Project Overview for the Root Zone Update Process Study RFP

Request for Proposal

28 April 2020

ICANN

Table Of Contents

1. Introduction

1.1 About this document

The Internet Corporation for Assigned Names and Numbers (ICANN) organization is soliciting proposals to identify a contractor qualified to conduct a study to "investigate whether there is a need to increase (and if so, how) the robustness of the operational arrangements for making changes to the Root Zone content to reduce or eliminate single points of failure". This study is called for in the proposal[1] to transition the Internet Assigned Numbers Authority (IANA) functions to the private sector. (The IANA stewardship transition and the proposal are described in more detail below in Section 2, Background.) The contractor will perform the investigation called for in the proposal and write a document outlining the findings and proposing any changes to address any weaknesses identified as a result of the investigation.

This document provides an overview of the request for proposal (RFP). It aims to provide background and pertinent information regarding the requirements. The RFP comprises this document as well as others that are hosted in the ICANN sourcing tool (SciQuest/Jaggaer). Indications of interest are to be received by emailing RZUPStudy-RFP@icann.org by 15 May 2020.

Complete proposals must be electronically submitted by 23:59 UTC on 12 June 2020 using the ICANN sourcing tool (SciQuest/Jaggaer). Access to the ICANN sourcing tool will be granted after receipt of an indication of interest to the email address above.

1.2 Overview of the Internet Corporation for Assigned Names and Numbers (ICANN)

The ICANN organization is a non-profit public benefit corporation dedicated to ensuring the stable and secure operation of the Internet's unique identifier systems; to promoting competition; to achieving broad representation of global Internet communities; and to developing policy appropriate to its mission through bottom-up, consensus-based processes. More specifically, the ICANN organization:
1. Coordinates the allocation and assignment of the four sets of unique identifiers for the Internet, which are:
    a. Domain names (forming a system referred to as the Domain Name System, or DNS);
    b. Internet Protocol (IP) addresses;

---

[1] Please see https://www.icann.org/en/system/files/files/iana-stewardship-transition-proposal-10mar16-en.pdf

      c.   Autonomous System (AS) numbers; and

      d.   Protocol port and parameter numbers.

2. Coordinates the operation and evolution of the DNS root name server system.
3. Coordinates policy development reasonably and appropriately related to these technical functions.

See www.icann.org for more information.

2. Background

2.1 Study Background

Historically the U.S. Department of Commerce (DoC) played an active role in the coordination and management of the DNS. After a nearly two-decades long process that culminated on 1 October 2016, the DoC's role was transitioned to the private sector as part of an effort called the *IANA stewardship transitio*n. As part of the planning for this transition, the IANA Stewardship Transition Coordination Group (ICG) released a document in March 2016 entitled "Proposal to Transition the Stewardship of the Internet Assigned Numbers Authority ("IANA") Functions from the U. S. Department of Commerce's National Telecommunications and Information Administration ("NTIA") to the Global Multi-stakeholder Community" (ICG proposal).[2] This document proposed a plan to implement the transition and included additional recommendations, including a call for a formal study to be conducted to examine the operational procedures governing changes to the root zone after DoC NTIA's involvement ceased.

This RFP solicits a provider to perform the study described in the ICG proposal.

The specific text calling for the study begins on page 58 of the proposal and is reproduced below. In the quoted text immediately below, "IFO" refers to the IANA Functions Operator, currently Public Technical Identifiers (PTI), a wholly owned subsidiary of ICANN, that operates the IANA functions under contract to ICANN. The text also refers to the "Root Zone Maintainer", a role currently performed by Verisign, Inc., also under contract to ICANN. The IFO and Root Zone Maintainer roles are explained in more detail later in this document.

