Root Zone Management Evolution Study

Study Overview

April 25, 2018

1.   Purpose

In March 2016, the IANA Stewardship Transition Coordination Group ("ICG") released a document 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" (https://www.icann.org/en/system/files/files/iana-stewardship-transition-proposal-10mar16-en.pdf). The scope of the proposed transition included transferring NTIA's historical oversight of the management of the DNS root zone to ICANN. Among the many recommendations contained in the proposal was that a formal study be conducted to examine the operational procedures governing changes to the root zone after NTIA's involvement ceased.

The specific text calling for the study appears on page 59 of the proposal and is reproduced here:

> **P1.III.A.iii Proposed changes to Root Zone environment and relationship with Root Zone Maintainer**
>
> 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. (If this recommendation is approved, the estimated costs for the study should be added to the PTI budget for the period(s) in which it will be performed.) 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.

In the foregoing text, "IFO" refers to the IANA Functions Operator, currently PTI, a wholly owned subsidiary of ICANN that operates the IANA functions. The text also refers to the Root Zone Maintainer, a role currently performed by Verisign and explained further in the next section.

2.   Background

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

1. The IANA Functions Operator (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. NTIA provided an oversight role and changes to the root zone did not proceed without its explicit authorization.
3. Once a change was authorized, the Root Zone Maintainer (Verisign) implemented the change by updating its database of root zone information, generating a new root zone file, cryptographically signing it, and making it available on the "stealth master servers" for the root operators to retrieve and publish on the root name servers.

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

*   NTIA no longer has any role in the root zone management process.
*   The oversight role formerly performed by NTIA is now handled by ICANN.
*   A wholly owned subsidiary of ICANN named Public Technical Identifiers ("PTI") was created and is now the IANA Functions Operator for Domain names. The separation of PTI as a subsidiary is intended to ensure independence of the oversight role from the contractor providing the service.

While the IANA stewardship transition simplified the root zone management process by removing one party, there are still issues with the process, 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. The study proposed here would assess the current architecture and process and make recommendations to address any issues discovered.

3.   Scope of The Study

The study will investigate the root zone management process. The study will look for opportunities to improve the overall process along several dimensions:

- Efficiency: Are there unnecessary steps, complexity or parties involved?
- Robustness: Are there single points of failure?
- Security: Does the process ensure that the intended root zone changes are made following the policies established by the ICANN community?

All recommendations for changes in the architecture or process should include a risk analysis and cost/benefit analysis. In other words, a proposed architectural or process change should include an analysis of what risks to the overall system it addresses, as well as an analysis of the costs to implement it and the expected benefit. While all aspects of the root zone change management architecture and process would be 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.

4.   Process

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

- Development of work plan and timeline
- Gathering of documentation, records, etc.
- Interviews with stakeholders
- Development of recommendations and writing the report
- Delivery of a draft report
- Delivery of a final report

Execution of the study will require interviews with IFO (PTI) staff, ICANN staff and Root Zone Maintainer (Verisign) staff.