



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

Assessment Report for Public Consultation

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Executive Summary

Independent Organizational Review

This report presents the initial findings of an independent organizational review of the ICANN Root Server System Advisory Committee (RSSAC), which was undertaken in accordance with the ICANN Bylaws¹ 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 produce results that are meaningful and useful to the RSSAC itself as well as informative and conclusive to ICANN and its community.

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)”. By statute, its voting members are 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). It is important to recognize, however, that the RSSAC is not an “association” of the RSOs.

Assessment and Recommendations

The results of our review of the RSSAC will be 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 this Assessment Report; and

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

- (ii) our **recommendations** for changes to the structure or operation of the RSSAC, which follow from the findings augmented by public consultation, will appear in a subsequent Final Report.

The findings presented in this Assessment Report are the result of research and qualitative analysis, not judgement; as such they are the background for and input to the recommendations that we will make in the Final Report but are not themselves definitive or conclusive. None of these findings should be interpreted as implying any particular recommendation; they state what we found, not what action—if any—should be taken in response.

This Assessment Report has been published to solicit feedback from the ICANN community during a public consultation period which will include a webinar, open calls, and a public participation mailing list. The public consultation period will begin on 23 February 2018.

Following the public consultation period, we will incorporate feedback into a Final Report, which will contain both an updated assessment of the RSSAC and our recommendations for improving its structure and operation. A draft Final Report 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.

It is important to emphasize that our approach to this assessment report, and to the final report, does not require perfect representation across the ICANN community from either those interviewed or those surveyed. We have not, for example, drawn conclusions based simply on the frequency with which we heard a particular opinion during our interviews and through the survey instrument. Similarly, our use of direct quotations is intended to illustrate findings that are based on multiple sources, not to give undue weight or significance to the opinion of one individual.

Principal findings

The principal findings of our review represent a high-level summary of our assessment focused on the three areas of **purpose**, **effectiveness**, and **accountability** identified in the Bylaws mandate for organizational reviews. All of the findings presented in this report are supported by the evidence compiled from extensive personal interviews, a public on-line survey, and the documentary record.

- 1** The ongoing RSSAC reformation that began in 2013—revised RSSAC charter, new operating procedures, and creation of the RSSAC Caucus—has substantially improved the structure and operation of the RSSAC.

Implementing changes recommended by the prior review has significantly improved the effectiveness of the RSSAC. The addition of staff support and travel funding has increased RSSAC and Caucus work quality and meeting participation.

- 2** The RSSAC has become more open, transparent, and accessible since the last review, but this has not been widely recognized by outside observers.

The RSSAC's focus on technical root server issues and deliberate non-participation in other ICANN activities have concentrated its impact on a small technical audience of DNS experts. It is still widely perceived to be closed and secretive, and less transparent than other ICANN ACs and SOs.

- 3** As the only visible interface between ICANN and the RSOs, the RSSAC is expected to deal with every root service issue that arises within ICANN, whether or not the issue is properly within its scope.

The RSSAC's scope is limited to providing information and advice about the root server system, but because it is the only visible point of contact between ICANN and the RSOs many in the ICANN community imagine that its role is (or should be) much broader. The RSSAC is expected to deal with 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.

- 4** The RSSAC's ability to serve as a shared space for RSO–ICANN communication and cooperation is complicated by a persistent legacy of distrust of ICANN by some of its members.

The RSSAC is paradoxically both a statutory part of ICANN and a group with some members who persistently distrust ICANN, pushing back forcefully on its real or perceived infringement on their exclusive responsibility for all matters concerning root system operations. The tension between the RSSAC and some of its member organizations has the potential to interfere with the clarity and authority of RSSAC advice.

- 5** The current RSSAC membership model excludes non-RSO participants and their different skills and perspectives.

The RSSAC membership model excludes both serving-side root service participants (*e.g.*, non-RSO anycast instance providers and public DNS resolvers) and provisioning-side interested parties (*e.g.*, TLD registries and the ccNSO). It also denies the RSSAC the benefit of skills and perspectives beyond those that can be provided by the root server operators.

- 6** The RSSAC's continuing purpose in the ICANN structure may include serving as the focal point for issues of mutual concern to ICANN and the RSOs, such as future operational and funding scenarios for serving the root.

The RSSAC is developing advice and recommendations concerning the future evolution of the root server system and how it might be supported, but this work is being conducted entirely by RSO representatives who will be directly affected by it. Many people outside of the RSSAC either don't know that it's working on root service evolution and other strategic policy issues or believe that its focus is misdirected.

- 7** Because RSSAC members do not agree on who its stakeholders should be, it is not clear for what and to whom it should be accountable.

Although its charter does not explicitly identify its stakeholders, its statement of RSSAC's role implies that they are the ICANN Board and community. Its members, however, do not agree on what this means in practice. The RSSAC has occasionally found it difficult to reach agreement on issues such as service level agreements and reporting for the root server system in the absence of a consensus accountability framework for itself and its members. A major stumbling block has been disagreement about ICANN's role in such a framework.

- 8** The relative roles and responsibilities of the RSSAC, the RSSAC Caucus, the RZERC, and the SSAC are unclear to both outsiders and insiders.

In many cases even members of one of these groups could not distinguish its responsibilities from those of the others.

Part I – INTRODUCTION

I.1 The Root Server System Advisory Committee

According to Section 12.2(c)(i) of the ICANN bylaws,² the role of the Root Server System Advisory Committee (RSSAC) “is to advise the ICANN community and Board on matters relating to the operation, administration, security, and integrity of the Internet's Root Server System”.

The RSSAC’s voting members are representatives and alternates nominated by the Root Server Operators (RSOs). The IANA Functions Operator (IFO) and the Root Zone Maintainer (RZM) each appoints one non-voting member. Non-voting inward liaisons are provided by the Internet Architecture Board (IAB) and the ICANN Security and Stability Advisory Committee (SSAC).

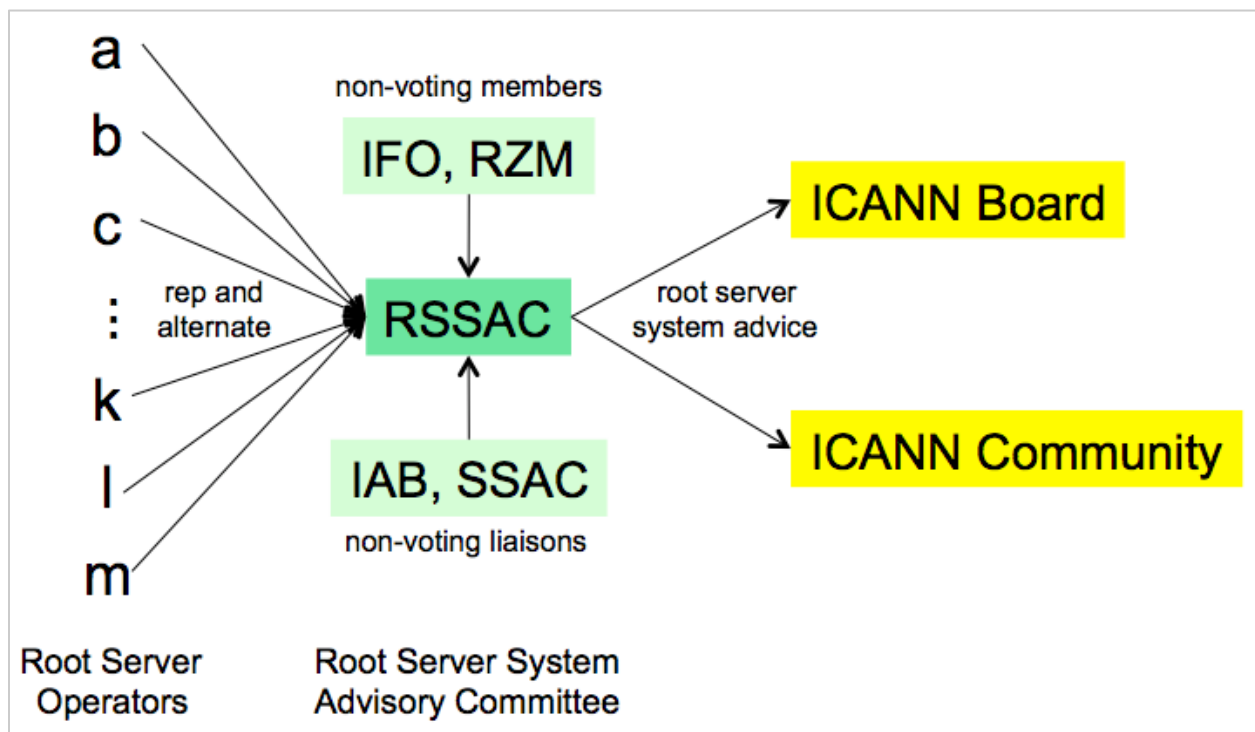


Figure 1 – The Root Server System Advisory Committee

² <https://www.icann.org/resources/pages/governance/bylaws-en/#article12>

I.2 The RSSAC Review

I.2.1 Objectives

Section 4.4 of ICANN's bylaws³ establishes the basic objectives of the periodic organizational review of ICANN's structures and operations:

The Board shall cause a periodic review of the performance and operation of each Supporting Organization, each Supporting Organization Council, each Advisory Committee (other than the Governmental Advisory Committee), and the Nominating Committee (as defined in Section 8.1) by an entity or entities independent of the organization under review. The goal of the review, to be undertaken pursuant to such criteria and standards as the Board shall direct, shall be to determine (i) whether that organization, council or committee 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 that organization, council or committee is accountable to its constituencies, stakeholder groups, organizations and other stakeholders.

The objectives of this review of the RSSAC are specified in the scope of work:⁴

1. **An assessment of the implementation state of RSSAC's prior review.** This includes a status report of the implementations approved by the ICANN Board from the first RSSAC Review, and an assessment of the effectiveness of these implementations.
2. **An assessment of whether RSSAC has a continuing purpose within the ICANN structure.** Examination of RSSAC's chartered purpose, to advise the ICANN community and Board on matters relating to the operation, administration, security, and integrity of the Internet's Root Server System, and how well it is fulfilled, will help assess the RSSAC's continuing purpose within the ICANN structure.
3. **An assessment of how effectively RSSAC fulfills its purpose and whether any change in structure or operations is needed to improve effectiveness,** in accordance with the ICANN-provided objective and quantifiable criteria. The assessment of RSSAC structure and operations may include an assessment of RSSAC's makeup, its current level of participation in, but not limited to, ICANN's specific review team, and cross-community efforts, the RSSAC's representation and effectiveness within ICANN, the effectiveness of its

³ <https://www.icann.org/resources/pages/governance/bylaws-en/#article4>

⁴ <https://www.icann.org/en/system/files/files/rfp-rssac-review-05jun17-en.pdf>

communications (both internal and external towards ICANN and other SO/ACs), and the alignment of its charter with ICANN's mission. Other points to examine include RSSAC's decision-making methodology, transparency, processes, procedures, and competencies.

4. **An assessment of the extent to which RSSAC as a whole is accountable to the wider ICANN community**, its organizations, committees, constituencies, and stakeholder groups to make effective selections. Determine if the RSSAC is sufficiently accountable regarding the operation, administration, security, and integrity of the Internet's Root Server System, according to its chartered mandate.

1.2.2 Methodology

The Interisle review team members attended, as observers, various RSSAC workshops, meetings, and conference calls. The in-person venues included the RSSAC Workshop in Maryland (October 2017), all sessions of the RSSAC meeting held during ICANN60 in Abu Dhabi (October 2017), and the RSSAC Caucus meeting at IETF100 in Singapore (November 2017). The team listened in on most of the RSSAC and RSSAC Administrative Committee conference calls from October 2017 through February 2018.

Interisle conducted interviews with 48 people, both face-to-face at IETF and ICANN meetings and remotely between October 2017 and February 2018. Interisle developed an on-line survey to gather inputs from a broader set of people than could be interviewed; the survey ran from late November 2017 to December 2017. The Interisle team reviewed a variety of relevant documents, including the RSSAC charter, internal RSSAC papers and notes, the RSSAC publications, and other pertinent documentation sources.

The information gathered from these sources was subjected to a structured qualitative analysis, during which we identified key themes and perspectives and developed the salient findings that appear in this report.

1.2.3 Sources

The findings of our independent review are derived from three principal sources:

- Individual interviews with 48 people who represent a variety of perspectives on the RSSAC, including RSSAC representatives, alternates, and liaisons; RSSAC Caucus members; members of ICANN Supporting Organizations and Advisory Committees; the ICANN Board; members of the Root Zone Evolution Review Committee (RZERC), the Internet Architecture Board (IAB) and Internet

Engineering Task Force (IETF), and the DNS Operations, Analysis, and Research Center (DNS-OARC); operators of large DNS resolver systems; ICANN staff; and well-placed observers of the Internet and its governing bodies. Appendix A.1 contains a list of the people we interviewed.

- The responses of 39 people to an on-line survey. Appendix A.2 describes the survey and its results.
- Publicly available documentary materials, including published papers and articles, blog entries, email exchanges, formal and informal presentations, and other reports that discuss the RSSAC and related activities.
- Our own extensive knowledge of ICANN, the RSSAC, and the DNS root server system.

During a multi-stage review of documents, interview transcripts, and other source materials, we identified and evaluated a very large number of individual arguments, statements, and assertions, and distilled those into a set of observations that represent the findings of our review. These observations are based on data extracted from multiple sources, but in some cases a direct quotation⁵ from a particular document, interview, or survey response provides an important illustration of an observation. When we include a quotation from a primary source in this report, we either set it off typographically as a separate paragraph:

This is a direct quotation from a primary source.

...or we include it in-line using “*quotation marks and italics*”.

⁵ In some cases—particularly those involving data from personal interviews—we have edited or paraphrased the direct quotation in order to ensure that the source is not identifiable.

Part II – FINDINGS

Findings are statements that express our reasoned interpretation of the information we collected. They are numbered sequentially and set off typographically as follows:

n Findings are derived from data subjected to collective qualitative analysis and evaluation. As the informative Assessment component of our independent review, they precede and inform our subsequent Recommendations.

This is the second review of the RSSAC, and as such builds on the outcome—findings, recommendations, and implementation—of the previous review. Our objective in presenting the findings of this review, however, is not to produce a simple report card, but to convey to both the RSSAC itself and the wider community the richest possible trove of information. Findings are the result of research and qualitative analysis, not judgement; as such they are the background for and input to the Recommendations that will appear in the Final Report but are not themselves definitive or conclusive.

II.1 Implementation State of Prior Review

The first item in the scope of work for the current review is:

1. An assessment of the implementation state of RSSAC’s prior review. This includes a status report of the implementations approved by the ICANN Board from the first RSSAC Review, and an assessment of the effectiveness of these implementations.