The proposal states:

> ***P1.III.A.iii Proposed changes to Root Zone environment and relationship with Root Zone Maintainer***

[2] Please see https://www.icann.org/en/system/files/files/iana-stewardship-transition-proposal-10mar16-en.pdf

In relation to the Root Zone Management Process Administrator role that is currently performed by NTIA, the CWG-Stewardship recommends that this role be discontinued post-transition. As a result of this discontinuation the CWG-Stewardship recommends:

Recommendations related to the elimination of NTIA Authorization of changes to the Root Zone content and the associated WHOIS database

Currently, changes to the Root Zone File, as well as changes to the Root Zone WHOIS Database, are transmitted to the NTIA for authorization. Such changes cannot be enacted without explicit positive authorization from the NTIA. Post-transition, no authorization for Root Zone change requests will be needed.

[Paragraphs 1) and 2) contain text not directly relevant to the proposed study and are not reproduced here; consult the original document to read them.]

3) *It should be determined whether or not additional checks/balances/verifications are required post transition. The CWG-Stewardship recommends that a formal study be undertaken post transition to investigate whether there is a need to increase (and if so, how) the robustness of the operational arrangements for making changes to the Root Zone content to reduce or eliminate single points of failure. This study should include a risk analysis and cost/benefit analysis factoring in the history and possibility of such problems. Any new procedures/processes should be designed to minimize:*

   a) *The potential for accidental or malicious changes or omissions by the IFO or Root Zone Maintainer.*

   b) *The potential for out-of-policy changes by the IFO. The term "policy" is used in its most general sense, representing formal Policy adopted by ICANN as well as established standards, practices, and processes.*

   c) *The potential for accidental or malicious errors in the communications path from the IFO to the Root Zone Maintainer.*

   d) *The potential for accidental outages or malicious actions related to the telecommunications infrastructure serving the IFO and the Root Zone Maintainer. Such outages or actions could be related to the infrastructure shared with ICANN.*

Any changes to procedures or processes should be based on a cost/benefit and risk analysis factoring in the history and possibility of such problems. The review should involve all parties that may be affected or impacted by any changes to be implemented.

2.2 Root Zone Administration Background

An understanding of how DNS works and the importance of the DNS root zone is required to understand the scope of the requested study.

Data in the DNS is stored in a distributed database spanning the entire Internet called the *name space*, which is typically represented as an inverted tree data structure.[3] The name space is partitioned into separate administrative regions to allow for distributed management: different organizations are granted authority to manage their corresponding regions, which are called *zones*. Administrative authority is delegated, with higher-level zones in the name space's inverted tree delegating to lower-level zones. This delegation process starts at the *root zone*, which is the topmost administrative region in the name space.

The root zone is particularly important because the DNS resolution process starts there: to find information anywhere in the name space, the search begins at the root zone and follows the zone delegation path downward through the tree until reaching the zone containing the desired information.

Most DNS zones are managed by a single organization. Multiple parties are involved in managing the root zone, however, making the administrative process considerably more complicated than a typical zone.

Before the IANA stewardship transition on 1 October 2016, responsibility for managing the root zone was divided among three parties, each performing different roles:[4]

1. The IANA Functions Operator (IFO), a role historically performed by ICANN, received a request for a change to the root zone from a top-level domain (TLD) manager and performed technical and administrative checks and validations on the change request. Once the request passed the necessary checks, it was sent to two other organizations for authorization and implementation, respectively.

2. The U.S. Department of Commerce National Telecommunications and Information Administration (NTIA) provided an oversight role and changes to the root zone could not proceed without NTIA's explicit authorization.

---

[3] In an inverted tree, the root is at the top and the branches grow downward, hence the term "inverted".
[4] The process descriptions that follow are high-level summaries and in the interest of brevity do not cover every step.

3. Once a change was authorized by NTIA, the Root Zone Maintainer, a role performed by Verisign, also performed a set of checks and validations, then implemented the change by updating its database of root zone information, generating a new root zone file, cryptographically signing it, and making the newly signed, modified zone file available on distribution servers for the Root Server Operators to retrieve and publish on the root name servers (the name servers authoritative for the root zone).

