SAC068
SSAC Report on the IANA Functions Contract

A Report from the ICANN Security and Stability Advisory Committee (SSAC)
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Preface

This is a Report to the Internet Corporation for Assigned Names and Numbers (ICANN) Board of Directors, the ICANN community, and the Internet community more broadly from the ICANN Security and Stability Advisory Committee (SSAC). It provides information about the current relationship between the U.S. Government's National Telecommunications and Information Administration (NTIA)[1] and the Internet Assigned Numbers Authority (IANA) as defined by a contract —the "IANA Functions Contract." The SSAC believes that making this information available now is particularly important as NTIA has announced its intention to transition key Internet domain name functions to the global multistakeholder community. This report focuses on the current state of affairs, aiming to establish a baseline of community understanding about the current contractual relationships. It does not offer specific advice on future arrangements.

The SSAC focuses on matters relating to the security and integrity of the Internet's naming and address allocation systems. This includes operational matters (e.g., pertaining to the correct and reliable operation of the root zone publication system), administrative matters (e.g., pertaining to address allocation and Internet number assignment), and registration matters (e.g., pertaining to registry and registrar services). SSAC engages in ongoing threat assessment and risk analysis of the Internet naming and address allocation services to assess where the principal threats to stability and security lie, and advises the ICANN community accordingly. The SSAC has no authority to regulate, enforce, or adjudicate. Those functions belong to others, and the advice offered here should be evaluated on its merits.

A list of the contributors to this Report, references to SSAC members' biographies and disclosures of interest, and SSAC members' objections to the findings or recommendations in this Report are at end of this document.

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[1] NTIA is part of the U.S. Department of Commerce. See http://www.ntia.doc.gov

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Executive Summary

In this document, the SSAC identifies key aspects of the relationship between the U.S. Government's National Telecommunications and Information Administration (NTIA) and the Internet Corporation for Assigned Names and Numbers (ICANN) as defined by the Internet Assigned Numbers Authority (IANA) Functions Contract.

Based on current public contractual information, the SSAC finds that:

- The NTIA performs the role of IANA Functions Contract Administrator for all the requirements contained within the Contract.

- As the Root Zone Management Process Administrator, NTIA's role can be described as the "Final Authorization Authority" for changes to the Root Zone content and contact information for the Top Level Delegations. This is the most significant technical and policy activity currently performed by NTIA that is related to IANA activities.

- With other IANA activities, such as the Internet Numbers Registry Management, Protocol Parameter Registry Management, Address and Routing Parameter Area (.ARPA) and INternational Treaty organizations (.INT) top-level domains (TLDs) management, NTIA monitors these contract activities but does *not* play an active role.

The table below summarizes the role of NTIA with respect to the IANA Functions defined in the IANA Functions Contract.

IANA Functions	Involved Parties	NTIA Role
DNS Root Zone Management	ICANN, NTIA and Verisign	IANA Functions Contract Administrator and Root Zone Management Process Administrator
Internet Numbers Registry Management	ICANN under authority of Regional Internet Registries and their communities	IANA Functions Contract Administrator
Protocol parameter registry management	ICANN under authority of The Internet Engineering Task Force (IETF) / Internet Architecture Board (IAB)	IANA Functions Contract Administrator
.ARPA and .INT management	ICANN under authority of IETF/IAB and other existing processes	IANA Functions Contract Administrator

1. Introduction

On 14 March 2014, the U.S. Commerce Department's (DoC) National Telecommunications and Information Administration (NTIA) announced its intention to transition out of its current role with respect to the Internet Assigned Numbers Authority (IANA) Functions [12]. In that announcement, NTIA called upon the Internet Corporation for Assigned Names and Numbers (ICANN) to "convene global stakeholders to develop a proposal to transition the current role played by NTIA in the coordination of the Internet's domain name system (DNS) [12]." The NTIA also specified a set of criteria that must be met by the proposal.

During this process, as the stakeholder communities discuss and formulate their expectations and proposals for a post–NTIA IANA Functions arrangement, it will be important to understand the role that NTIA currently plays with respect to the IANA Functions. This report documents that role based on current public contractual information. It complements SAC067, "Overview and History of the IANA Functions [3]," by focusing specifically on the role that NTIA currently plays in the context of the IANA Functions Contract between NTIA and ICANN [9].