II.1.1 *Timeline*

The first organizational review of the RSSAC was conducted in 2008 and 2009 by the Independent Examiner (IE) Westlake Consulting. The IE’s final report of that review⁶ was published on 9 March 2009. The RSSAC Review Working Group (RWG) considered public comments on the IE’s report, and submitted its final report⁷ to the ICANN Board on 8 June 2010. On 25 January 2011 the Board approved⁸ a set of “implementation

⁶ <https://www.icann.org/en/system/files/files/rssac-review-final-mar09-en.pdf>

⁷ <https://www.icann.org/en/system/files/files/rssac-review-final-report-08jun10-en.pdf>

⁸ https://www.icann.org/resources/board-material/resolutions-2011-01-25-en?routing_type=path#1.j

steps”⁹ based on that report, and in July and August 2012 a working group of the RSSAC and members of the Board’s Structural Improvements Committee (SIC) was formed to draft a revised RSSAC charter. On 11 April 2013 the Board adopted¹⁰ an amendment to ICANN’s bylaws modifying the RSSAC charter¹¹ to reflect the results of the organizational review.

II.1.2 Recommendations

The 2010 RWG report assessed the 8 recommendations from the IE and proposed implementation actions (and actors) for each of them. These are the “implementations approved by the ICANN Board from the first RSSAC Review”, and as such are the focus of our current assessment of the implementation state of that prior review.

The RWG noted that the first 3 recommendations concerned structural changes to the RSSAC that could not be implemented without the consent of the Root Server Operators (RSOs):

- Recommendation 1: That the RSSAC be relaunched as a strategy group, run jointly by ICANN and the Root Server Operators.
- Recommendation 2: That the substance of RSSAC’s ‘Terms of Reference’ as laid out in the Bylaws should be amended to set out the RSSAC’s new purpose [recitation omitted; see Bylaws].
- Recommendation 3: That the RSSAC should initially be reconstituted with a membership of 9, as follows: 4 Root Server Operators, appointed by the operators; 1 appointed by IANA; and 4 appointed by the Board/Nominating Committee of ICANN.

The RWG proposed a dialogue between ICANN and the RSOs “to consider the structural changes suggested”.

The revised charter and new operating procedures that resulted from the proposed dialogue specified a restructuring of the RSSAC that differed from the specifics of Recommendations 1–3 but substantially followed their intent. The notable exception was the omission of Board/Nominating Committee appointments to the RSSAC. We

⁹ <https://www.icann.org/en/system/files/files/rssac-review-implementation-steps-01dec10-en.pdf>

¹⁰ <https://www.icann.org/resources/board-material/resolutions-2013-04-11-en#1.b>

¹¹ <https://www.icann.org/resources/pages/governance/bylaws-en#XI-2>

concluded that the RWG had compelling and well-defended reasons to deviate from these IE recommendations.

The RWG proposed that the RSSAC itself consider Recommendations 4–6, concerning its Chair, liaisons, and meetings, in conjunction with its work on Recommendations 1–3:

- Recommendation 4: That the RSSAC should appoint its Chair from among its members, and that the term of appointment be two years with a limit of three consecutive two-year terms.
- Recommendation 5: That the following non-voting liaison positions be established: outward liaison from the RSSAC to the ICANN Board (as currently exists) and the SSAC; inward liaison to the RSSAC from IETF/IAB and the SSAC.
- Recommendation 6: In relation to the RSSAC’s meetings: that the RSSAC should meet at each ICANN meeting, with provision for it to hold additional meetings in between these; that its sessions be held in public, so that anybody who wishes may attend, but with provision for it to go into closed session for part of a meeting if a majority of the RSSAC members at the meeting believe it appropriate; that all Root Server Operators and members of the ICANN Board be invited to attend meetings and have speaking rights (at the discretion of the Chair who will be responsible for managing the agenda); that other attendees at RSSAC meetings may be granted speaking rights at the discretion of the Chair; and that, in the event that RSSAC went into closed session, subject to the Chair’s discretion in case of exceptional circumstances, the Root Server Operators, any members of the ICANN Board, formally-appointed Liaisons, and technical staff would be invited to join the closed session.

The revised charter and new operating procedures implement Recommendations 4–6 with only minor differences in detail.

The RWG agreed with the IE on their recommendation for additional staff support:

- Recommendation 7: That ICANN nominate two members of staff to support the RSSAC: a Technical Fellow (to do the research and drafting for reports on behalf of the RSSAC, this role to be separate from L-root operations), and Administrative Support (to provide the administrative role necessary for the effective operation of a group of part-time volunteer members).

Staff support has been effectively integrated into the operation of the RSSAC in response to Recommendation 7. Before the first review the RSSAC had consistently declined offers of support as potentially compromising to the independence of the RSOs; that concern appears to have subsided, and our research found widespread

appreciation of the level and quality of staff support. The intent of the Technical Fellow recommendation has been implemented through the RSSAC Caucus.

In their comments on Recommendation 7 the RWG made an additional recommendation for further analysis of the ICANN–RSO relationship:

From a broader perspective, the WG considers that the very coordination of the relation between ICANN and the Root Server Operators deserves further analysis. In general, one remarks that Root Server Operators are committed to serving the data provided to them by IANA, but otherwise they consider themselves to be independent from, and only partially related to ICANN. ICANN currently has two structural relationships with RSSAC: one via IANA, and another one via the ‘L’ Root Server operation. Due to their specific focus and fields of activity, none of these operational relations however represents ICANN as a whole, to the Root Server Operators. The RSSAC review WG recommends that ICANN identify a member of the senior management team with the duty to represent the whole Organization in communications with the RSSAC, particularly with regard to the operational implementation of ICANN policies in the areas of new TLDs (new gTLDs, ccTLDs, and IDN TLDs), and the continued roll-out of DNSSEC and IPv6. This senior contact would then coordinate ICANN interaction with RSSAC, either by direct involvement or through others, including but not necessarily limited to the ‘L’ Root Operator and the IANA staff.¹²

ICANN’s relationship with the RSOs is still almost entirely limited to the involvement of L-root operator and IANA (PTI) staff, with little or none of the senior management coordination envisioned in the RWG’s addendum to Recommendation 7 beyond that provided by the Office of the CTO on technical issues such as the DNSSEC rollout.

The RWG agreed with the IE on their recommendation that ICANN provide travel support for RSSAC members:

- Recommendation 8: That ICANN fund travel and accommodation for RSSAC members to and from ICANN meetings and other relevant technical meetings.

¹² <https://www.icann.org/en/system/files/files/rssac-review-implementation-steps-01dec10-en.pdf>

The RSSAC has accepted travel funding¹³ for its periodic workshops and its meetings at ICANN meetings, overcoming the same concern about compromising RSO independence that delayed acceptance of staff support. Our research found that the availability of travel funding has substantially improved RSSAC member participation in meetings and workshops.

Considering all of the RWG recommendations discussed in this section, we conclude that:

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|--|
| <p>1 The ongoing RSSAC reformation that began in 2013—revised RSSAC charter, new operating procedures, and creation of the RSSAC Caucus—effectively implements the recommendations of the prior review.</p> |
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II.1.3 Outcomes

The prior review recommendations catalyzed substantial reform of the RSSAC in 2013 and 2014. The revised RSSAC charter developed by the 2012 joint working group of RSSAC and SIC members and adopted by the Board in 2013, the creation of the RSSAC Caucus, and the new RSSAC Operational Procedures adopted in 2014 and revised twice since then are the tangible signs of that reformation.

Our research revealed a widespread perception that the RSSAC was organizationally dysfunctional from its creation in 1998 until the reformation prompted by the first review, but that it has improved enormously since then—to the extent that it is reasonable to refer to “pre-reform” and “post-reform” versions of the RSSAC. We recorded almost entirely negative comments about the pre-reform RSSAC, but almost always in the context of positive comments about the effect of the prior review in creating a “better” post-reform committee:

Before the first review RSSAC had no formal procedures for decision making, no formal processes for developing advice to the Board or the ICANN community. After the review the changes brought better focus and attention to structure.

RSSAC seemed to have no purpose and lacked accountability and transparency; stagnant and resistant to change. It now has a sense of purpose and direction, with better focus after the reform.

¹³ We note that some RSSAC member organizations are structurally unable to accept travel (or other) funding from outside sources.

*The improvements that were made after the previous review have resulted in a **much** more functional group in terms of process—real operational procedures now exist—much wider avenues for input (e.g., the RSSAC Caucus), a good set of published documents, and ongoing useful work seems now to be the norm rather than the exception.*

RSSAC wouldn't have evolved without that 2010 review—it didn't go as far as it could have, but it pushed things in the right direction.

Before the review RSSAC was just the poor cousin of the rootops; they met at IETF meetings and mostly ignored ICANN. Now it has completely re-engaged within ICANN to fulfill its mission of advising the ICANN Board and community.

The most widely recognized and cited positive effects of the reformation that followed the prior review can be summarized in the following findings:

2 The operational procedures adopted in 2014 (and revised twice since) have substantially improved the structure and operation of the RSSAC.

3 The addition of staff support and travel funding has increased RSSAC and Caucus work quality and meeting participation.

4 The RSSAC has become more open, transparent, and accessible since the last review.

II.2 Findings of the Current Review

The current review began in October 2017. This section organizes the findings of the review into high-level categories, but in many cases a finding presented in one category will resonate with findings in one or more other categories.

II.2.1 Context

II.2.1.1 Origin

The RSSAC was established in 1998—shortly after the formation of ICANN itself—to satisfy ICANN's obligations under sections II.B(b), V.C.4, and V.C.5 of its Joint Project Agreement (JPA)¹⁴ with the United States Government's Department of Commerce. As

¹⁴ <https://www.icann.org/resources/unthemed-pages/icann-mou-1998-11-25-en>

codified in section VII.3(b) of ICANN's original 6 November 1998 bylaws,¹⁵ the role and scope of the RSSAC were much more limited than the language of the JPA would have suggested:

(b) There shall be a DNS Root Server System Advisory Committee. The initial chairman of the DNS Root Server System Advisory Committee shall be appointed by the Board; subsequent chairs shall be elected by the members of the DNS Root Server System Advisory Committee pursuant to procedures adopted by the members. The responsibility of the Root Server System Advisory Committee shall be to advise the Board about the operation of the root name servers of the domain name system. The Root Server System Advisory Committee should consider and provide advice on the operational requirements of root name servers, including host hardware capacities, operating systems and name server software versions, network connectivity and physical environment. The Root Server System Advisory Committee should examine and advise on the security aspects of the root name server system. Further, the Root Server System Advisory Committee should review the number, location, and distribution of root name servers considering the total system performance, robustness, and reliability.

In particular, the neonatal RSSAC had no role in the actual operation of the root server system; it was chartered to “consider”, “examine”, and “review” in order to “advise”. Operational matters were to remain the responsibility of the root server operators, most of whom had been providing root name resolution service for many years before ICANN was formed.¹⁶

II.2.1.2 The RSSAC and the RSOs

The distinction between the RSSAC and the RSOs is obvious to insiders, but bears repeating: the RSSAC is an advisory committee created by ICANN; the RSOs are independent operators of root servers designated by the Internet Assigned Numbers Authority (IANA)¹⁷ prior to the creation of ICANN. RSSAC members are representatives of the RSO organizations, but the RSSAC is not an “association” of RSOs. The RSOs began meeting as the “root ops” group to discuss operational issues of mutual interest at IETF43 in December 1998 and have continued to do so ever since.

¹⁵ <https://www.icann.org/resources/unthemed-pages/bylaws-1998-11-06-en#VII>

¹⁶ See RSSAC023, “History of the Root Server System” (<https://www.icann.org/en/system/files/files/rssac-023-04nov16-en.pdf>) for a detailed account.

¹⁷ Until his death on 16 October 1998, Jon Postel filled the role of IANA, in which he personally designated operators for all of the root letters except J and L.

The RSSAC’s scope is limited to providing information and advice about the root server system, but because it is the only visible point of contact between ICANN and the RSOs many in the ICANN community imagine that its role is (or should be) much broader. The RSSAC is expected to deal with 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.

5 As the only visible interface between ICANN and the RSOs, the RSSAC is expected to deal with every root service issue that arises within ICANN, whether or not the issue is properly within its scope.

II.2.1.2.1 RSO diversity

RSO diversity¹⁸ is not an accidental artifact of Internet history—it is a fundamental design feature, deliberately encouraged and maintained as the linchpin of a robust and resilient root server system. Our research indicates broad acceptance of the importance of RSO diversity coupled with the realization that this sometimes makes it difficult or time-consuming for the RSSAC to reach consensus.

II.2.1.2.2 RSO independence

As recently as October 2017¹⁹ the RSSAC reiterated its commitment to RSO autonomy, bounded only by established service expectations.²⁰ In addition to the straightforward rationale that independence facilitates an unencumbered focus on the core RSO mission of serving a faithful copy of the root, we found that at least some RSOs harbor a long-standing suspicion of ICANN (and the RSSAC) as a central point of control and capture:

Root ops are concerned that ICANN does not have the best interests of everyone at heart. Having root servers independent is critical—ICANN is corrupt and can’t be trusted.

¹⁸ “Diversity” in this report refers to variation in the way in which different organizations operating in different jurisdictions provide root service in different ways; it is not the diversity of age, nationality, gender, etc. that concerns ICANN in other contexts.

¹⁹ See RSSAC029, “Report from the RSSAC October 2017 Workshop” (<https://www.icann.org/en/system/files/files/rssac-029-28oct17-en.pdf>).

²⁰ See RFC7720, “DNS Root Name Service Protocol and Deployment Requirements” (<https://tools.ietf.org/html/rfc7720>).

RSSAC is an artifact of ICANN's creation, to influence/control the root server operators. RSOs didn't welcome that approach. ICANN offered contracts but all of the RSOs declined. Started with an adversarial relationship and hasn't gotten better.

Our research suggests that the core of the original root server belief system—that RSOs operate under a personal mandate from Jon Postel to faithfully serve the IANA root for the good of the Internet—persists with some members to this day:

Root ops are accountable only to Internet users as a legacy from Jon—they are not accountable to ICANN or to anyone else.

In this context the RSSAC is paradoxically both a statutory part of ICANN and a group with some members who persistently distrust ICANN.²¹ We observed many discussions during which RSSAC members forcefully asserted the root operators' exclusive responsibility for all matters concerning root system operations, pushing back on real or perceived encroachment of the RSSAC (or ICANN) into their territory.

6 The RSSAC's ability to serve as a shared space for RSO–ICANN communication and cooperation is complicated by a persistent legacy of distrust of ICANN by some of its members.

This tension also makes it difficult for the RSSAC to “speak with one voice” when it provides its advice. From a formal perspective RSSAC advice is unambiguously the consensus advice of the RSSAC as an advisory committee. But because the RSSAC is the only visible point of interaction and coordination between ICANN and the root server operators, it is not always clear—particularly to outsiders—what that means:

There's an almost existential uncertainty about who is speaking when RSSAC gives advice—is it RSSAC speaking or the root ops? Who is the target of a question like “Dear RSSAC: What do you think about X?” Who is expected to answer? With what authority is the answer given?

²¹ We note that this distrust is institutional, not personal. Without exception the individual participants in the RSSAC who happen to be ICANN employees are trusted and respected.

The authority with which the RSSAC’s technical advice is received and interpreted by the ICANN Board and community is necessarily linked to its source: the RSO representatives who comprise the RSSAC membership. In this context it can be difficult for outsiders to distinguish “RSSAC advice” from “RSO advice”.

7 Because all of the voting RSSAC members are RSO representatives, outsiders sometimes find it difficult to distinguish “RSSAC advice” from “RSO advice”.