As of 1 October 2016, after the IANA stewardship transition, the process changed:

1. NTIA no longer has any role in the root zone management process.

2. A wholly owned subsidiary of ICANN named Public Technical Identifiers (PTI) was created and is now performing as the IANA Functions Operator for domain names under contract to ICANN. The separation of PTI as a subsidiary is intended to ensure the independence of the oversight role (ICANN) from the contractor providing the service (PTI).

3. The Root Zone Maintainer role is still operated by Verisign but now under contract to ICANN and managed through the Root Zone Maintainer Agreement (RZMA).[5]

While the IANA stewardship transition simplified the operational root zone management process by removing one party, there are still potential issues with the process as alluded to in the ICG proposal, including, for example, the ability for the IFO or Root Zone Maintainer to make accidental or malicious changes or omissions, and for the IFO to make out-of-policy changes. In addition, the complexity of supervising the IANA functions increased: two new groups were formed to assist in this oversight, the Customer Standing Committee (CSC)[6] and the Root Zone Evolution Review Committee (RZERC)[7], and a periodic IANA Naming Functions Review (IFR) was instituted.

The study described in this RFP will investigate whether there is a need to increase (and if so, how) the robustness of the operational arrangements for making changes to the root zone content to reduce or eliminate single points of failure. The study should also include any recommendations for follow-on studies.

More details of the root zone management process and additional background information are contained in the ICG proposal. Respondents to this RFP are encouraged to read the proposal in its entirety for further background information and context.

3. Scope of Work

The study described in this RFP will investigate all aspects of the root zone management architecture and process relevant to the ICG proposal, including the overall architecture and design of the system, all processes, and all communication among all parties involved, for single points of failure.

---

[5] Please see https://www.icann.org/iana_imp_docs/129-root-zone-maintainer-service-agreement-v-28sep16.
[6] Please see https://www.icann.org/csc.
[7] Please see https://www.icann.org/rzerc.

The scope of the study includes:
- The process and means by which a TLD manager submits a root zone change request to the IFO
- All policies in place, tasks performed, and systems used by the IFO to evaluate and process a requested root zone change, from receipt of the request from the TLD manager through the means and mechanism by which the change request is communicated to the Root Zone Maintainer
- All communications between the IFO and Root Zone Maintainer
- All policies in place, tasks performed, and systems used by the Root Zone Maintainer to evaluate and process a requested root zone change, from receipt of the request from the IFO through the means and mechanism by which the signed root zone is distributed to the Root Server Operators

To summarize, the scope begins with a TLD manager's request for a change and ends with the publication of a new root zone on the Root Zone Maintainer's platform for distributing the root zone to the Root Server Operators (RSOs). The actions of the RSOs are not in scope, except to the extent that any possible issues with the design or operation of the Root Zone Maintainer's root zone distribution platform might affect the RSOs' ability to receive an updated version of the root zone in a timely and accurate manner.[8]

Note that both the IFO and the Root Zone Maintainer each sometimes refer to their respective software implementing their functions in the overall system as the "Root Zone Management System". But it should be clear from the preceding text that both the IFO's and Root Zone Maintainer's "Root Zone Management System" software are within the scope of the study. It should further be clear that the scope is broader than just the software: all processes and policies related to the root zone change process at both the IFO and Root Zone Maintainer, and any software that implements those processes and policies, is in scope.

The study provider will look for opportunities to improve the overall architecture and process along several dimensions:
- Efficiency: Are there unnecessary steps or complexity?
- Robustness: Are there single points of failure?
- Conformance: Does the process ensure that the intended root zone changes are made following the policies established by the ICANN community?
- Confidentiality: Do communications between various parties meet the level of confidentiality required by the system?
- Integrity: Does the system ensure the integrity of data, both in transit among various parties and at rest?

---

[8] This statement is not intended to imply that there are any issues with or concerns about the Root Zone Maintainer's root zone distribution platform. Rather, the intent is to clarify the intended scope of the study.

- Availability: Do the system's components meet the appropriate availability requirements?
- Transparency: Is the operation of the system sufficiently transparent and auditable?