1.1 Terminology

The **IANA Functions:** The IANA Functions have been operated as a combined set of activities by successive organizations[2] ever since they were implemented as part of the DARPA/USC contract (page 4 of [9]). While it is commonly referred to as "the IANA," there is no distinct, separate entity with that name.

In this document, the IANA Functions refer to the current set of functions as defined in the latest version of the IANA Functions Contract [9] issued in July 2012 by NTIA and performed by the IANA Functions Operator, ICANN. These are:

- the coordination of the assignment of technical Internet protocol parameters (hereinafter referred to as "Protocol Parameter Registry Management");
- the administration of certain responsibilities associated with the Internet DNS root zone management (hereinafter referred to as "DNS Root Zone Management");
- the allocation of Internet numbering resources (hereinafter referred to as "Internet Numbers Registry Management"); and
- other services related to the management of the "Address and Routing Parameter Area" (.ARPA) and "INternational Treaty organizations" (.INT) top-level domains (TLDs) (hereinafter referred to as ".ARPA and INT Management").

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[2] See Section 2 SAC067 for the list of organizations.

Each of these functions is described in detail in SAC067, "Overview and History of the IANA Functions [3]." In this report, the SSAC refers to these four functions collectively as the IANA Functions, and individually to each function as described in SAC067.

The **IANA Functions Contract,** for the purposes of this SSAC document, refers *only* to the Contract that NTIA awarded to ICANN on 2 July 2012 [9], and amended in October 2012 [10] and April 2013 [11], for the performance of the IANA Functions.

2.   Overview of the IANA Functions Contract

The IANA Functions Contract includes:

- The Award issued by NTIA [9]. The document, approximately 65 pages long, specifies the statement of work, price/costs, deliverables, and other administrative and legal information of the award.
- The ICANN proposal [2] responding to the NTIA Request For Proposals [8]. The document, approximately 550 pages long, is *incorporated by reference* as part of the IANA Functions Contract, and is referred to in this document as the "ICANN Response."
- Two amendments that were made in October 2012 [10] and April 2013 [11].

The key passages where NTIA specified requirements for the contractor to fulfill are sections C.1 to C.8 of the Award [9]. The following paragraphs summarize key elements of the Contract.

First, section C.1 of the Award requires the contractor to have close constructive relationships with "interested and affected parties" germane to the Contract. These are defined as follows:

> "The interested and affected parties include, but are not limited to, the multi-stakeholder, private sector led, bottom-up policy development model for the domain name system (DNS) that the Internet Corporation for Assigned Names and Numbers (ICANN) represents; the Internet Engineering Task Force (IETF) and the Internet Architecture Board (IAB); Regional Internet Registries (RIRs); top-level domain (TLD) operators/managers (e.g., country codes and generic); governments; and the Internet user community." [9]

In the ICANN Response [2], section 1.1.1 provides a more extensive list of interested and affected parties as well as clearly stating that these entities operate independently from ICANN in many instances. ICANN also acknowledges that it will operate registries under the direction and policies defined under Memoranda of Understanding (MOU) with the Internet Engineering Task Force (IETF), the Internet Architecture Board (IAB) [4][5], and the Numbers Resource Organization (NRO) [1] for the respective protocol parameters and numbers registries.

Second, section C.2 of the Award describes what ICANN is required to do under the contract. It includes general requirements such as:

- Jurisdiction (e.g., contractor shall be "a wholly U.S. owned and operated firm or fully accredited United States University or College operating in one of the 50 states of the United States or District of Columbia.")
- Costs and fees (No-fee contract)
- Separation of policy development and operational roles
- Transparency and accountability (Publicly available processes and performance reporting)
- Responsibility and respect for stakeholders (Engagement with stakeholders for identification and implementation of policy processes)
- Performance standards (Develop and publish performance standards for each area of IANA Functions and report on metrics for those standards)

The Award also covers the definition of the IANA Functions and activities the contractor should perform in fulfilling them. In the ICANN Response [2], section 1.2 provides specific details about how these activities will be performed in approximately 180 pages of details. This section defines both the technical and process details of how ICANN is performing and will continue to perform the IANA functions.