II.2.1.3 The root server system

As its name suggests, the root server system (RSS) comprises those DNS components that *serve the root*—that is, make the contents of the DNS root zone available to the rest of the Internet by responding to queries from DNS resolvers²² about top-level domain names (TLDs). In Figure 2, the RSS is on the “serving” side of the midline:

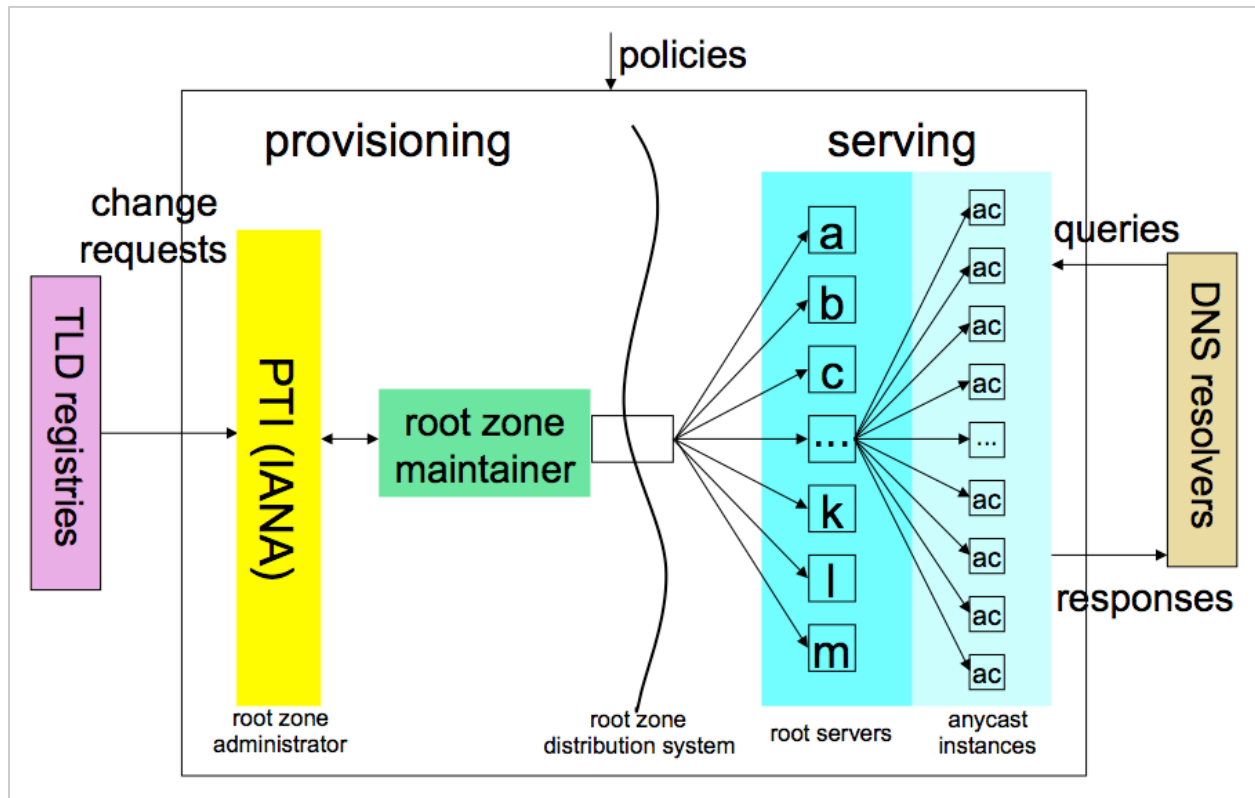


Figure 2 – The Root Zone Management System

²² See RSSAC026, “RSSAC Lexicon” (<https://www.icann.org/en/system/files/files/rssac-026-14mar17-en.pdf>), for definitions of the terms used here and throughout this report.

When the RSOs began deploying anycast instances in the aftermath of a distributed denial-of-service (DDOS) attack in October 2002, they managed them directly. More recently, some RSOs have contracted with other organizations to deploy and operate anycast instances. These third parties are part of the root server system but do not participate in the RSSAC.

8 The root server system has expanded to include non-RSO anycast instance providers, which are not represented in the RSSAC.

Traditionally, and by design, the RSOs serve precisely what they find in the root zone distribution system—they don't interfere in what is there or how it got there. This rigid separation of the provisioning and serving sides of the root registry is typical of DNS registries at other levels. What is not typical is the relationship between the two sides: only in the root registry are the provisioning functions fulfilled by organizations that have no control over the way in which the serving side organizations fulfill theirs.

It's very strange that the manager of the root zone doesn't get to hire the people who serve the zone—he's accountable for service delivery but has no power to ensure it.

As a joint enterprise of ICANN and the RSOs, the RSSAC could—but currently does not—provide this intermediation. But because the RSS *status quo* today is “nothing's broken” we found little enthusiasm for “fixing it”.

II.2.1.4 IANA transition

The 2016 transition²³ of formal ICANN oversight from the U.S. Government to the multistakeholder Empowered Community²⁴ had essentially no effect on the RSS or the RSSAC, which are concerned exclusively with the distribution of the root zone data, not the way in which they are generated.

NTIA was holding up some changes to IANA so it's better now. At least from the outside nothing has changed.

²³ <https://www.icann.org/news/announcement-2016-10-01-en>

²⁴ The shorthand reference is commonly “IANA transition”, although that term oversimplifies the governance changes that actually took place.

Our research did, however, reveal a high-level concern about oversight:

No single entity now has complete oversight of the root server system. NTIA²⁵ had that role (nominally) before the transition; no one has it now. The ICANN Board should not be expected to take on that responsibility.

The NTIA contribution to the RSSAC was not just oversight. NTIA didn't represent "governments", but they were aware of the issues that concern governments, and that perspective is no longer at the table.

II.2.1.5 DNSSEC

Since 15 July 2010 the RSOs have been serving a signed root²⁶ using the DNS Security Extensions (DNSSEC) technology defined by the Internet Engineering Task Force (IETF).²⁷ Because anyone can validate the authenticity of a signed root, anyone—not just the specially-designated root servers—can serve it.²⁸

Our research suggests that a side effect of RSO participation in the RSSAC may be reluctance to embrace the consequences of technical change:

It worries me that RSSAC spends a lot of time and energy justifying and sustaining the centralized mechanism when doing a better job of centralizing is the wrong approach. Really the job should be to decentralize—embrace technical change, even if it puts us out of a job. Becoming part of the ICANN system hasn't helped—no one in the ICANN world thinks about putting themselves out of business.

DNS over UDP from 13 distinct IP addresses is not state of the art—the right way is to add functionality to the resolver software to pull the root zone file from anywhere. ICANN is funding resolver developers (e.g., Unbound²⁹) to add functionality to pull the root from arbitrary places. Why doesn't this come up at (for example) the latest RSSAC workshop? Because RSSAC is about the root server system and not about other ways to distribute and serve the root zone.

²⁵ The National Telecommunications and Information Agency of the U.S. Government's Department of Commerce.

²⁶ <http://www.root-dnssec.org>

²⁷ The basics are specified in RFC 4033 (<https://tools.ietf.org/html/rfc4033>), RFC 4034 (<https://tools.ietf.org/html/rfc4034>), and RFC 4035 (<https://tools.ietf.org/html/rfc4035>).

²⁸ We recognize that this is an oversimplification, which ignores important root service integrity and stability issues beyond authenticity.

²⁹ <https://www.unbound.net>

9 The RSSAC is expected to provide advice that anticipates a wide variety of changes to the root zone distribution model beyond the server-centric *status quo*.

II.2.2 Role

II.2.2.1 Statutory role

According to Section 12.2(c)(i) of the ICANN bylaws,³⁰ the RSSAC's role "is to advise the ICANN community and Board on matters relating to the operation, administration, security, and integrity of the Internet's Root Server System". The charter revision following the last review added additional detail to this remit; the current ICANN bylaws call on the RSSAC to:

- Communicate on matters relating to the operation of the Root Servers and their multiple instances with the Internet technical community and the ICANN community. The RSSAC shall gather and articulate requirements to offer to those engaged in technical revision of the protocols and best common practices related to the operation of DNS servers.
- Communicate on matters relating to the administration of the Root Zone with those who have direct responsibility for that administration. These matters include the processes and procedures for the production of the Root Zone File.
- 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.
- Respond to requests for information or opinions from the Board.
- Report periodically to the Board on its activities.
- Make policy recommendations to the ICANN community and Board.

This expanded list of responsibilities may be understood as the formal or "statutory" role of the RSSAC.

Particularly from people outside of the RSSAC we recorded a broad consensus that the RSSAC is fulfilling its role as an advisory body extremely well, and that it is "the least controversial part of ICANN"; "not broken, so doesn't need fixing"; and "abundantly stable". We found that at this level its role is widely understood and appreciated, and that from many different perspectives the RSSAC is considered to be a well-functioning

³⁰ <https://www.icann.org/resources/pages/governance/bylaws-en/#article12>

communication channel linking the root server system to the ICANN Board and community.

10 The RSSAC is widely considered to be a well-functioning information channel linking the root server system to the ICANN Board and community.

II.2.2.2 Contrarian role

Not everyone accepts the “official” view of the RSSAC as the instantiation of a meaningful relationship between the RSOs and ICANN:

It’s mostly harmless and serves a useful function: a fig leaf on policy-making and compliance with the ICANN bylaws.

The RSSAC is unimportant because it doesn’t really do anything that matters. That stuff goes on in root ops. RSSAC is a convenient fiction—it allows the root ops to pay lip service to ICANN, and it allows ICANN to say that it has an Advisory Committee (with an audit trail for policy making and consultation) which engages with the root system. If anyone conducts a risk analysis on ICANN, there’s a box that can be ticked for root server stuff.

RSSAC members bother with RSSAC only because ICANN bylaws require it. It exists, but everyone is happy for it not to do much. The real work is done in root ops. RSOs wouldn’t notice or care if RSSAC went away.

These viewpoints focus on perceived underlying reasons for the formation and perpetuation of the RSSAC: that it was always intended to be a do-nothing public shield for the root ops, keeping the mainstream away from sensitive operational matters. In this formulation whatever the RSSAC does is irrelevant, because the root ops will decide what to do on their own; and therefore RSO participation in the RSSAC is merely an expensive and inconvenient obligation.

11 Some RSSAC participants and observers view the RSSAC and its statutory role as a facade behind which the real work and decision-making go on elsewhere.

We also found almost precisely the opposite viewpoint among both insiders and outsiders: that the RSSAC, particularly its periodic workshops, provides a valuable opportunity to develop and explore ideas that “could never be done at root ops”.

12 The RSSAC provides a venue for the RSOs to discuss DNS root issues in the “multistakeholder” context of ICANN in addition to the more history-encumbered context of root ops.

Our research suggests that at least some of the more cynical assessments arise from the disdain of some technical operations people for non-technical issues and expertise—in policy, governance, and strategy—or lack of appreciation for the policy development that has been the principal focus of the RSSAC’s work for at least the past two years. In our findings “lack of appreciation” encompasses both ignorance—many people are simply not aware of what the RSSAC is doing unless and until its advice is published—and a sense that much of what the RSSAC is doing is fundamentally misdirected and therefore a waste of time:

RSSAC isn’t thinking strategically about the alternative root service models enabled by (for example) DNSSEC, and is too busy with pretend make-work, like the remove/add/replace function. By going through the motions on such things, RSSAC seems to be active and worthwhile; other parts of the ICANN machinery can then relax because RSSAC is thinking important thoughts, albeit about hypothetical processes that may never be formalized or used. Since nothing is expected to come out of this effort, nobody has to think about what to do about these things if and when RSSAC throws a set of consensus documents over the wall. There’s a collective sense of denial and pretense.

This viewpoint recalls the concerns we reported in section II.2.1.5 about the effect of new technologies such as DNSSEC on the root service model.

13 Some people outside of the RSSAC either don’t know that it’s working on root service evolution and other strategic policy issues or believe that its focus is misdirected.

II.2.2.3 Technology and policy

Our research found that RSSAC insiders tend to think of the RSSAC as a policy body (but not one that should be involved in “politics”), whereas outsiders tend to think of it as a technical body. Insiders were correspondingly more concerned about the mismatch between the RSSAC’s policy role and the mainly technical skill sets contributed to the RSSAC by its RSO members:

The RSSAC is tasked with looking at policy matters—like the add/remove/replace function—but it doesn’t have policy experts.

This mismatch is not always recognized within the RSSAC:

Some RSSAC members have very directed skillsets; some topics require skills that members don’t have. I’ll often say: “I’m not qualified to do this”—others should do that more.

14 The RSSAC’s role is technical policy and advice. It has the technical expertise for this, but maybe not the policy skills.

II.2.2.4 Root service evolution

The evolution of the DNS root service governance framework is an important current work item for the RSSAC, which began at the workshop in October 2016³¹ with the creation of a “50,000-foot apolitical mind map”. Most of the seven principal components identified in the map are concerned with the evolution of the root **server** system—how to define accountability and stakeholders, performance monitoring and measurement, and financial support for RSOs. One of them—the “Strategic, Architectural, and Policy Function”—includes a Strategic and Architectural work stream that considers root **service** system evolution from first principles (*e.g.*, “define and articulate architectural principles which made the root service system a resilient service to date and a set of principles that are worth preserving going forward”) as well as from the standpoint of root server operation (*e.g.*, “develop audit procedures to test a root server’s and a root operator’s readiness for various outage and overload scenarios”).

15 The RSSAC is developing advice and recommendations concerning the future evolution of the root server system.

II.2.2.5 Strategy and architecture

One of the threads within the mind map’s “Strategic, Architectural, and Policy Function” recognizes that future root service scenarios include, but are not limited to, those that are based on the current model of fixed designated root servers. We found that RSSAC discussions of root system evolution tended to alternate between “how should root service be provided?” and “how should RSOs serve the root?” without clear recognition of the difference or explicit context-switching. At a recent meeting the concept paper draft referred to “Root Server Evolution” while the corresponding presentation slides referred to “Root Service Evolution”.

This is not just about consistent use of terminology; it reflects what we found to be a profound conflict in the root evolution discussion being conducted entirely by those

³¹ See RSSAC025, “RSSAC October 2016 Workshop Report” (<https://www.icann.org/en/system/files/files/rssac-025-04nov16-en.pdf>).

who will be directly affected by it. As one participant put it, *“the current RSSAC membership gets to mark its own homework”*.

RSSAC is focusing on addition/removal/replacement of RSOs when it should be looking at changes to the basic root service model. The root system is evolving, and we need to be part of that evolution, not digging our heels in.

16 Because its membership model excludes other participants, the RSSAC discussion of root service evolution is being conducted entirely by RSO representatives who will be directly affected by it.

II.2.2.6 RSSAC and SSAC

The RSSAC and the Security and Stability Advisory Committee (SSAC) are frequently sorted together as the “technical groups” within ICANN—and not just because their acronyms are confusingly similar. Both are engaged in activities that appear closed and esoteric to other ICANN participants; as one of those outsiders put it, *“if I need to know more about what they’re doing then there’s probably something wrong”*.