Any recommendations for a change in architecture or process must include a risk analysis and cost/benefit analysis factoring in the history and possibility of potential problems. In other words, a proposed architectural or process change must include an analysis of what risks to the overall system it addresses, as well as an analysis of the costs to implement the change and the expected benefit.

Any recommendation for a change must also take into account the history of the risks the change is intended to address, and the possibility and likelihood that consequences from the risks might occur in the future. For example, it would not be appropriate to propose a significant change to address a risk that is judged to be extremely unlikely to occur.

While all aspects of the root zone change management architecture and process are in scope, ultimately any recommendations for changes must be "evolutionary" in nature. For example, it would not be cost effective to completely redesign the system from scratch and develop all new software, and therefore such a recommendation in the study would not be appropriate.

Production of the study will require interviewing relevant stakeholders in the ICANN organization (i.e., PTI staff and any relevant ICANN org staff) and at the Root Zone Maintainer (i.e., Verisign). In addition to interviews, the contractor will need to obtain and review documentation and records from these parties.

To obtain the most complete understanding of the root zone management process, the contractor may also choose, at their discretion, to interview other stakeholders, such as TLD operators, Root Server Operators (RSOs), the Root Server System Advisory Committee (RSSAC), the Security and Stability Advisory Committee (SSAC), the Governmental Advisory Committee (GAC), the Global Names Supporting Organization (GNSO), the Country Code Supporting Names Supporting Organization (ccNSO), and the RZERC. (This list is not intended to be exhaustive or to limit the contractor's investigation.)

A draft version of the study will be put out for public comment following the standard ICANN public comment process.[9] As a standard part of the public comment process, at the end of the comment period, the ICANN org publishes a report summarizing the comments received. The study contractor will be responsible for preparing a draft of this public comment report, which will be finalized and published by the ICANN org.

---

[9] Please see https://www.icann.org/public-comments.

4. High-Level Selection Criteria

The decision to select a contractor as an outcome of this RFP will be based on, but not limited to, the following selection criteria:

- Capability and experience of key personnel
- Trust and reliability of key personnel
- Availability of key personnel
- Demonstrated understanding of the scope of work, including required deliverables
- Proposed approach to the work including timeframe for completion
- Quality of similar prior work
- Responsiveness and flexibility to work with ICANN-specific requirements, agreement terms, etc.
- Financial value / pricing
- Reference checks
- Mitigation of any conflicts of interest

5. High-Level Business Requirements

5.1 Deliverables

The following deliverables are required:

1. A proposed work plan and timeline, to be created first and reviewed by the ICANN org before any other work is performed.
2. A draft study report, which will include:
    a. A thorough and detailed system document describing the architecture and processes of the entire post-transition root zone management process. This document will cover the systems and processes of both the IFO and Root Zone Maintainer.
    b. A list of recommendations for opportunities to "increase the robustness of the operational arrangements for making changes to the root zone content to reduce or eliminate single points of failure", including a risk analysis and cost/benefit analysis for each recommendation.
    c. Any other relevant information or observations the contractor believes are appropriate.
3. A draft public comment report in response to comments received as part of an ICANN public comment process on the draft study report.
4. A final study report, resulting from any revisions necessary to the draft study report based on the public comments and consultation with ICANN org.

5.2 Process

The process for executing the study is anticipated to include the following major tasks:

- Developing a work plan and timeline (to be reviewed with ICANN org)
- Interviewing stakeholders at IFO and Root Zone Maintainer (and potentially others)
- Gathering documentation, records, etc.
- Performing research and analysis, developing recommendations, and writing a draft study report
- Delivering a draft study report to the ICANN org
- Initiation of a public comment proceeding for the draft study report by ICANN org
- Analyzing public comments received and preparing a draft public comment report
- Updating the study report, in consultation with ICANN org, to address public comments received
- Delivering a final report to the ICANN org

5.3 Summary of Requirements

A summary of the requirements for a contractor to perform the study is:

- Provide a complete response based on ICANN specifications by the designated due date.
- Participate in finalist presentations via conference call/remote participation.
- Execute a professional services agreement substantially in accordance with the terms and conditions of ICANN's Contractor Consulting Agreement (contact ICANN staff for copy).
- Possess the subject matter expertise and technical skills required to understand, analyze and write about the DNS root zone management system.
- Produce all the deliverables listed above in Section 5.1 Deliverables.
- Provide bi-weekly status updates via phone/email/meeting, as appropriate. Contractor must be able to accommodate bi-weekly status meetings with key personnel during business hours in Eastern Time Zone.
- Communicate (verbally and in writing) in English.

