Enabling Operational Use of RPKI via Internet Routing Registries

Merit Network, Inc.
Dr. Joe Adams

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Agenda

- Introduction
- Technical Approach
- Timeline & Deliverables
- Technology Transition Plan
Team Profile

About Merit

Shared Services  Cybersecurity

Internet

Infrastructure as a Service

Other Research & Education Networks

Horizontal Collaboration

OARnet  NYSERNet  WiscNet

Vertical Collaboration

University  Community College  K-12

Internet²

Professional Development

9/13/2013  CYBER SECURITY DIVISION 2013 PRINCIPAL INVESTIGATORS' MEETING
Customer Need

- Advertised routes are currently held in Internet Routing Repositories (IRR).
  - The Internet has had several incidents due to the lack of security in its Border Gateway routing protocol (BGP)
  - Large scale incidents include the “AS7007” incident of 1997 and Pakistani Youtube hijack of 2008
  - Ongoing smaller scale incidents observed on a daily basis
- Resource Public Key Infrastructure (RPKI) is an initiative to make internet routing more secure through establishing trustworthy repositories of internet route advertisements.
- Applying trust to the IRR system is a natural fit to spread the adoption of RPKI to the broader Internet community.
Approach

- Existing Internet BGP Routing protocol **lacks basic security**
- We propose an **incremental** approach to improve and secure Internet routing configurations
- Rather than modifying protocols, we propose **automating** the generation of BGP filters which are supported by **existing** router capabilities
Technical Approach

- Extend the Routing Policy Specification Language to include RPKI attributes.
- Establish and operate a public RPKI validation cache.
- Modify registry software to allow searching on RPKI attributes.
- Augment existing tool sets to use the RPKI information being distributed via the IRRs.
The Internet Engineering Task Force has been working on improving Internet Routing Security through the Secure Inter-Domain Routing Working Group.

The working group has produced a base standard for securing routing called Resource Public Key Infrastructure (RPKI).

Our approach is to modify existing databases (Internet Routing Registries) and tools to enable the use of this standard with existing toolsets employed by Internet Service Providers (ISPs).
Augment existing Routing Registry data with RPKI data to **validate** the information.

Update existing tools such as IRRToolSet to use this validation information when automating the generation of BGP filters.

Increase utilization of the tools by increasing the **confidence** in the information and also making the tools **easier** to use.
Benefits

- The benefit of this approach is that it requires minimal modifications to existing tools.
- It enables rapid deployment as it does not require the wholesale replacement of tools and potential hardware/firmware upgrades to routers.
- It increases ISPs’ confidence as it does not require deployment of modifications which have seen limited testing in the real world.
Benefits

- The IRR system and the Routing Assets Database (RADb) are used by the network operational community for routing policy specification and route configuration generation.
- Allows for an easy to use mechanism to disseminate RPKI object information to large numbers of users via a familiar interface.
- Integration of RPKI with default RADb configuration supports rapid adoption by the Internet community.
- Creates production quality stable and supported validation cache as a community resource to support ongoing deployment and adoption of RPKI.
Current Status

- 1 year funded effort for software development
- 4 deliverables:
  - Extend RPSL for RPKI (mo 1 - 3)
  - Create public validation cache (mo 4 - 6)
  - Add RPKI searching to IRRD (mo 7 - 10)
  - Augment IRR tool sets to use RPKI attributes (mo 11 - 12)
Next Steps

- RADb is already operational
- Establish a more trusted validation cache
- Move toward broader use of RPKI attributes
- Integrating RPKI attributes with commonly used tool sets
Contact Information

Dr. Joe Adams
Vice President of Research &
Cyber Security
Merit Network, Inc.
wjadams@merit.edu
(734) 527 - 6966

Larry Blunk
Senior Research Engineer
Merit Network, Inc.
ljb@merit.edu
(734) 527 - 5725
Title: Enabling Operational Use of RPKI via Internet Routing Registries

Operational Capability
Overall Performance Target:
To enable the operational use of RPKI via Internet Routing Registries enhancing the security posture of the DHS and the Internet as a whole

Benefits of RPKI Integration with the IRR System
- The IRR system and RADB are used by the network operational community for routing policy specification and route configuration generation
- Allows for an easy to use mechanism to disseminate RPKI object information to large numbers of users via a familiar interface
- Integration of RPKI with default RADB configuration supports rapid adoption by the Internet community
- Creates production quality stable and supported validation cache as a community resource to support ongoing deployment and adoption of RPKI

Technical Approach
Leverage the operational reach of the Routing Assets Database (RADB) to promote adoption of RPKI on a large scale
- Develop RPSL extensions in the form of additional route attributes such as roa-valid or roa-uri that link the IRR with the RPKI architecture
- Operate a production public RPKI validation cache as part of RADB
- Develop and demonstrate RPKI support in IRR tools commonly used by the Internet community
- Implement changes to IRRD software that forms the basis of the IRR system to implement support for RPKI validation lookups and responses to route queries

Schedule, Costs, Deliverables, & Contact Info:
Proposal Type: Type III
Duration: 1 Oct 2012 – 30 Sep 2013

Technical POC
Dr. Joe Adams
1000 Oakbrook Dr., Suite 200
Ann Arbor, MI 48104
(743) 527-6966
wjadams@merit.edu

Deliverables & Schedule
- Develop RPSL extensions for RPKI (mo 1 - 3)
- Build/Operate Public Validation Cache (mo 4 - 6)
- RPKI Support in RRD (mo 7 - 10)
- Add RPKI Support to IRR Tools (mo 11 – 12)