We found that the role and responsibilities of the RSSAC and the SSAC are not clearly distinguishable even among insiders, and that coordination between the two has been effective primarily because the chairs and liaison have worked well together as individuals:

It’s unclear where the divisions of labor lie between RSSAC and SSAC—the overlap/coordination should be more explicit. Maybe merge them?

For example, the SSAC charter³² includes the following 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.

This overlaps a similar mandate in the RSSAC charter³³ to “[c]ommunicate on matters relating to the operation of the Root Servers and their multiple instances with the

³² [https://www.icann.org/resources/pages/governance/bylaws-en/#article12.2\(b\)](https://www.icann.org/resources/pages/governance/bylaws-en/#article12.2(b))

³³ [https://www.icann.org/resources/pages/governance/bylaws-en/#article12.2\(c\)](https://www.icann.org/resources/pages/governance/bylaws-en/#article12.2(c))

Internet technical community and the ICANN community” and “[e]ngage in ongoing threat assessment and risk analysis of the Root Server System.”

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”³⁴), the RSSAC’s role is often misunderstood as a subset of the SSAC’s.

17 The roles and scopes of the RSSAC and the SSAC partially overlap.

II.2.2.7 RSSAC and ICANN

When we were able to get past the legacy doubts about ICANN’s legitimacy and RSO autonomy, we found a desire on all sides for the RSSAC to play a constructive role in facilitating a coordinated ICANN/RSO response to root server system challenges:

We have trouble talking about what “we” can do, when “we” is two independent parts: RSOs and ICANN. And “we” can’t get together to work out what to do. Why can’t RSSAC do that? I’m concerned (not terrified) that when a quasi-disaster strikes we won’t have a warning—and we’re not ready. How realistic are our predictions of disaster? What are the 12 RSOs doing? Do they have enough bandwidth to serve? Will DDoS shut them down? There’s no uniform view of the dangers we face.

What is the threshold for RSSAC’s advice? Stability threats from IDNs? Other developments? Whose job is it to do that? Who will say that something is a threat to the root system? Even if we all agree on the nature and timing of the threat, we still have to agree on what to do.

18 Other parts of ICANN look to the RSSAC to play its role of “ongoing threat assessment and risk analysis of the Root Server System” more strongly.

We also discovered a sense among people who accepted ICANN’s role in the RSS that RSSAC participation in the wider world of ICANN would be beneficial:

The RSSAC has superb technical expertise that could help ICANN in many ways. For example, SSR2³⁵ needs impartial expert advice on technical matters. RSSAC’s involvement is crucial to SSR2. People will listen if RSSAC speaks, so their participation in a wider range

³⁴ Section 12.2(b) of the ICANN bylaws

(<https://www.icann.org/resources/pages/governance/bylaws-en/#article12>).

³⁵ “SSR2” refers to the second ICANN Security, Stability, and Resiliency of the DNS review

(<https://community.icann.org/display/SSR/SSR2+Review>).

of activities (which they previously may have declined) is appropriate and helpful. Really critical to have the tech experts at the table—policy people may be well-intentioned, but they need the perspective of the tech folks.

RSSAC should get more engaged in what is going on in policy debates elsewhere in ICANN (e.g., the GNSO's³⁶ new gTLD subsequent procedures PDP³⁷)—they should be pro-active about discovering where their advice might be needed and deliberately insert their advice into policy discussions where the people might not even know that what they are talking about involves the operation of the root server system.

19 Other ICANN groups would welcome greater RSSAC involvement in activities beyond the root.

II.2.2.8 Research and measurement

The RSSAC charter includes a mandate to “recommend any necessary audit activity to assess the current status of root servers and the root zone”. Although RSSAC002³⁸ (currently in its third revision) defines a common set of metrics and a standard format for reporting them, researchers find that the RSSAC has largely missed the opportunity to be an effective vehicle for collective RSO transparency with respect to service levels and other fundamental statistics. The data available at root-servers.org are neither complete (with respect to RSSAC002 standards) nor adequate for the purposes of researchers interested in root zone issues such as scaling and name collision.

20 The RSSAC is in a good position to coordinate the gathering and publishing of meaningful data about the root server system.

We also found support for an additional RSSAC role in coordinating funded research on root traffic projects, collaborating with other groups (e.g., ICANN’s Office of the CTO or the DNS Operations, Analysis, and Research Center) to generate the empirical data necessary to inform policy decisions about the evolution of the root.

³⁶ The GNSO is ICANN’s Generic Names Supporting Organization (<https://gns0.icann.org/en>).

³⁷ The Policy Development Process considering the procedures for future rounds of new Generic Top-Level Domain (gTLD) introduction (<https://gns0.icann.org/en/group-activities/active/new-gtld-subsequent-procedures>).

³⁸ “RSSAC Advisory on Measurements of the Root Server System” (<https://www.icann.org/en/system/files/files/rssac-002-measurements-root-06jun16-en.pdf>)

II.2.3 Structure

The RSSAC is an Advisory Committee³⁹ consisting of voting representatives and alternates nominated by the 12 RSO organizations (and confirmed by the ICANN Board); non-voting representatives of the IANA Functions Operator⁴⁰ and the Root Zone Maintainer;⁴¹ and non-voting liaisons from the Internet Architecture Board (IAB)⁴² and the ICANN Security and Stability Advisory Committee (SSAC).⁴³ From among its voting membership the RSSAC also designates outward liaisons to the ICANN Board, the Customer Standing Committee,⁴⁴ and the Root Zone Evolution Review Committee.⁴⁵

II.2.3.1 Current structure

This structure is defined by the Operational Procedures⁴⁶ developed and adopted (and twice revised, most recently on 23 October 2017) by the RSSAC itself. The RSSAC charter does not specify that its voting membership must (or even should) consist of representatives from the 12 current RSO organizations, nor does it specify the representation of other interested parties (either as members or liaisons). The current structure was determined during the reformation of the RSSAC following the last review.

We found broad agreement that the basic structure of the RSSAC is well-suited to the fulfillment of its role, with two potential caveats:

³⁹ From the ICANN Glossary (<https://www.icann.org/resources/glossary>): “An Advisory Committee is a formal advisory body made up of representatives from the Internet community to advise ICANN on a particular issue or policy area. Several are mandated by the ICANN Bylaws and others may be created as needed. Advisory committees have no legal authority to act for ICANN, but report their findings and make recommendations to the ICANN Board.”

⁴⁰ Currently the nonprofit public benefit corporation Public Technical Identifiers (PTI) (<https://pti.icann.org>).

⁴¹ Currently Verisign, Inc. (<https://www.icann.org/en/stewardship-implementation/root-zone-maintainer-agreement-rzma>).

⁴² <https://www.iab.org>

⁴³ <https://www.icann.org/groups/ssac>

⁴⁴ <https://www.icann.org/csc>

⁴⁵ <https://www.icann.org/rzerc>

⁴⁶ RSSAC000v3 (<https://www.icann.org/en/system/files/files/rssac-000-op-procedures-23oct17-en.pdf>)

- The RSSAC enjoys a diverse membership only because of the diversity among the RSOs (and the representatives and alternates they send to the committee):

Fortunate that we have good diversity among the RSOs, but it is not by design—better structure would help to insure this. Diversity is very, very important—has served us well.

- Not all of the parties with a critical interest in the serving side of the root registry have a place at the RSSAC table. The most obvious of these are the non-RSO anycast instance providers, because they participate directly in serving the root; but other groups with a stake in the integrity and quality of root data distribution are also missing:

If RSSAC is just RSOs, it's missing elements. Maybe have more liaisons to the RSSAC from other organizations, because there are more stakeholders than just the two that are currently represented—at least the TLD registry operators, the ccNSO, and public DNS resolver operators.

No consensus currently exists within the RSSAC about who its stakeholders are or should be, so the following finding should not be taken as asserting that the organizations listed are in fact RSSAC stakeholders. That issue will be considered later in this report.

21 The current RSSAC structure works well but leaves out potential stakeholders such as non-RSO anycast instance providers, the TLD registries, the ccNSO, and public DNS resolvers.

II.2.3.2 Future structure

Our research revealed a concern that the RSSAC as currently constituted may not be up to the job of planning for the future—particularly a (widely anticipated) future that does not involve designated root servers:

The current RSS is defined by a high degree of commonality on the mission: to serve a faithful copy of the root zone. That won't be sufficient for the future. New players may have a different view; RSSAC is not in the least prepared for that.

This concern speaks directly to one of the primary questions of this organizational review: does the RSSAC “have a continuing purpose in the ICANN structure?” Although the RSSAC is actively debating the issue of RSS evolution as part of its work on a “DNS root service governance framework” through regular workshops and email

exchanges, the focus has been almost entirely on enhancements to the current RSS model; for example, from the report of the May 2017 workshop:⁴⁷

Workshop participants continued their analysis of the existing RSS by delineating attributes existing both today and potentially in the future, as well as attributes that are held by the RSOs versus external entities.

Given its current structure, it is not surprising that the RSSAC devotes most of its attention to issues that concern the stable and sustainable operation of the existing root server system.

22 The RSSAC has a continuing purpose in the ICANN structure, which may include serving as the focal point for issues of mutual concern to ICANN and the RSOs, such as future operational and funding scenarios for serving the root.

II.2.4 Membership

The operating procedures adopted by the RSSAC in 2014 defined its voting membership to be a representative and an alternate nominated (and then, following its charter, confirmed by the Board) by each of the 12 RSO organizations. The IANA Functions Operator and the Root Zone Maintainer each appoint one non-voting member, and non-voting liaisons are provided by the Internet Architecture Board (IAB) and the Security and Stability Advisory Committee (SSAC).

II.2.4.1 Composition

The current RSSAC membership model was developed during the restructuring of the RSSAC in 2013 and 2014, which also included the creation of the RSSAC Caucus. The thinking at the time was that the RSSAC would be a relatively small group drawn from the RSO organizations, augmented by a relatively large Caucus that would include all of the RSSAC members along with a wide variety of other interested parties. Diversity of perspective would come from the Caucus, allowing the RSSAC itself to remain small and focused.

In this model the RSSAC does not encompass the entire root server system—in particular, on the serving side of the root zone management system⁴⁸ it omits anycast

⁴⁷ RSSAC027, “May 2017 Workshop Report” (<https://www.icann.org/en/system/files/files/rssac-027-16jun17-en.pdf>).

⁴⁸ See Figure 2 in Section II.2.1.3.

providers and resolver operators. By design it also omits others who depend on (rather than participate in) the root server system, such as TLD registries. We found a broad consensus outside of the RSSAC that this model has two shortcomings:

- it denies non-RSO groups with an interest in the root a “place at the table” when issues that potentially affect their interests are being discussed; and
- it denies essential non-RSO skills and perspectives to the RSSAC itself.

Current membership is fine if RSSAC is just an ICANN version of root ops—but if you want it to do policy work, you need representatives with other skills and from other perspectives. Because RSSAC is the policy executive, diversity in the Caucus (which is just manpower for projects decided and directed by others) does not satisfy this requirement.

Obviously, these are “shortcomings” only if their premises are accepted: that non-RSO interests are entitled to a voice in root server discussions, and that the RSSAC needs skills and perspectives that it cannot (realistically) get from RSO organizations. Our research found tacit but unenthusiastic support for the first premise—most of the “disenfranchised” groups believe that they have alternatives for participating in root system debates and activities that do not depend on the RSSAC—and strong support for the second:

Expand the composition of the RSSAC to get a wider set of skills. Bring in fresh blood. Why is it restricted to RSO staff? Add other DNS experts; maybe draft in people from the Caucus. Or maybe NomCom should put people on the RSSAC.

Outside of the RSSAC we found significant skepticism that the RSSAC has the skills it needs to succeed as a policy body, or the “soft skills” essential to enable it to navigate the ICANN community:

RSSAC members think that they’re politicians and diplomats as well as engineers! Many have simply been promoted into management/political roles. Amateur politicians at RSSAC get exposed whenever they meet the professionals.

The people on the RSSAC now who think they are business people, or think they have political and governance skills, are mostly wrong.

| |
|---|
| 23 The current RSSAC membership model excludes non-RSO participants and their different skills and perspectives. |
|---|

Not everyone we talked to agreed with either premise, particularly the interest of non-RSO groups in having a “place at the table”:

An expanded RSSAC might bring in unwelcome visitors—vested interests, not acting in good faith. A danger if you expand beyond the RSOs is that other players (e.g., ISPs) have other avenues for participation in ICANN and they tend to send business people not tech people.

At least the current membership criterion (“RSO rep”) is clear. If you want other voices set up a work party or something—don’t change the RSSAC or Caucus membership criteria. There’s too great a risk that they would lose focus and clarity.

Some of the people we talked to were also concerned about the destabilizing effect of changing the RSSAC membership model:

Bringing outsiders into RSSAC would be difficult—they wouldn’t have the historical perspective, understanding how the RSS works and all the bits fit together. Might be helpful one day, but not now.

And some noted that changing the composition of the RSSAC would be difficult in practice because of the deeply entrenched principle that the RSO organizations have sole authority to determine whom to send to the RSSAC:

The origin and history of the RSSAC have created a charmed circle of insiders that makes it hard for non-insiders to get involved. But the RSSAC is no different in this respect from other ICANN SOs and ACs.

However, even if broader representation of interests and contribution of skills were accepted as desirable objectives, it might not be easy to achieve them:

How do you get people from other realms involved? Most people don’t care about the root servers. Perhaps we should pay for the complementary skills we think we need. You won’t get an accountant interested in root ops!

We also noted the perception of a potential conflict of interest for ICANN in its multiple RSSAC roles: as the sponsoring organization (the RSSAC is an Advisory Committee within ICANN); as an RSO and therefore an RSSAC member; and as the institutional home of the IANA Functions Operator (through PTI).

II.2.4.2 Leadership

A consequence of the RSSAC restructuring prompted by the last review is a leadership model in which two co-chairs share equal responsibility for leading the committee. Our research found evenly divided assessments of this arrangement. On the one hand, “co-chairs have worked really well—whichever is leading us at any given time is leading us”. On the other hand, “it causes confusion—who’s in charge, who’s running the meeting—and it’s

confusing for staff and anyone else who has to figure out who speaks for the RSSAC". But everyone we talked to said that the leadership arrangement that emerged from the restructuring was "better" than before.

24 The leadership changes that followed the 2013-14 RSSAC restructuring substantially improved the management and operation of the committee.

We found a pervasive concern, particularly within the RSSAC, that leadership skills in the group are not widely distributed. Some participants suggested that the RSOs could have done a better job of selecting their principal and alternate representatives: *"the primary should have been an executive (strategic thinking), the secondary a good DNS engineer"*.

Because the co-chairs of the RSSAC are selected from among its voting primary representatives, they are constantly in a conflicted position, obliged to serve as both chair and advocate in many of the committee's deliberations. We found that organizations with more than one RSSAC role—*e.g.*, Verisign as RSO for the A- and J-roots⁴⁹ and also the root zone maintainer; ICANN as RSO for the L-root and also (through PTI) the IANA Functions Operator⁵⁰—had more options for separating the administrative role of chair (for example) from the participant role of RSO representative.

