Independent Review of the ICANN Root Server System Advisory Committee (RSSAC)

Draft Recommendations for the RSSAC RWP

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Executive Summary

Independent Organizational Review

This report presents the draft recommendations of an independent organizational review of the ICANN Root Server System Advisory Committee (RSSAC), which was undertaken in accordance with the ICANN Bylaws[1] in order to determine

  (i) whether [the RSSAC] has a continuing purpose in the ICANN structure;

  (ii) if so, whether any change in structure or operations is desirable to improve its effectiveness; and

  (iii) whether [the RSSAC] is accountable to its constituencies, stakeholder groups, organizations, and other stakeholders.

In fulfilling this mandate, the Independent Examiner has made every effort to focus its recommendations on what the RSSAC should reconsider or do differently within its remit or how the RSSAC might alter its charter or operating procedures to meet new expectations from the ICANN community.[2]

The Root Server System Advisory Committee

The RSSAC is an ICANN Advisory Committee, created "to advise the ICANN community and Board on matters relating to the operation, administration, security, and integrity of the Internet's Root Server System (RSS)."[3] Its voting members are defined by its operational procedures[4] to be representatives of the Root Server Operators (RSOs)—the independent organizations that maintain and operate the worldwide server infrastructure that resolves domain names at the top level (the root) of the Domain Name System (DNS).

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[1] ICANN Bylaws, Article 4, Section 4.4
(https://www.icann.org/resources/pages/governance/bylaws-en/#article4)

[2] RSSAC032, "Feedback on the Independent Review of the Root Server System Advisory Committee (RSSAC) Assessment Report for Public Consultation," 28 March 2018
(https://www.icann.org/en/system/files/files/rssac-032-28mar18-en.pdf)

[3] ICANN Bylaws, Article 12, Section 12.2(c)
(https://www.icann.org/resources/pages/governance/bylaws-en#article12)

[4] https://www.icann.org/en/system/files/files/rssac-000-op-procedures-23oct17-en.pdf

Assessment and Recommendations

The results of our review of the RSSAC are presented in two phases:

(i) our **findings** concerning the context, role and purpose, structure, operation, and outcomes of the RSSAC, which represent the raw data collected from all sources subjected to a formal qualitative analysis, appear in the *Assessment Report for Public Consultation;*[5] and

(ii) our **recommendations** for changes to the structure or operation of the RSSAC, which follow from the findings augmented by public consultation, appear in this *Draft Recommendations for RWP* Report.

Following the public consultation period, we will incorporate feedback into a draft of the Final Report, which will contain both an updated assessment of the RSSAC and our recommendations for improving its structure and operation. This draft will be published for public comment on 27 April 2018. The public comment period will be open for 40 days. After incorporating comments from the ICANN community, we will publish the Final Report on 2 July 2018.

Principal Recommendations

The principal recommendations of our review focus on the three dimensions of **purpose**, **effectiveness**, and **accountability** described in the Bylaws mandate for organizational reviews. They follow directly from our findings, and are intended to recommend improvements (1, 2, …) and suggest ways in which they might be achieved (1a, 1b, …) rather than prescribe the details of a specific implementation.

> 1 Modify the RSSAC membership criteria to allow the RSSAC to recruit a variety of skills, perspectives, and interests that include but are not limited to those available from the root server operator organizations.

The statutory "RSO representatives only" membership criterion handicaps the RSSAC in at least the following ways:

- it encourages the (erroneous but widespread) perception that the RSSAC is an "association" of RSOs;

- it excludes viewpoints and expertise that might contribute to the fulfillment of the RSSAC's mission but are not readily available from the RSO organizations;

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[5] https://www.icann.org/en/system/files/files/rssac-review-assessment-report-22feb18-en.pdf

- it excludes stakeholders with direct involvement in serving the root, including non-RSO anycast instance providers and public DNS resolvers;

- it excludes stakeholders with provisioning-side interest in the way in which the root is served, including TLD registries and the ccNSO; and

- it compels every RSO to participate regardless of its willingness or ability to do so.

