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Use Cases for Localized Versions of the RPKI
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Abstract

There are a number of critical circumstances where a localized routing domain needs to augment or modify its view of the Global RPKI. This document attempts to outline a few of them.

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1. Introduction

Today RPKI-based Origin Validation, [RFC6811], relies on widespread deployment of the Global Resource Public Key Infrastructure (RPKI), [RFC6480]. In the future, RPKI-based Path Validation, [I-D.ietf-sidr-bgpsec-overview], will be even more reliant on the Global RPKI.

But there are critical circumstances in which a local, clearly-scoped, administrative and/or routing domain will want to augment and/or modify their internal view of the Global RPKI.

This document attempts to lay out a few of those use cases. It is not intended to be authoritative, complete, or to become a standard. It merely tries to lay out a few critical examples to help frame the issues.

2. Suggested Reading

It is assumed that the reader understands the RPKI, see [RFC6480], the RPKI Repository Structure, see [RFC6481], Route Origin Authorizations (ROAs), see [RFC6482], and GhostBusters Records, see [RFC6493].

3. What is 'Local'

The RPKI is a distributed database containing certificates, CRLs, manifests, ROAs, and GhostBusters Records as described in [RFC6481].

Policies and considerations for RPKI object generation and maintenance are discussed elsewhere.

Like the DNS, the Global RPKI tries to present a single global view, although only a loosely consistent view, depending on timing,

updating, fetching, etc. There is no 'fix' for this, it is not broken, it is the nature of distributed data with distributed caches.

There are critical uses of the RPKI where a local administrative and/or routing domain, e.g. an end-user site, a particular ISP or content provider, an organization, a geo-political region, ... may wish to have a specialized view of the RPKI.

For the purposes of this exploration, we refer to this localized view as a 'Local Trust Anchor', mostly for historical reasons, but also because implementation would likely require the local distribution of one or more specialized trust anchors, [RFC6481].

4. Example Uses

We explore this space using three examples.

Carol, a resource holder (LIR, PI holder, ...), operates outside of the country in which her RIR is based. Someone convinces the RIR's local court to force the RIR to remove or modify some or all of Carol's certificates, ROAs, etc. or the resources they represent, and the operational community wants to retain the ability to route to Carol's network(s). There is need for some channel through which operators can exchange local trust, command, and data collections necessary to propagate patches local to all their RPKI views.

Bob has a multi-AS network under his administration and some of those ASs use private ([RFC1918]) or 'borrowed' address space which is not announced on the global Internet (not to condone borrowing), and he wishes to certify them for use in his internal routing.

Alice is responsible for the trusted routing for a large organization, commercial or geo-political, in which management requests routing engineering to redirect their competitors' prefixes to socially acceptable data. Alice is responsible for making the CA hierarchy have validated certificates for those redirected resources

as well as the rest of the Internet.

5. Some Approaches

In these examples, it is ultimately the ROAs, not the certificates, which one wants to modify or replace. But one probably can not simply create new ROAs as one does not have the private keys needed to sign them. Hence it is likely that one has to also do something about the [RFC6480] certificates.

The goal is to modify, create, and/or replace ROAs and GhostBuster Records which are needed to present the localized view of the RPKI data.

One wants to reproduce only as much of the Global RPKI as needed. Replicating more than is needed would amplify tracking and maintenance.

One can not reissue down from the root trust anchor at the IANA or from the RIRs' certificates because one does not have the private keys required. So one has to create a new trust anchor which, for ease of use, will contain the new/modified certificates and ROAs as well as the unmodified remainder of the Global RPKI.

Because Alice, Bob, and Carol want to be able to archive, reproduce, and send to other operators the data necessary to reproduce their modified view of the global RPKI, there will need to be a formally defined set of data which is input to a well-defined process to take an existing Global RPKI tree and produce the desired modified re-anchored tree.

It is possible that an operator may need to accept and process modification data from more than one source. Hence there is a need to merge modification 'recipes'.

6. Security Considerations

Though the above use cases are all constrained to local contexts, they violate the model of a single global PKI, albeit to meet real

operational needs. Hence they MUST be implemented to assure the local constraint.

Authentication of modification 'recipes' will be needed.

7. IANA Considerations

This document has no IANA Considerations.

8. Acknowledgments

The author thanks Chris Morrow, Karen Seo, Rob Austein, and Steve Kent for comments and suggestions.

9. References

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