Third, sections C.3 through C.7 of the Award describe various categories of requirements. These include requirements on
- Security (Security of IANA registries, request handling and data storage),
- Performance Metrics (Appropriate performance metrics and reporting for each of the IANA Functions),
- Audit (Preparation and availability of audit materials on specific schedules and on demand),
- Conflict of Interest (A standard employee COI policy and demonstration that ICANN staff performing the IANA Functions are held to that policy),
- Continuity of Operations (Development and maintenance of an appropriate continuity plan for extraordinary circumstances),
- and other special requirements (Transition to Successor Contractor planning).

The ICANN Response [2] sections 1.3 through 1.7 provide the complementary details on how ICANN plans to meet each of those requirements.

Finally, section C.8 of the Award describes actions that ICANN is specifically *prohibited* from performing with respect to root zone content changes, as well as constraints on ICANN from policies developed by other organizations (e.g., by the IETF, IAB, and NRO). Sections 1.2.10 and 1.8 of the ICANN Response provides complementary details on how ICANN plans to fulfill these obligations. Specifically, from section 1.2.10:

> "ICANN recognizes that the execution of the Root Zone Management function is a collaborative effort between ICANN, NTIA and the Root Zone Maintainer and that in the performance of the Root Zone Function, ICANN will abide by the

separation of roles and responsibilities in performing its role in administering requests for Root Zone changes.

"As with all of the IANA Functions, ICANN will implement processes and procedures that will apply the policies that are established by the policy making entities of the IETF, the Regional Internet Registries and the Supporting Organizations like the ccNSO. ICANN will not make changes to the established processes of the performance of the IANA Functions until it has received prior approval from the Contracting Officer.

"The performance of the Root Zone Management function will not be predicated on any negotiated agreements with individual Top Level Domains. The performance of validating that all root zone change requests are consistent with the established criteria is how ICANN does and will continue to perform the Root Zone function. ICANN will not enter into any agreements with third parties that will impact ICANN's compliance with the IANA Root Zone Functions." [2]

3.   IANA Functions Contract Implementation Activities

In this section, the SSAC outlines the implementation activities as described in the ICANN proposal for the various IANA Functions, and NTIA's role with respect to these functions.

3.1   Protocol Parameter Registry Management

The implementation of the first function, "the coordination of the assignment of technical Internet protocol parameters," is described primarily in section 1.2.9.1 of the ICANN Response [2]. Various other sections provide other details on the performance, such as section 1.1.1.2 [2] which clearly states that the implementation of these registries and overall protocol parameter functions will be in accordance with the MOU with the IETF/IAB [4,5]. Specifically:

"ICANN will continue to operate under the existing MoU with the IETF. This MoU sets out technical requirements for use in performance of the IANA function in assigning and registering Internet protocol parameters only as directed by the criteria and procedures specified in Requests for Comments (RFCs), including Proposed, draft and full Internet Standards and Best Current Practice documents and any other RFC that calls for IANA Actions. If there is no documentation for an existing registry, then ICANN will continue to assign and register Internet protocol parameters that have traditionally been registered, following past and current practice for such assignments, unless otherwise directed by the IESG. If in doubt or in case of a technical dispute, ICANN will seek and follow technical guidance exclusively from the IESG. Where appropriate the IESG will appoint an expert to advise ICANN. ICANN will work with the IETF to develop any missing criteria or procedures over time, which ICANN will adopt when so instructed by