As long as its membership is defined to be representatives and alternates from the RSOs the RSSAC will be perceived to be an advisory committee of the root server operators, not the root server system, and its advice will be received as advice from the RSOs.

1a	Extend RSSAC membership by invitation to any qualified person.

This is the membership model used by the SSAC—recruit the expertise you need, with confirmation/ratification by the Board. The RSOs might retain their prerogative to appoint representatives to the RSSAC, but the RSSAC could recruit members from other sources as well.

The RSSAC Caucus does not help here. It is defined to be a pool of expert resources available to perform specific tasks on demand—its members do not participate in the executive activities of identifying the "specific tasks" or determining the "demand". The Caucus charter notes only that "[t]he RSSAC may also ask caucus members for advice and opinions about RSSAC business".[6]

1b	Let individual RSOs decide whether or not to participate in the RSSAC.

Some RSOs are interested in the RSSAC, some are not; some RSOs have the resources to commit to RSSAC activities, others do not. Admit any RSO that wishes to participate, but do not require every RSO to do so.

This recommendation recognizes that the RSSAC is not involved in any aspect of root server operations. Rootops might require the attention of every RSO; the RSSAC does not.

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[6] https://www.icann.org/en/groups/rssac/rssac-caucus-06may14-en.pdf

> **2** Resolve the apparent mismatch between the charter and operational procedures of the RSSAC and the requirements and expectations of the ICANN Board and Community for interaction with the root server system.

The RSSAC is the only group within ICANN that connects it to the system of root servers that implements the "serving" side of the DNS root registry.[7] As such, it is the default target for every root service issue that arises within ICANN—whether or not the issue is properly within its scope—simply because it appears to be the only available interface between ICANN and the root server operators.

To the extent that ICANN either is or is widely held to be responsible for the reliable and secure operation of the root, it requires a relationship with the serving side of the root registry that extends beyond the "exchange of information" limits of the RSSAC charter. The nature of that relationship is primarily an RSO/Board issue, not an RSSAC issue, and therefore out of scope for the present review. But the apparent mismatch between what ICANN needs from an interface to the root server system and what the RSSAC is currently chartered to provide suggests that either the RSSAC scope should be expanded or the attention and expectations of the Board and Community should be explicitly redirected away from the RSSAC to some other group.

> **2a** Document the rationale for the architecture of the root server system.

In its role as the primary source of information and advice to the Board and Community concerning the root server system, the RSSAC could improve the quality of discussions about the ICANN/RSS relationship by clearly documenting the rationale for the current RSS architecture, particularly with respect to RSO diversity and independence.

Although the RSSAC has provided a wealth of information about the way in which the RSS has evolved in RSSAC023, "History of the Root Server System", the rationale is mentioned only briefly, on page 31: *"There is great diversity in the operational history and approaches of root servers, as well as hardware and software. This diversity in aspects such as geography, organizations and operations has enabled the root server system to deal with local challenges, avoid capture by any single party and provide reliable service to the Internet community"*.[8]

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[7] See Figure 2 in Section II.2.1.3 of this report.

[8] https://www.icann.org/en/system/files/files/rssac-023-04nov16-en.pdf

Similarly, Section 3.6, "Diversity of Implementation", of RSSAC001, "Service Expectations of Root Servers", says that "*[t]he goal of this diversity is to ensure that the system as a whole is not unnecessarily dependent on a single implementation choice, which might otherwise lead to a failure of the whole system due to a serious defect in a common component*".[9] But this is an isolated observation on page 8 of a document that is not obviously concerned with the architecture of the root server system.

A more complete and accessible explanation of the rationale for RSO diversity and independence would improve Board and Community understanding of the reasoning behind the observable but not readily explicable structure and operation of the RSS.

> 3   Formalize the responsibilities of the RSSAC to the ICANN Board and Community in a work plan that is periodically reviewed and published, and hold the RSSAC accountable for work plan deliverables.