6. Project Timeline

The following dates have been established as milestones for this RFP. ICANN reserves the right to modify or change this timeline at any time as necessary.

Activity	Estimated Date
RFP published	28 April 2020
Participants to indicate interest in submitting RFP proposal	**15 May 2020 by 23:59 UTC**
Participants submit any questions to ICANN via RFP sourcing tool (SciQuest/Jaggaer)	**22 May 2020 by 23:59 UTC**
ICANN responds to participant question	29 May 2020
Participant proposal bids due by	**12 June 2020 by 23:59 UTC**
Evaluation of responses, contracting and award	July 2020

7. Terms and Conditions

General Terms and Conditions

1. Submission of a proposal shall constitute Respondent's acknowledgment and acceptance of all the specifications, requirements and terms and conditions in this RFP.
2. All costs of preparing and submitting its proposal, responding to or providing any other assistance to ICANN in connection with this RFP will be borne by the Respondent.
3. All submitted proposals including any supporting materials or documentation will become the property of ICANN. If Respondent's proposal contains any proprietary information that should not be disclosed or used by ICANN other than for the purposes of evaluating the proposal, that information should be marked with appropriate confidentiality markings.

Discrepancies, Omissions and Additional Information

1. Respondent is responsible for examining this RFP and all addenda. Failure to do so will be at the sole risk of Respondent. Should Respondent find discrepancies, omissions, unclear or ambiguous intent or meaning, or should any question arise concerning this RFP, Respondent must notify ICANN of such findings immediately in writing via email no later than ten (10) days prior to the deadline for bid submissions. Should such matters remain unresolved by ICANN, in writing, prior to Respondent's preparation of its proposal, such matters must be addressed in Respondent's proposal.

2. ICANN is not responsible for oral statements made by its employees, agents, or representatives concerning this RFP. If Respondent requires additional information, Respondent must request that the issuer of this RFP furnish such information in writing.
3. A Respondent's proposal is presumed to represent its best efforts to respond to the RFP. Any significant inconsistency, if unexplained, raises a fundamental issue of the Respondent's understanding of the nature and scope of the work required and of its ability to perform the contract as proposed and may be cause for rejection of the proposal. The burden of proof as to cost credibility rests with the Respondent.
4. If necessary, supplemental information to this RFP will be provided to all prospective Respondents receiving this RFP. All supplemental information issued by ICANN will form part of this RFP. ICANN is not responsible for any failure by prospective Respondents to receive supplemental information.

Assessment and Award

1. ICANN reserves the right, without penalty and at its discretion, to accept or reject any proposal, withdraw this RFP, make no award, to waive or permit the correction of any informality or irregularity and to disregard any non-conforming or conditional proposal.
2. ICANN may request a Respondent to provide further information or documentation to support Respondent's proposal and its ability to provide the products and/or services contemplated by this RFP.
3. ICANN is not obliged to accept the lowest priced proposal. Price is only one of the determining factors for the successful award.
4. ICANN will assess proposals based on compliant responses to the requirements set out in this RFP, responses to questions related to those requirements, any further issued clarifications (if any) and consideration of any other issues or evidence relevant to the Respondent's ability to successfully provide and implement the products and/or services contemplated by this RFP and in the best interests of ICANN.
5. ICANN reserves the right to enter into contractual negotiations and if necessary, modify any terms and conditions of a final contract with the Respondent whose proposal offers the best value to ICANN.