the IESG. In the event of a technical dispute between the ICANN and the IESG, both will seek guidance from the IAB, whose decision will be final." (page 15 of [2])
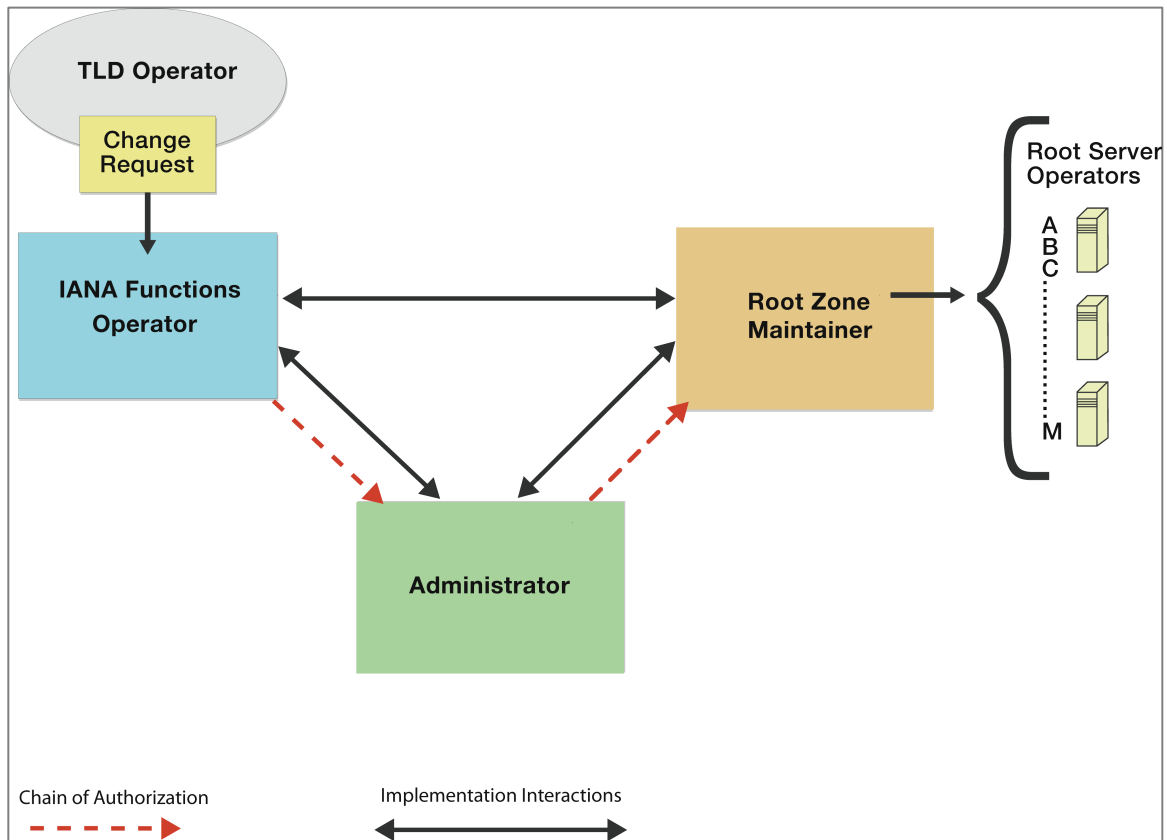
Thus, the IANA Functions Contract essentially directs ICANN to do as those groups direct with the resources for which they are responsible. NTIA's involvement with the protocol parameter registry management is one of monitoring contract obligations. It does *not* play an active role in the actual management of the registry.

3.2   DNS Root Zone Management

The implementation of administrative functions associated with root zone management is coordinated under two separate legal agreements that pertain to ICANN as the IANA Functions Operator through the IANA Functions Contract and Verisign as the Root Zone Maintainer, as articulated in Cooperative Agreement Amendment 11. Award document Appendix 1 designates NTIA as the Root Zone Management Process Administrator.

In addition to the Contract, the implementation is documented in [13][14] and has evolved over time. In summary, there is a *structured* information exchange between ICANN, Verisign and NTIA. ICANN sends the root zone change request to Verisign (via EPP) and after receiving the acknowledgement from Verisign, it sends the request to NTIA for authorization. Verisign conducts its own set of checks. After NTIA approves the change, it sends a positive response to both ICANN and Verisign. Verisign verifies what NTIA authorizes corresponds to the request that ICANN submitted. Verisign generates and DNSSEC signs the root zone twice daily, uploads it to the distribution masters, and from there distributes it to the root servers regardless of whether there are content changes or not. These relationships, illustrated in Figure 1 below, ensure that all data changes stay consistent from user submission to ultimate inclusion in the root zone, and minimizes the opportunities for error. Figure 1 also illustrates the chain of authorization as described in the Award and in section 1.2.9.1 of the ICANN Response [2].