II.2.4.3 Succession

Our research considered both leadership succession and membership succession, and the issues of terms and term limits.

Section 12.2(c)(ii)(A) of the ICANN bylaws⁵¹ establishes the term of RSSAC membership but does not limit the number of terms:

- RSSAC membership appointment shall be for a three-year term, commencing on 1 January and ending the second year thereafter on 31 December. Members may

⁴⁹ We understand and respect the RSSAC decision to deprecate the designation of root server operators by the "letter" of the root they operate but found it difficult to make the point in this paragraph without doing so.

⁵⁰ Because ICANN's RSO and PTI staff are obliged to be neutral and not "make policy" they cannot take any leadership role in RSSAC.

⁵¹ <https://www.icann.org/resources/pages/governance/bylaws-en/#article12>

be re-appointed, and there are no limits to the number of terms the members may serve.

We found that although many people support the principle of membership term limits, they recognize that the RSSAC is constrained by its current membership model:

There are only so many people who work on root operations at the 12 RSOs—that’s a limited pool of volunteers with limited time, and some RSOs don’t have a lot of people to choose from.

25 The traditional rationale for membership term limits—to bring new people with new ideas into an organization—is not directly applicable to the RSSAC, which draws members from a fixed and limited pool of volunteers.

Membership succession faces the additional challenge of volunteer pool demographics: “key people are aging and will retire soon”. We found many people concerned about how to retain essential institutional memory in the RSSAC.

The RSSAC operating procedures⁵² specify both the term and the number of terms for its co-chairs:

- The RSSAC shall elect two Co-Chairs. The term for Co-Chairs shall be two years. A person may only serve for two consecutive terms. The eligibility status for a previous Co-Chair is reset one year after having stepped down.

From an organizational standpoint we found it surprising that the RSSAC has no leadership training or mentoring program, and no documented plan for either membership or leadership succession. Perhaps as a result it has no obvious identifiable candidate pool for leadership roles, including liaison representation to other groups.

26 With no formal provision for identifying or training future leaders, the RSSAC faces difficult issues of succession in all of its leadership roles.

II.2.5 Stakeholders and Accountability

It is important to clearly distinguish issues of “stakeholder” and “accountability” as they apply to the RSSAC (an ICANN advisory committee) and to the RSOs (independent organizations that collaborate to serve the root). We found that in practice

⁵² RSSAC000v3 (<https://www.icann.org/en/system/files/files/rssac-000-op-procedures-23oct17-en.pdf>)

it is difficult to do so. RSSAC members are RSO representatives, and because this creates for many people the (erroneous) impression that the RSSAC is an “association” of the RSOs, the distinction between RSSAC accountability and RSO accountability is often lost.

27 The RSSAC’s stakeholders and accountability are not the same as the RSOs’, but this distinction is not widely recognized within the ICANN community.

II.2.5.1 Stakeholders

There is no consensus inside the RSSAC on who its stakeholders are or should be. The RSSAC has tried hard for a few years to settle this issue, so far without success.

Comments made during our interviews included:

There’s no clarity on who the stakeholders are for RSSAC or each RSO. Who decides?

The ICANN board can be the constituents (stakeholders) of RSSAC.

Interested users should be RSSAC’s stakeholders.

RSSAC’s stakeholders are the IAB and IETF because they are in charge of the DNS protocol and root guidelines.

TLD operators are RSSAC stakeholders.

However there are much deeper problems. The RSSAC hasn’t reached consensus on what the term “stakeholder” means.

There is no agreement in the RSSAC on the definition of “stakeholder”. Some apply a definition of this term which is claimed implies “resolver operators are stakeholders in the root server system, but not the IETF or TLD registries”. Others use an ICANN definition of the term which means that the RSSAC’s stakeholders have to include the IETF/IAB, IANA/PTI, TLD registries, and the ICANN Board as well as ICANN’s Supporting Organizations and Advisory Committees. Yet another view inside the RSSAC is that everyone who uses the Internet is an RSSAC stakeholder. Reconciling these divergent opinions on what is meant by “stakeholder” is clearly a challenging problem for the RSSAC.

Some people [in RSSAC] believe that those with entries in the root zone are the direct customers. Others think that everyone on the planet are the customers. The real answer lies somewhere between those two extremes.

Further complications arise because of the distinctions among the RSSAC, the root server system as a whole, and the individual root server operators (RSOs). Do or should they all have the same stakeholders or not?

These meta-issues have still to be decided. They may well be very difficult because boundaries overlap and/or become blurred and might even conflict. For instance, each RSO might independently arrive at its own view of who its stakeholders are; then have to modify that or compromise if/when the RSOs reach consensus on who their collective stakeholders are for the root server system; and then do all of that again to get a consensus on the RSSAC's stakeholders.

A further meta-issue is the question of who decides what definition of stakeholder is to be used and who those stakeholders actually are. Does the RSSAC decide this for itself? Should their decision go for some sort of public consultation? Could that decision have an impact on either ICANN's bylaws or the RSSAC charter? Would the decision need to be endorsed by the ICANN Board?

28 RSSAC members do not agree on who its stakeholders should be.

It should therefore be unsurprising that the RSSAC deliberations on such a complicated and sensitive topic are taking a long time. An important decision of this nature by the RSSAC will require unanimous consent: *"nothing is decided until everyone agrees"*. With no agreement yet on what "stakeholder" means, determining who are the RSSAC's stakeholders is clearly going to take a long time.

II.2.5.2 Accountability

The RSSAC's difficulties over stakeholders has obvious impacts on questions of accountability. Since it's not clear who the RSSAC's stakeholders are it's not possible to decide who the RSSAC is or should be accountable to or what the RSSAC is or should be accountable for. That in turn makes it impractical to decide how that accountability gets exercised.

Who is in charge? If anything happened to the root server system the arrow of responsibility would point directly at ICANN. Imagine trying to explain the non-governance of the root server system to a Congressional subcommittee. "You [ICANN] let the RSOs run the root but you have no control over them. You should be replaced. Governments can do better than that."

Accountability issues get a lot of attention elsewhere at ICANN. RSSAC is lagging behind other ACs and SOs.

Hardly anyone [outside of the RSSAC] thinks about RSSAC accountability because the root always works.

29 It is not clear for what and to whom the RSSAC should be accountable.

Most RSSAC members who represented RSOs stated they had a duty to the Internet community as a whole and that was their fundamental responsibility. “RSSAC looks out for the whole Internet community”. Representatives from one root server operator said that each RSO would be accountable to its respective organization: *i.e.*, the board and shareholders of Verisign, RIPE NCC’s membership, and so on. An interviewee claimed it was a mistake to think that the RSOs did not have any oversight. One RSO has been subject to oversight by its national telecommunications regulator for some years. Another RSSAC member provided a list of who the RSSAC or the RSOs were in principle accountable to: their respective organizations; the Internet community; the technical community (IETF and IAB); nobody; the ICANN board; and the other RSOs. ICANN and Internet businesses were explicitly omitted from that list.

Questions about service level agreements and reporting for the root server system were fine, but it was not clear whom the RSOs would report to or what the enforcement mechanisms might be. A single reporting body could be a problem and there should be diversity—for instance to accommodate differences in national law and regulation.

One RSSAC member said that although the RSSAC was only accountable to the root server operators, it took its accountability to the ICANN Board as an advisory committee very seriously.

A subtle but important observation was made about what accountability means in the context of an advisory committee:

*The purpose of an advisory committee is to give advice. When people talk about accountability what is it that they want the group to be accountable for? RSSAC is accountable **for** its advice, not **to** someone or something else.*

II.2.6 Openness and Transparency

We found almost universal consensus that the RSSAC is far more closed and opaque than other ICANN groups.

Confidential discussions about the root server system—operational issues, DDoS mitigation, incident handling, *etc.*—do of course occur. These mostly take place at the

private root op meetings, not at the RSSAC. The RSSAC's efforts largely focus on policy matters and advice to the Board, most of which could be done in the open.

30 The RSSAC is widely considered to be a closed and secretive group, less transparent than other ICANN ACs and SOs.

The RSSAC traditionally met in secret and little information was made available about what was happening—although when it was first created, RSSAC meetings were open to anyone, with the caveat that they usually took place at IETF rather than ICANN meetings. Improvements have been made since the previous RSSAC review: minutes and documents are published, the RSSAC meets at ICANN meetings instead of at IETF meetings, and it holds open sessions at ICANN meetings which anyone can attend. One RSSAC member said they could now circulate RSSAC materials within their organization, something that had previously been (thought to be) not permitted.

RSSAC is trying to have more sessions that are open. But it wants a comfortable and secure space without the community observing. Some RSOs are more amenable than others to being open.

One of the flaws is that RSSAC is still a closed shop, highly secretive and discussions within RSSAC are treated as very confidential. I don't see the need for all that secrecy.

Meetings should be open even if others don't show. People complain RSSAC meetings aren't open, but don't show up when they are. They just want to know that they could go to the meeting. And they would [then be able to] know if the meetings were running properly.

The perception that RSSAC is a closed circle has been like that for its whole history.

Of course, the diverse opinions held in the group could be taken out of context or misrepresented by outside observers. The RSSAC might sometimes prefer to have contentious discussions in private before presenting a consensus view to the public: “more transparency could blow up the group”.

RSSAC is not an open process but it would be hard to argue that either the gNSO or the ccNSO operates in a genuinely transparent manner. They have superficial transparency but what you see there does not match how decisions actually get made. A better model might be to allow groups to deliberate in private and then have an opportunity to make the case for their conclusions in public.

The RSSAC's visibility is limited: “If you don't attend ICANN meetings, then you never see RSSAC. Maybe they should have a public meeting or presentation at IETF or DNS-OARC”. Members of the RSSAC are generally not visible at ICANN meetings or widely known

to rest of the attendees. *“RSSAC and its output are mostly seen via the RSSAC chair and its board liaison”.*

To the rest of the community the RSSAC appears closed: *“RSSAC does not consider communication a priority”.* If the RSSAC were to participate in forums such as APRICOT, DNS-OARC, NANOG, or RIPE, it would need help and additional resources.

31 RSSAC visibility at ICANN and in the wider Internet community is poor. Apart from the SSAC, it generally does not interact with other SOs and ACs.

There is broad satisfaction with the RSSAC documents within the technical community who are interested in the root server system. However, some of these are very narrowly focused and are not meant for the general public.

Most of the publications seem to be directed at root server operations and not to the community.

RSSAC advice and recommendations are sometimes unclear and hard for outsiders to understand.

32 The RSSAC’s focus on technical root server issues and deliberate non-participation in other ICANN activities have concentrated its impact on a small audience of DNS experts.

II.2.7 RSSAC Caucus

Following the 2009 Review, the RSSAC Caucus (RC) was formed in 2014. The main objective of the RC is to “define a well-defined pool of motivated experts to whom the RSSAC can turn to for getting work done”.⁵³ In essence, the RSSAC Caucus is a pool of volunteers that the RSSAC can draw upon to help produce documents. Many of the most recent RSSAC publications were developed by the RSSAC Caucus.

Membership in the RC is open to anyone with an interest in the DNS, especially the root server system, who is willing to help produce RSSAC documents. RSSAC members are automatically members of the RSSAC Caucus. The RSSAC periodically issues calls for participation in the caucus. It approves applications to join the RC and generally accepts all approaches made by seriously motivated volunteers. The RSSAC Caucus has around 90 members at present but only 25-30 are actively contributing to its work.

⁵³ <https://www.icann.org/en/system/files/files/rssac-caucus-06may14-en.pdf>

The RSSAC Caucus organizes itself into work parties which produce documents requested by the RSSAC on specific topics; for example, *Best Practices for the Distribution of Anycast Instances of the Root Name Service* and *DNS Packet Sizes*⁵⁴. Each RC work party is assigned a member of the RSSAC as a shepherd who oversees the activity. And in some cases, a member of the RSSAC will lead a work party. The RC aims to hold two physical meetings per year which typically take place during ICANN or IETF meetings. Anyone can attend caucus meetings and minutes of these meetings are published on the ICANN web site.

Our research found general satisfaction from technically-minded sections of the community with both the quality and technical content of the documents produced by the RSSAC Caucus. These have improved their perceptions of the RSSAC. Useful work is being seen to be done, the output is visible, and the documents are appreciated by those interested in the root server system.

Members of the RSSAC and the RSSAC Caucus consider the Caucus to be a success that has improved the RSSAC's profile:

The Caucus has helped RSSAC to be more open.

Addition of the Caucus is a smart move. Better documentation. More transparency. Getting work done.

The Caucus helps RSSAC fulfill its role.

The Caucus seems to make the RSSAC more accessible.

However, the documents are “largely ignored by the rest of the community and, in some cases, appear to get little attention from RSSAC itself”. Another observation was: “[Caucus authored] RSSAC documents are not widely disseminated or considered. They don't penetrate anywhere in ICANN—unlike SSAC documents. Caucus output is mostly for the attention of a small group and often seems like research notes”. It's not clear if anyone cares about whether or not Caucus deliverables have tangible outcomes. “It's just more window-dressing to keep everyone happy”. Caucus members are unsure what impact their output has at the RSSAC and get little feedback. “Caucus members feel like indentured servants”.

The Caucus is passive, relying on guidance and direction from the RSSAC which does not appear to take a hands-on approach. Despite being members of the Caucus, RSSAC members are rarely active in the Caucus beyond the recently introduced shepherd role

⁵⁴ <https://www.icann.org/resources/pages/rssac-caucus-work-parties-2017-06-20-en>

in work parties: “RSSAC members don’t really engage in Caucus activities” and “RSSAC provides little direction to the Caucus”. Some RSSAC members agree with these opinions.

33 RSSAC members don’t engage effectively in Caucus activities.

The roles of the Caucus and the RSSAC and the boundaries between them are unclear, even to some members of both committees. Processes for managing the documents and work flow between the Caucus and the RSSAC could be better: “Caucus provides; RSSAC decides. Stuff should come from Caucus for ratification by RSSAC” and “the default assumption is RSSAC will accept advice from the Caucus. RSSAC should be free to decline Caucus advice but they have to explain why”.

34 The roles of the RSSAC and the Caucus, and the boundaries between them, are not clear.

Work in the Caucus is sometimes confused or allowed to drift.

The Caucus’s work program is somewhat vague, and things could be clearer about who is doing what, when deliverables are due, etc.

It’s unclear what the Caucus’ priorities are or who is driving things.

The Caucus has not been very effective in getting work done; they are volunteers with day jobs.

New members are unsure how to join and participate in work parties. An informal 2016 survey of the RSSAC Caucus membership found that they did not know how the work of the Caucus influences the RSSAC.

35 The work of the Caucus is not well defined and lacks oversight from the RSSAC.

There was widespread concern about the size and composition of the RSSAC Caucus:

The barrier to entry is too low and nobody’s ever asked to leave.

I didn’t expect the Caucus would be so big or as “busy” making work for itself.

This low barrier to entry means “there’s no sense of mutual shared purpose or that the Caucus is anything special”.

The RSSAC is supposed to review the composition of the RSSAC Caucus and add or remove members once a quarter. This does not appear to happen. The RSSAC and

RSSAC Caucus leaderships seem either to be too busy to expend effort pruning the Caucus membership or are content with the *status quo*.