Because the root server system is poorly understood by most outsiders, the Board and Community generally do not know what advice to expect or solicit from the RSSAC. The exercise of constructing and periodically revisiting a formal work plan would align the understanding and expectations of both the Board and the RSSAC, and enable the Board to hold the RSSAC accountable for specific deliverables rather than general undefined advice. It would also help to dispel the erroneous impression that the RSSAC is an "association" of the RSOs, in which the distinction between RSSAC accountability and RSO accountability is too often lost.

Our findings suggest the following initial recommendations for work plan deliverables, but the full plan should be constructed and populated by mutual agreement of the Board and the RSSAC.

> 3a   Engage in ongoing threat assessment and risk analysis of the Root Server System and recommend any necessary audit activity to assess the current status of root servers and the root zone.[10]

This is a direct quotation from the RSSAC charter. The activity might profitably be undertaken in collaboration with the SSAC.

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[9] https://www.icann.org/en/system/files/files/rssac-001-root-service-expectations-04dec15-en.pdf

[10] ICANN Bylaws Article 12 Section 12.2(c)(i)(C) (https://www.icann.org/resources/pages/governance/bylaws-en#article12).

> **3b**   Coordinate the gathering and publishing of meaningful data about the root server system.

The RSSAC is not an association of RSOs, and has no power or authority to collect or compel the collection of root server system data. It has, however, recommended that individual RSOs collect and publish data in a standard format for a standard set of metrics, defined in RSSAC002, "RSSAC Advisory on Measurements of the Root Server System".[11] We found[12] that both the extent and the quality of compliance with this recommendation varied dramatically among the 12 RSOs, and in aggregate fell short of what academic and industry researchers told us they would need in order to conduct meaningful analyses of the root server system.

> **3c**   Assess and report on the status of compliance with the recommendations of RSSAC001.

The RSSAC published RSSAC001v1, "Service Expectations of Root Servers", in December 2015. RSSAC001 "*describes the best practice service provided by Root Servers, and defines the expectations that users might reasonably hold of both that service and the Root Server Operators*".

It is not clear from our research whether or to what extent individual RSOs have complied with either of the two recommendations of RSSAC001:

Recommendation 1: The RSSAC recommends each root server operator publish the level of service they offer as a root server operator to the Internet Community by responding to each of the expectations detailed herein.

Recommendation 2: The RSSAC recommends that each root server operator advise the RSSAC as to where this RSSAC001 responses have been published, and notify RSSAC of future revisions or either content or location.[13]

> **4**   Develop and implement a leadership training and succession plan.

The membership criteria for the RSSAC do not actively select for leadership skills, but as the evolution of the RSSAC since its reformation in 2014 demonstrates, leadership

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[11] https://www.icann.org/en/system/files/files/rssac-002-measurements-root-06jun16-en.pdf

[12] See Section II.2.2.8 of this report.

[13] https://www.icann.org/en/system/files/files/rssac-001-root-service-expectations-04dec15-en.pdf

matters. We found[14] that the leadership changes that followed the 2013-14 RSSAC restructuring substantially improved the management and operation of the committee. To secure these improvements, the RSSAC should deliberately plan for succession in its leadership roles.

Leadership training and succession plans developed by and for other ICANN groups might be adapted for use by the RSSAC.

5   Engage more actively with the rest of ICANN and its Community.

The RSSAC could fulfill its charter mandate to "*[c]ommunicate on matters relating to the operation of the Root Servers and their multiple instances with the Internet technical community and the ICANN community*"[15] more effectively if it engaged more visibly with other ICANN Advisory Committees, Supporting Organizations, review teams, and task forces. Doing so would also help to dispel the community perception that the RSSAC is a closed and secretive group, which we found[16] to be persistent despite the RSSAC's objectively considerable progress toward greater openness and transparency.

6   Clarify the role and responsibility of the RSSAC with respect to other groups with adjacent or overlapping remits, including the SSAC, the RZERC, and the RSSAC Caucus.