Figure 1: Implementation Interactions and Chain of Authorization in DNS Root Zone Management

In addition, section C.1.3 of the Award [9] and section 1.1.1 of the ICANN Response [2] provide a description of some of the policy establishment processes associated with root zone management.

Finally, the NTIA also defines a specific set of requirements for conducting the activities associated with the use of the DNS Security Extensions (DNSSEC) in the Root Zone [7]. In addition to the Contract, implementation details are described in [15][16].

Thus, as the Root Zone Management Process Administrator, NTIA's role can be described as the "Final Authorization Authority" for changes to the Root Zone content and contact information for the Top Level Delegations. This is the most significant technical and policy activity currently performed by NTIA that is related to IANA activities.

3.3 Internet Numbers Registry Management

The implementation of the allocation of Internet numbering resources is described primarily in section 1.2.9.3 of the ICANN Response [2]. Additionally, various other sections of the ICANN Response, such as section 1.1.1.2 [2], clearly state that the

implementation of these registries and overall "allocation of Internet numbering resources" functions will be in accordance with the MOU with the NRO [1]. Specifically:

> "ICANN will continue to operate under the existing MoU with the Numbers Resource Organization (NRO), a group comprising five Regional Internet Registries. The MoU defines the NRO's role in global policy development, providing recognition of other registries. The MoU also establishes that the NRO will fulfill the role, responsibilities and functions of the Address Supporting Organization (ASO) in advising the ICANN Board on Internet number resource allocation policy. This agreement ensures that the RIRs, an affected and interested party, have a voice in shaping relevant policy."

Similar to the protocol parameter registry management, the NTIA's involvement with the Internet Numbers Registry Management is one of monitoring contract compliance. It does *not* play an active role in the actual management of the registry.

4.   Summary

NTIA performs the role of IANA Functions Contract Administrator for all of the requirements contained within the Contract. In this role, NTIA oversees all aspects of the IANA Functions Contract. In addition, the NTIA performs an active role in the Root Zone Management Process.

The role of the NTIA as the Root Zone Management Process Administrator could be described as the "Final Authorization Authority" for changes to the Root Zone content and contact information for the Top Level Delegations in the Root Zone. Contact information is sometimes referred to in other SSAC publications as "social data." This role is the most significant technical and policy activity currently performed by NTIA that is related to IANA activities. NTIA's involvement with other IANA activities, such as the Internet Numbers Registry Management, Protocol Parameter Registry Management, and .ARPA and .INT management, is one of monitoring contract compliance. NTIA does *not* play an active role in the actual management of those activities.

The tight coupling between NTIA and ICANN for root zone management is consistent with the Contract, which does not name any other authoritative parties. In contrast, ICANN's activities regarding protocol parameters and IP addresses are governed by MOUs with organizations other than NTIA, e.g., IETF, IAB, NRO.

5. Acknowledgments, Disclosures of Interest, Dissents, and Withdrawals

In the interest of transparency, these sections provide the reader with information about four aspects of the SSAC process. The Acknowledgments section lists the SSAC members, outside experts, and ICANN staff who contributed directly to this particular document. The Disclosures of Interest section points to the biographies of all SSAC members, which disclose any interests that might represent a conflict—real, apparent, or potential—with a member's participation in the preparation of this Report. The Dissents section provides a place for individual members to describe any disagreement that they may have with the content of this document or the process for preparing it. The Withdrawals section identifies individual members who have recused themselves from discussion of the topic with which this Report is concerned. Except for members listed in the Dissents and Withdrawals sections, this document has the consensus approval of all of the members of SSAC.

5.1   Acknowledgments

SSAC thanks the following members and external experts for their time, contributions, and review in producing this Report.

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5.2   Disclosures of Interest

SSAC member biographical information and Disclosures of Interests are available at: https://www.icann.org/resources/pages/biographies-2014-10-08-en.

5.3   Dissents

There were no dissents.

5.4   Withdrawals

There were no withdrawals.