Even with just 25-30 active members, the RSSAC Caucus is thought to be too big and hard to manage. Support from ICANN Staff is an issue too: *“The RSSAC Caucus is largely an afterthought for ICANN staff resourcing, almost all of which is focused on RSSAC”*.

Many concerns were expressed about the motivations of some Caucus members. A large majority just observe and don't actively participate. Membership in the RSSAC Caucus seems to get exploited by some for personal vanity: padding their CV or enjoying a higher community profile. *“Everyone who joins a work party gets credit even if they didn't contribute to document production”*. Others are believed to see the Caucus as a potential pathway to RSSAC membership or even becoming a Root Server Operator.

36 The RSSAC is not acting to remove inactive or ineffective RSSAC Caucus members.

Among the active RSSAC Caucus members, skillsets are somewhat narrow and largely limited to DNS protocol expertise. There is little participation from anycast providers or operators of DNS resolver services. Operational DNS expertise in the Caucus is mostly provided by the root server operators who inherit Caucus membership because of their membership in the RSSAC. Some survey responses and interviewees suggested that the RSSAC Caucus might benefit from an even more diverse membership, for instance by adding policy, legal, or finance experts whenever these areas have an impact on the root server system.

Caucus membership includes business as well as technical expertise. But it's still a club for techies.

37 Caucus skillsets are narrowly focused on DNS protocol expertise.

RSSAC approval of Caucus membership may be a problem even though no applications to join the Caucus have been known to be declined. The RSSAC's notional control of the Caucus could be acting as a deterrent which limits the pool of volunteers. One Caucus member thought their application wouldn't have been accepted if they weren't already known to the RSSAC.

38 The RSSAC has *de facto* control of the Caucus because it decides who gets to join (and who must leave).

II.2.8 RSSAC and RZERC

The Root Zone Evolution Review Committee (RZERC) was formed in 2016 as a result of the IANA Stewardship Transition. The committee considers 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. The RZERC is expected to make recommendations related to those changes for consideration by the ICANN Board.⁵⁵ The channel for RZERC–Board communication is unclear and it is generally assumed that this would be carried out by the Board member who serves on the RZERC.

The RZERC has nine members. At the time of writing, five of them are also members of the RSSAC.

We found mixed perceptions of the RZERC and its relationship to the RSSAC.

One interviewee stated:

RZERC fills a long-unmet need. Until RZERC was created there were no fora or procedures for making changes to the root other than routine add/remove/update modifications to TLD delegations. (Or a mechanism for asking why those fora or processes did not exist.) Adding AAAA records for the root servers took years even though all of them had live IPv6 addresses. An ad-hoc group had to be formed to advise the ICANN Board on how to get the root zone signed. A body like RZERC, if it had existed at the time, would have been the obvious place to consider such issues.

Some RSSAC members are unsure of the scope of the RZERC. They consider that the role and purpose of the RZERC lacks clarity and might overlap with the RSSAC's responsibilities. One member suggested that the two committees could be merged. Although other RSSAC members felt that the roles of both committees are clear, oversight of some aspects of the Root Server System seemed to sit between the RZERC and the RSSAC. For others, the separation in roles is obvious: "RZERC is responsible for the provisioning side of the root zone registry and RSSAC handles the publication side".

These differences of opinion might be explained in part by the overlap in membership of both committees. RSSAC members serving on the RZERC could be more familiar with its scope and function than their colleagues. Since the RZERC is a recent creation

⁵⁵ <https://www.icann.org/en/system/files/files/revised-rzerc-charter-08aug16-en.pdf>

which has not been tested yet, it is understandable that there would be a degree of uncertainty about how it will interact with the RSSAC in practice.

39 The RSSAC and RZERC charters distinguish their roles and scopes, but it is not yet clear how those distinctions will be recognized in practice.

For those outside the RSSAC and the RZERC, the distinction between the committees and their respective responsibilities is vague. This view was particularly common in those who responded to the survey. Few of them could explain the RZERC's role and many seem to have simply cut and pasted their answers verbatim from the RZERC's home page⁵⁶. However, some survey responses indicated that although the roles of the RSSAC and the RZERC appeared clear to insiders, they were not well understood by the rest of the community.

Interviewees from other stakeholder groups also thought the boundaries between the RSSAC and the RZERC were not clear enough. Overlaps seemed likely and would best be dealt with on a case-by-case basis rather than through a fixed set of rules. There was also a concern 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. A small number of interviewees said they had no visibility of the RZERC to date and that this did not matter to them: in short, *"no news is good news"*.

Although there was a general consensus from survey responses and interviews that an overlap in the membership of the RZERC and the RSSAC was healthy and desirable, that overlap should not extend into the role and responsibilities of both committees.

II.2.9 RSSAC Relationships

Views on the RSSAC's relationship with the Board are generally positive and the overall perception is that the Board is happy with the RSSAC: *"the relationship is healthy"* and *"reporting from RSSAC to the Board is considered satisfactory (unlike other ACs and SOs)"*. Recent changes to the RSSAC leadership have helped. There have only been a small number of questions from the Board and these were *"clear and well scoped"*. The Board-RSSAC Liaison is working particularly well: *"the RSSAC-Board liaison channel isn't broken so don't fix it"*.

⁵⁶ <https://www.icann.org/rzerc>

40 The relationship between the Board and the RSSAC is good, and the Liaison is a critical part of that.

The RSSAC engagement with the SSAC has improved in recent years and works well. *“Liaison relationship and interactions seem good; hard to see how to improve on existing arrangement”*. There used to be lots of comments at the SSAC about *“why is RSSAC taking so long?”*. Even so, *“SSAC is trying to help by offloading idiot stuff from RSSAC”*. Although the division of work between the two ACs is sometimes unclear there has been *“good cooperation once RSSAC sorted itself out”*. The Liaison role from the SSAC is effective. Many members of the SSAC are also members of the RSSAC Caucus and this also helps the flow of information. However, *“SSAC has a liaison to RSSAC but not the other way”*.

41 The RSSAC’s relationship with the SSAC has improved and is working well.

The RSSAC’s interactions with other groups, inside and outside of ICANN, are not so good:

Most RSSAC members do not believe that they have an obligation to play the part of a good ICANN AC and participate in the business of other SOs and ACs that does not concern them as RSOs.

RSSAC hasn’t thought through what their presence ought to be at ICANN. GAC does and knows what happens to its output—people pay attention to GAC communiques. SSAC invests a lot into its docs and advisories. Tries to get recommendations activated, escalates if not. SSAC’s presence is intentional—aimed at the Board. GAC and SSAC are most effective on the Board. RSSAC’s impact seems accidental or just coincidental.

RSSAC does not encourage a collegial atmosphere with other groups. A Liaison from RSSAC to wherever does not substitute for interaction.

Friendly interaction with SSAC, not so much with other parts of ICANN. RSSAC and other ACs/SOs mostly ignore each other.

There has been no engagement with the ccNSO. Whenever the ccNSO has raised issues—getting anycast root servers, placement of anycast server instances, IANA support for newer crypto algorithms, etc.—the RSSAC did not appear to listen. The ccNSO has no regular contact with the RSSAC and it is not clear how both groups should or could interact with each other directly. Communications have to filter up and down via the Board.

Interactions between the RSSAC and the IAB are *“sporadic and satisfactory when the need arises for them to talk to each other”*.

Many survey responses and interview comments suggested that the RSSAC could engage more with the other parts of ICANN, for instance by appointing Liaisons or providing regular briefings whenever these ACs and SOs meet. These “motherhood and apple pie” suggestions are probably impractical and may not have any actual value. They seem to be expressing a wish rather than an actual need. After all, almost no-one shows up whenever the RSSAC has an open session at an ICANN meeting. If members of these ACs and SOs have genuine or important concerns, they have either not made use of these open RSSAC sessions or been unaware of them.

42 The RSSAC does not manage its relationships within ICANN with the same deliberate intent as other SOs and ACs.

Institutional memories inside the RSSAC and maintenance of the trusted, stable relationships among the RSSAC members depend on continuity of ICANN Staff support. This will gradually become more important as the older members of the RSSAC begin to retire.

Appendix A – Sources

A.1 Personal interviews

We conducted individual interviews with the following 48 people. Most of the interviews lasted for one hour, either in person or by telephone. Everyone interviewed was informed of, and agreed to, the following privacy policy: “the fact that the interview took place with a named person will be public and published in our report, but none of the information gathered during the course of the interview will be attributed to a particular individual”.

For each person interviewed, the list below shows the perspective(s) from which the person was asked to comment on the RSSAC.

| Name | Relevant Perspective |
|-------------------|---|
| Joe Abley | SSAC, RSSAC Caucus |
| Fred Baker | Internet Systems Consortium (F-root representative) |
| kc claffy | SSAC, Center for Applied Internet Data Analysis |
| Mark Carvell | Outgoing GAC vice-chair |
| David Conrad | ICANN CTO |
| John Crain | ICANN (L-root alternate) |
| Steve Crocker | Outgoing ICANN Board Chair |
| Kim Davies | RSSAC Caucus, PTI representative to the RZERC |
| Paul Diaz | GNSO Registry Stakeholder Group / RySG |
| Patrik Fältström | Outgoing SSAC Chair |
| Elise Gerich | Past IANA Functions Operator representative. RSSAC Caucus |
| Cathy Handley | ARIN, past NTIA contracting officer |
| Ted Hardie | IAB Chair |
| Ashley Heineman | Past NTIA liaison, RSSAC Caucus |
| Hiro Hotta | WIDE Project (M-root alternate) |
| Geoff Huston | SSAC, RSSAC Caucus, APNIC |
| Kevin Jones | NASA (E-root representative) |
| Daniel Karrenberg | RIPE NCC (K-root representative) |
| Howard Kash | US Army Research Laboratory (H-root representative) |
| Peter Koch | ccNSO representative to the RZERC |

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| | |
|--------------------|---|
| Mark Kusters | RSSAC Caucus, ARIN |
| Warren Kumari | RSSAC Caucus, SSAC, Technical Experts Group |
| Cheryl Langdon-Orr | ALAC |
| Lars-Johan Liman | Netnod (I-root representative), past RSSAC co-chair, RSSAC liaison to the Customer Standing Committee |
| Terry Manderson | ICANN (L-root representative) |
| Bill Manning | Past B-root representative, RSSAC Caucus |
| George Michaelson | RSSAC Caucus, APNIC |
| Ram Mohan | SSAC liaison to the ICANN Board |
| Russ Mundy | SSAC liaison to the RSSAC, SSAC representative to the RZERC |
| Jun Murai | WIDE Project (M-root representative), founding RSSAC chair |
| Jeff Osborn | Internet Systems Consortium (F-root alternate) |
| Kaveh Ranjbar | RIPE NCC (K-root alternate), RSSAC liaison to the ICANN Board, Board representative to the RZERC |
| Carlos Reyes | ICANN staff |
| George Sadowsky | ICANN Board |
| Naela Sarras | IANA Functions Operator representative |
| Katrina Sasaki | ccNSO Council chair |
| Steve Sheng | ICANN staff |
| Tripti Sinha | University of Maryland (D-root representative), RSSAC co-chair |
| Gerry Sneeringer | University of Maryland (D-root alternate) |
| Ryan Stephenson | US Department of Defense (G-root alternate) |
| Andrew Sullivan | Past IAB Chair |
| Ondřej Surý | RSSAC caucus, DNS-OARC vice-chair |
| Tapani Tarvainen | Outgoing GNSO Non Commercial Stakeholder Group / NCSG Chair |
| David Trout | DNS-OARC, Comcast |
| Brad Verd | Verisign (A/J-root representative), RSSAC co-chair, RSSAC representative to the RZERC |
| Paul Vixie | Cogent (C-root representative) |
| Duane Wessels | RSSAC Root Zone Maintainer representative, DNS-OARC chair, Root Zone Maintainer representative to the RZERC |
| Suzanne Woolf | University of Southern California (B-root alternate), past RSSAC liaison to the ICANN Board |

A.2 Survey

The RSSAC survey was intended to solicit opinions about the RSSAC from a broader group of people than could be interviewed in depth. ICANN advertised the existence of the RSSAC survey in communications with the community. Additionally, ICANN specifically followed up with individuals on the RSSAC Caucus to elicit their responses to the survey.

The RSSAC survey⁵⁷ was open between 27 November and 20 December 2017. The RSSAC survey was implemented using LimeSurvey.

39 people completed the survey. A further 35 people accessed the survey without answering the questions (“kicking the tires”).

The survey questions were organized into five separate groups of related questions

- Knowledge – of ICANN and RSSAC
- Role and Composition – of RSSAC
- Communication – between RSSAC and both the Board and other groups
- RSSAC Caucus and RZERC – about the RSSAC Caucus and the Root Zone Evolution Review Committee
- Previous RSSAC Organizational Review – about the previous review of RSSAC

A.2.1 Survey Questions

Some questions were only asked if the answer to one of the preceding questions showed that the subsequent question had any meaning.

A couple of questions (marked with “*”) required answers; the majority of questions were optional.

Questions are shown with numbers here, though those numbers were not displayed on the survey itself.

Questions that elicited free-form text answers are shown here with _____.

⁵⁷ Although no longer available, the RSSAC survey URL was:
<https://rssac2017.limequery.net/168544>

For questions that have a scale (typically 1..5) the range of choices was described below the question.

A.2.1.1 Introduction

Welcome to the ICANN Root Server System Advisory Committee (RSSAC) Organizational Review Survey!

The RSSAC Organizational Review is an assessment of:

- whether the RSSAC has a continuing purpose within the ICANN structure;
- how effectively the RSSAC fulfills its purpose, and whether any change in structure or operations would improve its effectiveness; and
- the extent to which the RSSAC as a whole is accountable to the wider ICANN community, its organizations, committees, constituencies, and stakeholder groups.

This Survey is intended to provide information that the Independent Examiner (Interisle Consulting Group) will use to perform the assessment. Your responses will not be seen by anyone else. At the end of the survey we will give you the opportunity to send us additional comments by email.

There are 31 questions in this survey

A.2.1.2 Knowledge

A series of questions about your knowledge of ICANN and its Root Server System Advisory Committee (RSSAC)

Q1 – How knowledgeable are you about ICANN? *

1 = not at all ... 5 = very knowledgeable

Q2 – How many ICANN meetings have you attended?

None; 1; 2-10; 11-20; More than 20

Q3 – Do you identify with a particular constituency?

ASO - Address Supporting Organization

ALAC - At-Large Advisory Committee

ccNSO - Country Code Names Supporting Organization

GNSO - Generic Names Supporting Organization

GDD - Global Domains Division

GAC - Governmental Advisory Committee

ICANN Staff

IETF

Internet Society

NomCom - Nominating Committee

NRO - Number Resource Organization

RIR - Regional Internet Registry

RSSAC - Root Server System Advisory Committee

RSSAC Caucus

SSAC - Security and Stability Advisory Committee

Other _____

Q4 – How knowledgeable are you about the RSSAC and its role? *

1 = not at all ... 5 = very knowledgeable

Q5 – What do you think the RSSAC is doing?

Q6 – What do you think the RSSAC should be doing?

Q7 – Have you read any of the RSSAC Publications?