Although their charter and operating procedure documents attempt to define the roles and responsibilities of these groups clearly, our research found both *de facto* and *de jure* confusion and ambiguity that affect the RSSAC's ability to effectively fulfill its role. Only the RSSAC and RSSAC Caucus charters and operating procedures are within the scope of the RSSAC, but clarity in these documents with respect to roles and responsibilities would be easier to achieve in collaboration with the SSAC and the RZERC.

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[14] See Section II.2.4.2 of this report.

[15] ICANN Bylaws Article 12 Section 12.2(c)(i)(A) (https://www.icann.org/resources/pages/governance/bylaws-en#article12).

[16] See Section II.2.6 of this report.

6a	Develop a more effective and transparent process for defining RSSAC Caucus projects, engaging its members and managing its membership, managing its work, and promoting its output.

The RSSAC Caucus charter says that its purpose is "*to define a well defined pool of motivated experts to whom RSSAC can turn to for getting work done*" and that "*[t]he RSSAC caucus is the group of people that produce RSSAC documents, such as reports and advisories*".[17] But we found[18] that the work of the Caucus is poorly defined and lacks effective guidance and oversight from the RSSAC.

6b	In cooperation with the SSAC, develop and publish a statement that clearly distinguishes the roles and responsibilities of the RSSAC and the SSAC, describes how they are complementary with respect to their shared interests in security and stability, and establishes a framework for collaboration on issues of mutual concern.

The SSAC charter includes the mandate to "*communicate on security matters with the Internet technical community and the operators and managers of critical DNS infrastructure services, to include the root name server operator community, the top-level domain registries and registrars, the operators of the reverse delegation trees such as in-addr.arpa and ip6.arpa, and others as events and developments dictate*".[19] This overlaps the similar mandate in the RSSAC charter to "*[c]ommunicate on matters relating to the operation of the Root Servers and their multiple instances with the Internet technical community and the ICANN community*" and "*[e]ngage in ongoing threat assessment and risk analysis of the Root Server System*".[20] Because the SSAC's scope includes the security and stability of the root zone (along with the rest of "the Internet's naming and address allocation systems"[21]), the RSSAC's role is often misunderstood as a subset of the SSAC's.

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[17] https://www.icann.org/en/groups/rssac/rssac-caucus-06may14-en.pdf

[18] See Section II.2.7 of this report.

[19] ICANN Bylaws Section 12.2(b) (https://www.icann.org/resources/pages/governance/bylaws-en/#article12).

[20] ICANN Bylaws Section 12.2(c) (https://www.icann.org/resources/pages/governance/bylaws-en/#article12).

[21] ICANN Bylaws Section 12.2(b) (https://www.icann.org/resources/pages/governance/bylaws-en/#article12).

6c	In cooperation with the RZERC and the SSAC, develop and publish a statement that clearly distinguishes the roles and responsibilities of the RSSAC, the RZERC, and the SSAC with respect to the evolution of the DNS root system (within the scope of ICANN's mission).

The RZERC charter says that *"[t]he Committee is expected to review proposed architectural changes to the content of the DNS root zone, the systems including both hardware and software components used in executing changes to the DNS root zone, and the mechanisms used for distribution of the DNS root zone"* and that *"[t]he Committee will consider issues raised to the Committee by any of its members, PTI staff, or by the Customer Standing Committee (CSC) to identify any potential evolutionary improvements and/or security, stability or resiliency risks to the architecture and operation of the DNS root zone"*.[22] These mandates overlap those of both the RSSAC and the SSAC, and we found[23] that although most insiders were confident that the overlaps could be resolved in practice on a case-by-case basis, most outsiders found them confusing; some were concerned that the RZERC might encroach on the work of the RSSAC and the SSAC or be expected to resolve conflicts and differences of opinion between those committees.

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[22] https://www.icann.org/en/system/files/files/revised-rzerc-charter-08aug16-en.pdf

[23] See Section II.2.8 of this report.