6.   References

[1] Internet Corporation For Assigned Names and Numbers (ICANN). (2004) ICANN Address Supporting Organization (ASO) MoU. Retrieved from: https://archive.icann.org/en/aso/aso-mou-29oct04.htm

[2] Internet Corporation For Assigned Names and Numbers (ICANN). (2012). Internet Numbers Authority Proposal (For Solicitation Number RFP SA1301-12-RP-0043). Retrieved from http://www.ntia.doc.gov/other-publication/2012/icann-proposal

[3] ICANN Security and Stability Advisory Committee (SSAC). (2014) *Overview and History of the IANA Functions* (SSAC publication No. 067). Retrieved from https://www.icann.org/en/system/files/files/sac-067-en.pdf

[4] Internet Engineering Task Force (IETF). (2000). Memorandum of Understanding Concerning The Technical Work Of the Internet Numbers Authority. Retrieved from: http://iaoc.ietf.org/documents/IETF-ICANN-MOU_2000.pdf

[5] Internet Engineering Task Force (IETF). (2006-2014). ICANN-IETF MoU Supplemental Agreement(s). Retrieved from: http://www.ietf.org/iana/iproc.html

[6] National Telecommunications & Information Administration, United States Department of Commerce. (1998-2012). Verisign Cooperative Agreement (No. NCR 92-18742). Retrieved from: http://www.ntia.doc.gov/page/verisign-cooperative-agreement

[7] National Telecommunications & Information Administration, United States Department of Commerce. (1999). Testing and Implementation Requirements for the Initial Deployment of DNSSEC in the Authoritative Root Zone. Retrieved from http://www.ntia.doc.gov/files/ntia/publications/dnssec_requirements_102909.pdf

[8] National Telecommunications & Information Administration, United States Department of Commerce. (2012). Internet Number Authority – Request for Proposal (Solicitation Number: SA1301-12-RP-0043 (April 16, 2012)), Retrieved from http://www.ntia.doc.gov/files/ntia/publications/sa1301-12-rp-0043-_final_04.16.2012.pdf

[9] National Telecommunications & Information Administration, United States Department of Commerce. (2012). IANA Functions Contract Award. (Contract No. SA1301-12-CN-0035, Retrieved from http://www.ntia.doc.gov/files/ntia/publications/sf_26_pg_1-2-final_award_and_sacs.pdf

[10]   National Telecommunications & Information Administration, United States Department of Commerce. (2012). Amendment of Solicitation / Modification of Contract (Contract No. SA1301-12-CN-0035), Retrieved from http://www.ntia.doc.gov/files/ntia/publications/sa1301-12-cn-0035_mod_0001_-_deliverable_schedule.pdf

[11]   National Telecommunications & Information Administration, United States Department of Commerce. (2013). Amendment of Solicitation / Modification of

Contract (Contract No. SA1301-12-CN-0035), Retrieved from
http://www.ntia.doc.gov/files/ntia/publications/sa1301-12-cn-0035001.pdf

[12]   National Telecommunications & Information Administration, United States
Department of Commerce. (2014). NTIA Announces Intent to Transition Key Internet
Domain Name Functions [Press release]. Retrieved from
http://www.ntia.doc.gov/press-release/2014/ntia-announces-intent-transition-key-
internet-domain-name-functions

[13]   Root Scaling Study Team. (2009). Scaling the Root – Report on the Impact on the
DNS Root System of Increasing the Size and Volatility of the Root Zone. Retrieved
from https://www.icann.org/en/system/files/files/root-scaling-study-report-31aug09-
en.pdf

[14]   TNO Information and Communication Technology. (2009). Root Scaling Study –
Descriptions of the DNS Root Scaling Model. Retrieved from:
https://www.icann.org/en/system/files/files/root-scaling-model-description-29sep09-
en.pdf

[15]   Root DNSSEC Design Team. (2010). DNSSEC Practice Statement for the Root
Zone KSK Operator. Retrieved from: https://www.iana.org/dnssec/icann-dps.txt

[16]   Verisign and ICANN. (2010). Final Report on DNSSEC Deployment Testing and
Evaluation in the Root Zone. Retrieved from:
http://www.ntia.doc.gov/files/ntia/publications/dnssec_05282010_0.pdf