

ARIN Staff Report on IRR Consultation

Executive Summary

Over the last several years, ARIN has received multiple ARIN Consultation and Suggestion Process (ACSP) requests and fielded many customer complaints about our existing Internet Routing Registry (IRR). Last year, a community consultation was issued to gauge community interest for ARIN to take on the project of improving this service. The consensus response was that the community would like ARIN to:

- Improve the validity of the IRR data
- Work with the other RIR's on authorization schemes
- Provide appropriate proxy registration services
- Integrate/validate with the registration database
- Cross reference RPKI work where appropriate

To accomplish these goals, we anticipate that this work effort will involve a fair bit of community involvement (both RIR, IETF, and operational groups such as NANOG and RIPE) in order to create the appropriate incremental upgrades to the IRR. This process will include the development of new standards, incremental development to those standards, and finally delivering a production IRR system that follows the standards.

Details

In response to multiple ACSPs regarding IRR route validation, ARIN opened a public consultation on March 17. This consultation was extended on April 15 and closed on April 24. This consultation was opened because the issues around IRR route validation are complex, and implementation was anticipated to exceed the cost of most ACSP implementations.

Within the consultation, the ARIN community was asked three questions:

- Should ARIN begin a new project to enable IRR route object validation to the ARIN registry database?
- If yes, should this effort be coordinated with other RIRs to help facilitate cross-registry authentication?
- If yes, should this effort also support third party IRR route object authentication?

The consultation also contained the following advisory regarding the possible implementation of IRR route validation by ARIN: "If this consultation results in support for moving forward in this area of work, it will be taken under advisement by the ARIN Board of Trustees for consideration as a new area of priority by the ARIN organization. If approved, ARIN staff would participate in community-driven initiatives in this area, and using information gathered from these initiatives and this consultation, produce a specific proposal to move forward."

There were eighteen individual participants in the consultation. Thirteen were in favor of ARIN creating a more robust IRR, two were against (although one recanted privately to the CTO on their objection of using ARIN's IRR on the arin-consult list), and three were unclear in their support or opposition.

Nine participants expressed support for efforts to facilitate inter-RIR authentication, and eight participants expressed support for 3rd party or proxy registrations for authentication of route objects.

Two participants suggested ARIN provide facilities for authentication/authorization or delegation to IRRs not operated by an RIR.

Several participants had concerns regarding the implementation of an ARIN-validated IRR. Three noted ARIN's past experience with the implementation and cost of RPKI with respect to both community adoption and opportunity-cost. And one participant expressed concerns for contractual obligations that ARIN may place on resource holders provisioning information in a validated IRR.

Implementation Experience Regarding ARIN's Current IRR

ARIN initially setup an a RIPE-based IRR years ago. Over the years, we upgraded it based on ACSP suggestions; IPv6 support was implemented in December 2009, and PGP with additional notifications was released in September 2011. In both of these releases we replicated the original approach of using the RIPE database software system with loose coupling to our mainline ARIN Online system. These upgrades did allow for additional functionality, but it came at a very substantial cost of time and unanticipated functionality issues related to the upgrades.

When we undertook these upgrades, we chose to continue the separation in the hopes of doing minimal environmental changes to ARIN's infrastructure to add the suggested improvements. However, the RIPE Perl codebase was not modularized, was environment-specific to RIPE, and consequently was not tuned well to work in ARIN's environment. This meant that in each case, we had to pull down the latest release from RIPE, adopt the correct environment for their software to work, make changes to it to allow functionality that we support, rip out dependencies to resource checks that would not exist in our system, and add dependency links to our system. This was a very labor-intensive process and it took a lot of engineering time to make the system work.

We also encountered significant issues in each upgrade from RIPE because of innate differences our database structures. RIPE had two systems – one being a front-end database and the other being a back-end database. RIPE staff had to manually synchronize these two systems. At ARIN, we have just one system that is placed behind the firewall and replicated out to the publically available ARIN slaves when changes are made. The RIPE community required that many features were removed from their replication schemes for privacy purposes. This meant that for RIPE, personally identified information (PII) could be seen on the master but not the slaves. Given that ARIN's publically available interface is a slave, the output available to the community was not the same as our internal master, and resulted in creating confusion for ARIN IRR users.

ARIN Registration Services Department also has challenges providing customer support to IRR users. Common problems include:

- Maintainers not being notified upon changes
- Cryptic responses to pgp-validation errors
- General lack of customer support features

ARIN spent considerable engineering time in the hopes that code re-use would save time and money. Unfortunately, this was not the case, and the result was an awkward, difficult-to-operate, and user-unfriendly system.

It should also be noted that the current ARIN IRR code-base is no longer supported or maintained by the RIPE NCC. The RIPE NCC has since completely rewritten their IRR software.

ARIN's Proposed Way Forward

Given the past experience with reusing code for IRR software, ARIN staff proposes a “ground-up” implementation of a validated IRR that will better integrate with ARIN’s current web portal, provisioning system, and other registry functions. This path forward will be multi-pronged and multi-phased and will rely on community-defined specifications and global RIR community consensus.

This approach will allow ARIN to field a routing registry incrementally, providing utility to the community much sooner than a “big-bang” release, and it will provide the community an opportunity to provide feedback with respect to features and cost as the project progresses.

- 1) *Produce a Simplified Profile of RPSL*: Most of the complexity of RPSL comes from features rarely used in routing registries. To reduce the implementation costs around data modeling and parsing of complex RPSL structures, ARIN will work to identify the most commonly used features of the language. This will be performed by a small working group of participants, mainly within the ARIN region, and ARIN staff.
- 2) *Schedule Frequent Deployments*: ARIN will adopt “continuous deployment” strategies to allow for more frequent deployments, and minimizing downtime and outages. This will allow the community to use new features of the IRR as they are developed. All ARIN systems will benefit from this improvement.
- 3) *Collaborate on Cross-RIR Authentication*: ARIN will work with the other RIRs via our existing Engineering Coordination Group (ECG) to create an appropriate mechanism for authentication and authorization of routing registry objects for which the resources cross regional boundaries.
- 4) *Develop a Proxy Registration Scheme*: ARIN’s reverse DNS system utilizes a hierarchical authorization scheme called Shared Authority. Using this feature as a starting point, ARIN will create a small working group to tackle proxy registration issues with the IRR.

- 5) *Cooperate on Standards and Best Practices:* Where applicable and appropriate, ARIN will work with the IETF and the other RIRs on standards and best practices.
- 6) *Develop a migration plan:* ARIN will develop a plan to move relevant parts of the existing IRR into the new system.

We do feel that this effort, once deployed, will help solve the secure routing problem that exists on the Internet today. The proposed, new ARIN IRR will provide a path beyond the existing RPKI framework to allow ISPs to more adequately protect their networks.