All/most of them; Some of them; 1 or 2 of them; None of them; I did not know about them

The RSSAC Publications can be found at

<https://www.icann.org/groups/rssac/documents>

Q8 – Any comments on the RSSAC publications?

A.2.1.3 Role and Composition

A series of questions about the role and composition of the RSSAC

Q9 – The RSSAC was established to provide advice to the ICANN Board and Community about the root server system of the DNS. How well do you think the RSSAC is fulfilling this role?

1 = poorly ... 5 = very well

Q10 – Why?

Q11 – The RSSAC membership consists of representatives from the 12 root server operators and liaisons from the IANA Functions Operator, the Root Zone Maintainer, the Internet Architecture Board, and the Security and Stability Advisory Committee. Does this membership give the RSSAC

everything it needs to fulfill its role?

Yes; No

Q12 – What changes would improve the RSSAC’s ability to fulfill its role?

Q13 – Do you think that the RSSAC has or should have an obligation to anyone other than the ICANN Board and Community?

Yes; No

Q14 – What other obligations does (or should) the RSSAC have?

A.2.1.4 Communication

A series of questions about the way in which the RSSAC communicates with the ICANN Board and other groups

Q15 – How well does the RSSAC’s advice satisfy the needs of the ICANN Board?

1 = not well at all ... 5 = very well

Q16 – Do you have any comments on the RSSAC’s advice to the ICANN Board?

Q17 – How well does the RSSAC’s advice satisfy the needs of the ICANN Community?

1 = not well at all ... 5 = very well

Q18 – Do you have any comments on the RSSAC’s advice to the ICANN community?

Q19 – How well does the RSSAC interact with other ICANN Supporting Organizations and Advisory Committees?

1 = not well at all ... 5 = very well

Q20 – What could RSSAC do better in its interactions with other ICANN Supporting Organizations and Advisory Committees?

A.2.1.5 RSSAC Caucus and RZERC

A series of questions about the RSSAC Caucus and about the Root Zone Evolution Review Committee (RZERC)

Q21 – How knowledgeable are you about the RSSAC Caucus and its role?

1 = not at all ... 4 = very knowledgeable, 5 = RSSAC Caucus member

Q22 – How well does the RSSAC Caucus contribute to the work of the RSSAC?

1 = not at all well ... 5 = very well

Q23 – How could the RSSAC Caucus contribute better to the work of RSSAC?

Q24 – Do you have any comments on the RSSAC Caucus’s membership or processes?

Q25 – How knowledgeable are you about the Root Zone Evolution Review Committee (RZERC) and its role?

1 = not at all ... 4 = very knowledgeable, 5 = RZERC member

Q26 – How well are the roles of the RZERC and the RSSAC defined and distinguished?

1 = not at all well ... 5 = very well

Q27 – How could the roles of the RZERC and the RSSAC better be defined and distinguished?

A.2.1.6 Previous RSSAC Organizational Review

A series of questions about the first review of the RSSAC in 2009

Q28 – How familiar are you with the results of the previous RSSAC Organizational Review?

1 = not at all ... 5 = very familiar

Q29 – How familiar are you with the changes to the RSSAC that have been made since the previous RSSAC Organizational Review?

1 = not at all ... 5 = very familiar

Q30 – Have those changes improved the RSSAC’s ability to fulfill its role?

1 = not at all ... 5 = significantly

Q31 – Why?

A.2.1.7 After Completing the Survey

Thank you for completing the RSSAC Review Survey!

The RSSAC Review independent examiner (Interisle Consulting Group) is interested in comments from anyone who has information or observations to contribute concerning any aspect of the role, structure, or operation of the ICANN RSSAC.

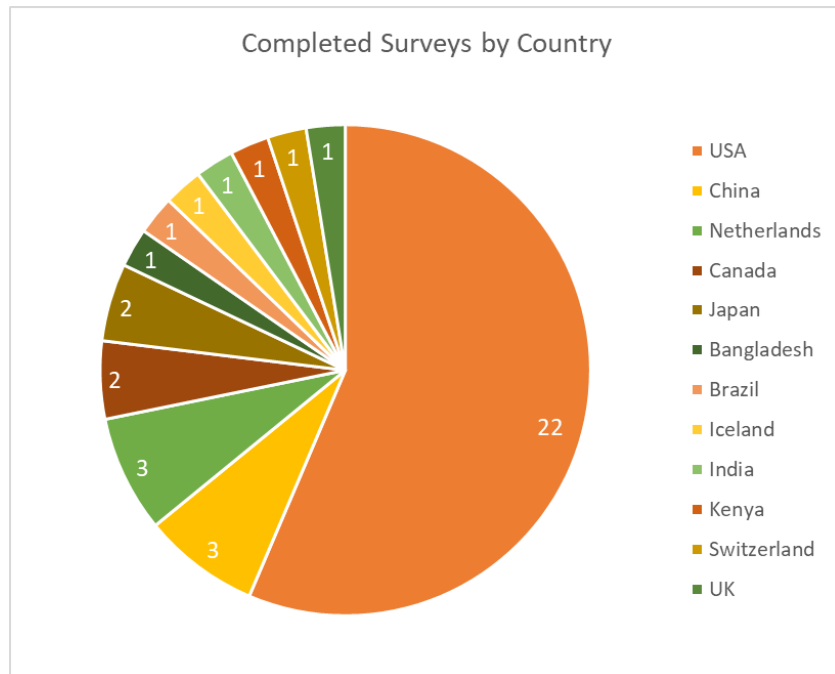
Comments should be sent no later than 20 December 2017 to rssacreview@interisle.net.

All comments must include the submitter's name and affiliation, but we will not reveal this information to anyone outside of the review team, and it will not appear in any report or other output of our review, without the explicit consent of the submitter.

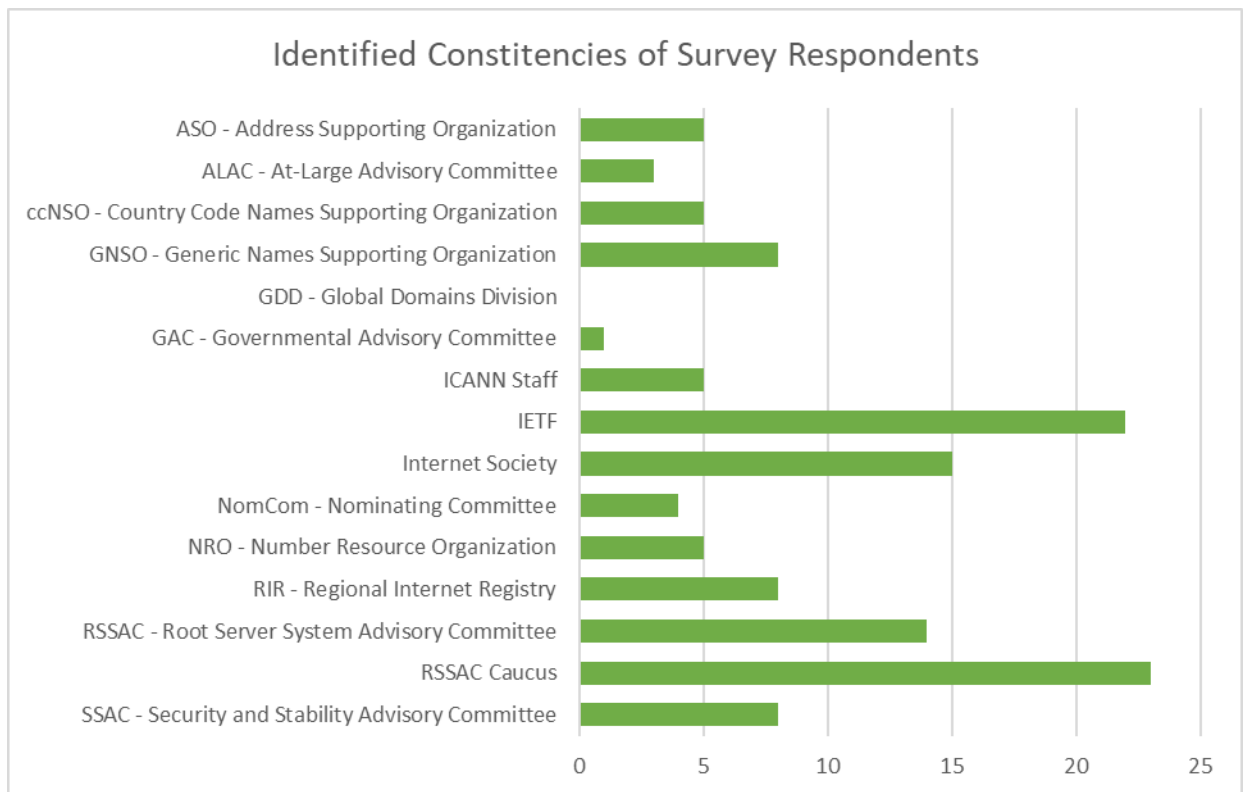
A.2.2 Who Responded

Survey respondents came from 12 different countries (based on the respondents' IP addresses):

| Country | Completed Surveys |
|-------------|-------------------|
| USA | 22 |
| China | 3 |
| Netherlands | 3 |
| Canada | 2 |
| Japan | 2 |
| Bangladesh | 1 |
| Brazil | 1 |
| Iceland | 1 |
| India | 1 |
| Kenya | 1 |
| Switzerland | 1 |
| UK | 1 |
| Total: | 39 |



In “Q3 – Do you identify with a particular constituency?”, the following numbers of responses to each option were:



Answers given under “Other” were:

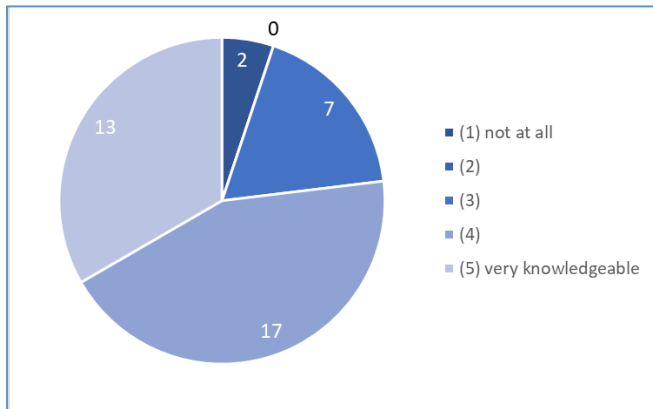
- Global Internet Community
- Centr.org
- onboarding pilot Program
- Root Server Operator
- IGF youth
- ISPC

A.2.3 Survey Responses

The following shows the responses to questions of a yes/no type or a 1..5 scale.

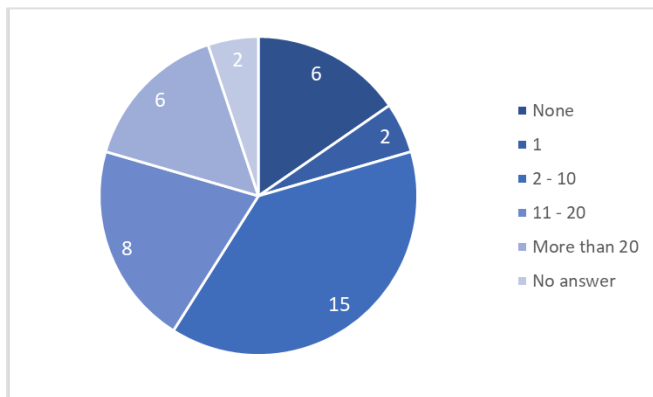
A.2.3.1 Knowledge

Q1 – How knowledgeable are you about ICANN?



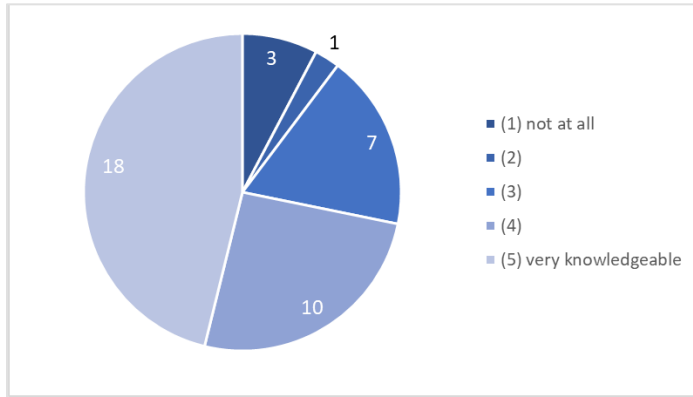
| | |
|------------------------|-----------|
| (1) not at all | 2 |
| (2) | 0 |
| (3) | 7 |
| (4) | 17 |
| (5) very knowledgeable | 13 |
| Total: | 39 |

Q2 – How many ICANN meetings have you attended?



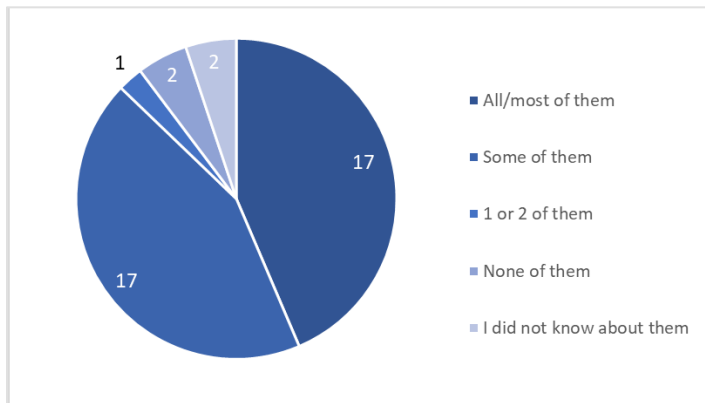
| | |
|---------------|-----------|
| None | 6 |
| 1 | 2 |
| 2 – 10 | 15 |
| 11 – 20 | 8 |
| More than 20 | 6 |
| No answer | 2 |
| Total: | 39 |

Q4 – How knowledgeable are you about the RSSAC and its role?



| | |
|------------------------|-----------|
| (1) not at all | 3 |
| (2) | 1 |
| (3) | 7 |
| (4) | 10 |
| (5) very knowledgeable | 18 |
| Total: | 39 |

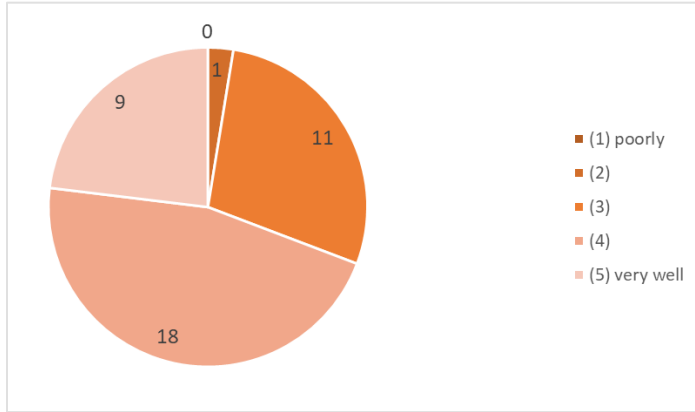
Q7 – Have you read any of the RSSAC Publications?



| | |
|---------------------------|-----------|
| All/most of them | 17 |
| Some of them | 17 |
| 1 or 2 of them | 1 |
| None of them | 2 |
| I did not know about them | 2 |
| Total: | 39 |

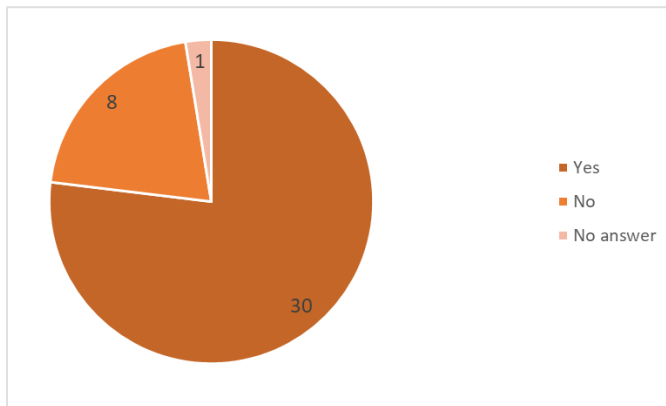
A.2.3.2 Role and Composition

Q9 – The RSSAC was established to provide advice to the ICANN Board and Community about the root server system of the DNS. How well do you think the RSSAC is fulfilling this role?



