility of limits harming revenues to the point of preventing a clearing target from being reached. For example, Rosston & Skrzypacz have suggested a dynamic market rule that allows for the gradual weakening of limits whenever the limits stand in the way of achieving a clearing target.[75] Such a rule should be carefully considered by the FCC as a safety valve in the incentive auction.

Conclusion

Recognizing market concentration in the mobile wireless marketplace, the Department of Justice has recommended that the Commission ensure that larger market participants do not foreclose smaller participants from acquiring critical low-band spectrum to improve their coverage.

Experience from the United States and around the world shows that spectrum limits, when properly applied, are an effective tool for promoting competition and consumer welfare.

[74] *Id.* at 20.

[75] Gregory Rosston and Andrzej Skrzypacz, "A Dynamic Market Rule for the Broadcast Incentive Auction: Ensuring Spectrum Limits Do Not Reduce Spectrum Clearance," attached to *Ex Parte* Presentation of T-Mobile USA, Inc., GN Docket No. 12-268 & WT Docket No. 12-269 (July 31, 2013).