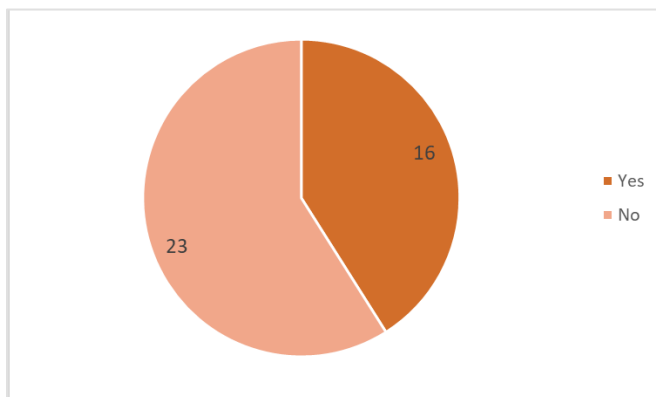
| | |
|---------------|-----------|
| (1) poorly | 0 |
| (2) | 1 |
| (3) | 11 |
| (4) | 18 |
| (5) very well | 9 |
| Total: | 39 |

Q11 – The RSSAC membership consists of representatives from the 12 root server operators and liaisons from the IANA Functions Operator, the Root Zone Maintainer, the Internet Architecture Board, and the Security and Stability Advisory Committee. Does this membership give the RSSAC everything it needs to fulfill its role?



| | |
|---------------|-----------|
| Yes | 30 |
| No | 8 |
| No answer | 1 |
| Total: | 39 |

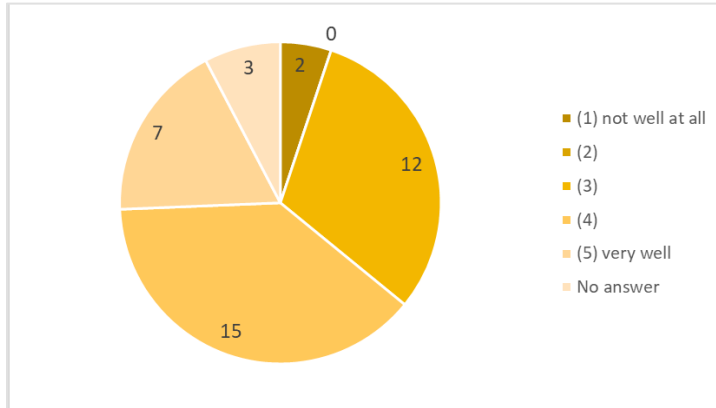
Q13 – Do you think that the RSSAC has or should have an obligation to anyone other than the ICANN Board and Community?



| | |
|---------------|-----------|
| Yes | 16 |
| No | 23 |
| Total: | 39 |

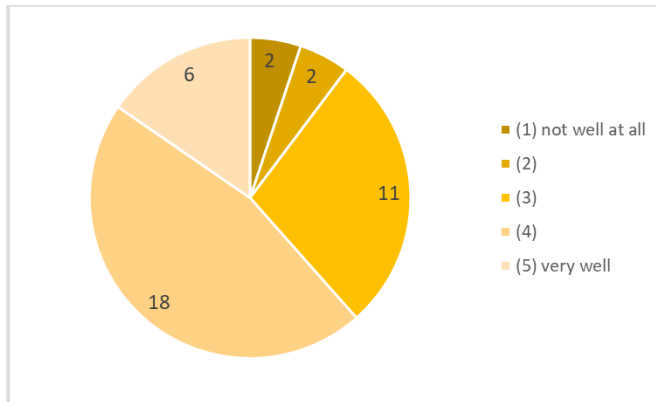
A.2.3.3 Communication

Q15 – How well does the RSSAC’s advice satisfy the needs of the ICANN Board?



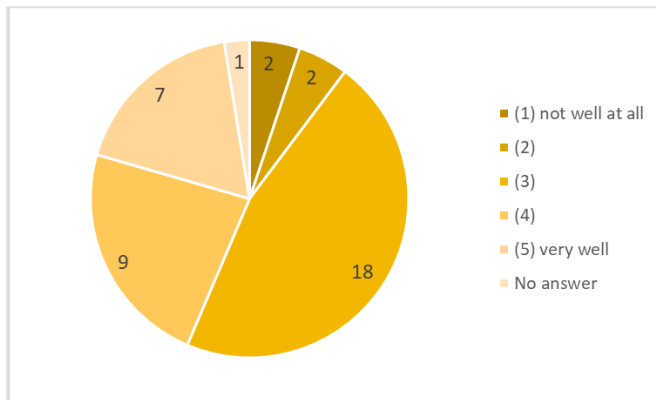
| | |
|---------------------|-----------|
| (1) not well at all | 2 |
| (2) | 0 |
| (3) | 12 |
| (4) | 15 |
| (5) very well | 7 |
| No answer | 3 |
| Total: | 39 |

Q17 – How well does the RSSAC’s advice satisfy the needs of the ICANN Community?



| | |
|---------------------|-----------|
| (1) not well at all | 2 |
| (2) | 2 |
| (3) | 11 |
| (4) | 18 |
| (5) very well | 6 |
| Total: | 39 |

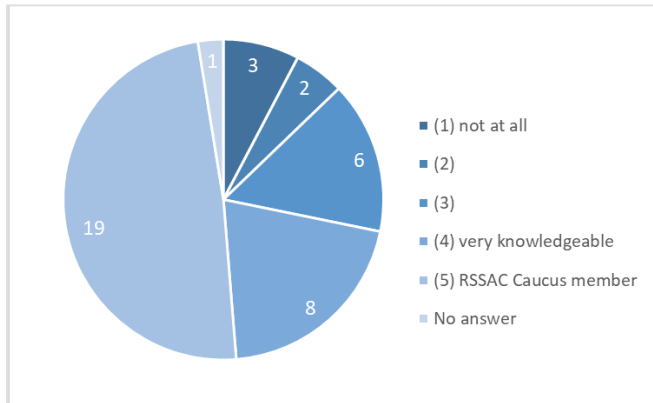
Q19 – How well does the RSSAC interact with other ICANN Supporting Organizations and Advisory Committees?



| | |
|---------------------|-----------|
| (1) not well at all | 2 |
| (2) | 2 |
| (3) | 18 |
| (4) | 9 |
| (5) very well | 7 |
| No answer | 1 |
| Total: | 39 |

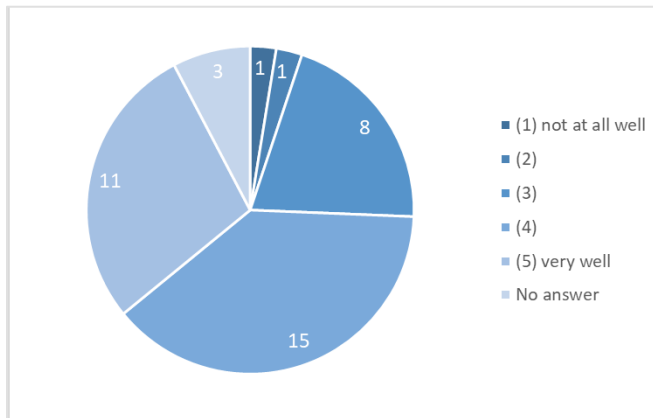
A.2.3.4 RSSAC Caucus and RZERC

Q21 – How knowledgeable are you about the RSSAC Caucus and its role?



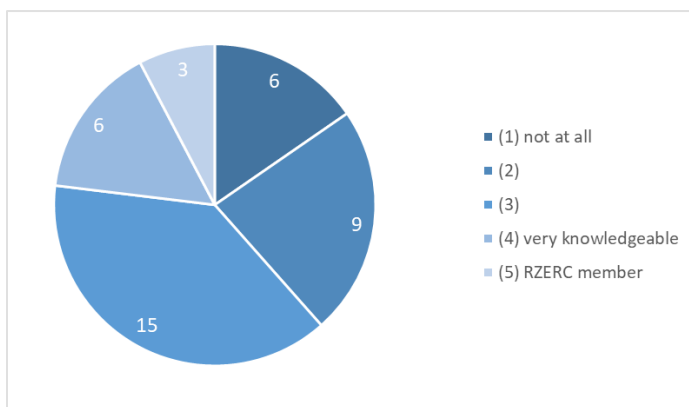
| | |
|-------------------------|-----------|
| (1) not at all | 3 |
| (2) | 2 |
| (3) | 6 |
| (4) very knowledgeable | 8 |
| (5) RSSAC Caucus member | 19 |
| No answer | 1 |
| Total: | 39 |

Q22 – How well does the RSSAC Caucus contribute to the work of the RSSAC?



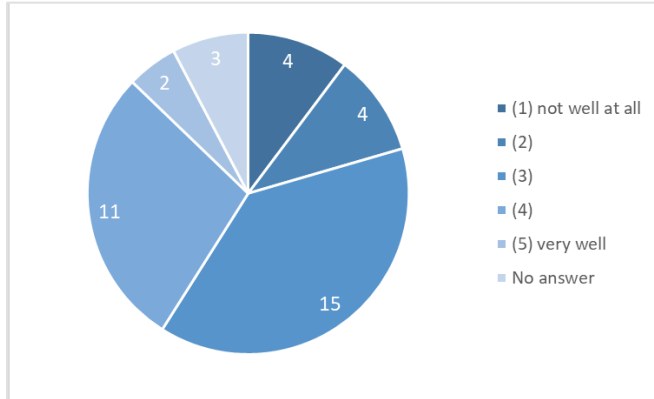
| | |
|---------------------|-----------|
| (1) not at all well | 1 |
| (2) | 1 |
| (3) | 8 |
| (4) | 15 |
| (5) very well | 11 |
| No answer | 3 |
| Total: | 39 |

Q25 – How knowledgeable are you about the Root Zone Evolution Review Committee (RZERC) and its role?



| | |
|------------------------|-----------|
| (1) not at all | 6 |
| (2) | 9 |
| (3) | 15 |
| (4) very knowledgeable | 6 |
| (5) RZERC member | 3 |
| Total: | 39 |

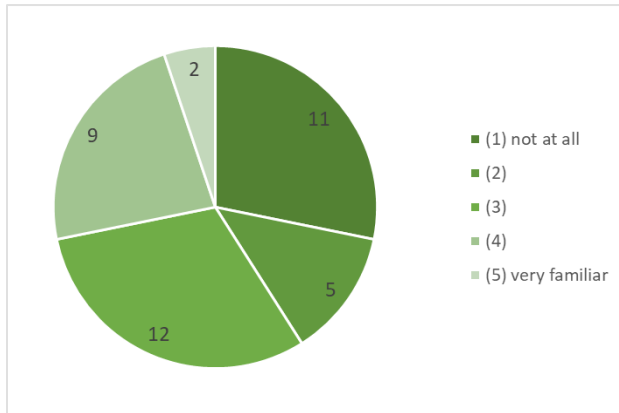
Q26 – How well are the roles of the RZERC and the RSSAC defined and distinguished?



| | |
|---------------------|-----------|
| (1) not well at all | 4 |
| (2) | 4 |
| (3) | 15 |
| (4) | 11 |
| (5) very well | 2 |
| No answer | 3 |
| Total: | 39 |

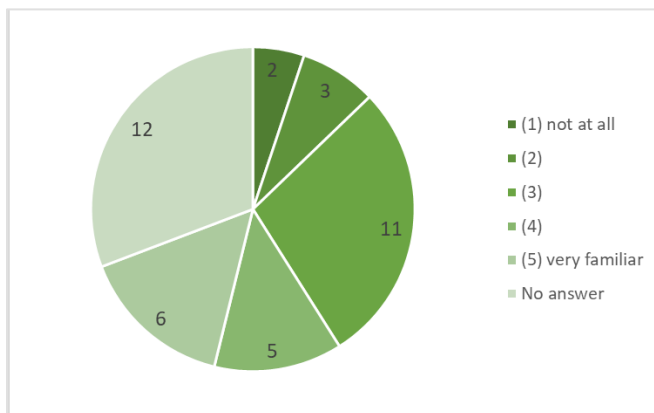
A.2.3.5 Previous RSSAC Organizational Review

Q28 – How familiar are you with the results of the previous RSSAC Organizational Review?



| | |
|-------------------|-----------|
| (1) not at all | 11 |
| (2) | 5 |
| (3) | 12 |
| (4) | 9 |
| (5) very familiar | 2 |
| Total: | 39 |

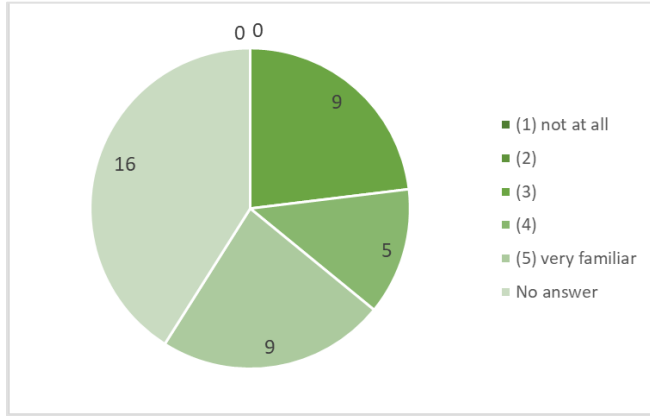
Q29 – How familiar are you with the changes to the RSSAC that have been made since the previous RSSAC Organizational Review?



| | |
|-------------------|-----------|
| (1) not at all | 2 |
| (2) | 3 |
| (3) | 11 |
| (4) | 5 |
| (5) very familiar | 6 |
| No answer | 12 |
| Total: | 39 |

Q30 – Have those changes improved the RSSAC's ability to fulfill its role?

ICANN Root Server System Advisory Committee Assessment



| | |
|-------------------|-----------|
| (1) not at all | 0 |
| (2) | 0 |
| (3) | 9 |
| (4) | 5 |
| (5) very familiar | 9 |
| No answer | 16 |
| Total: | 39 |