Enabling Operational Use of RPKI via Internet Routing Registries

Merit Network, Inc.
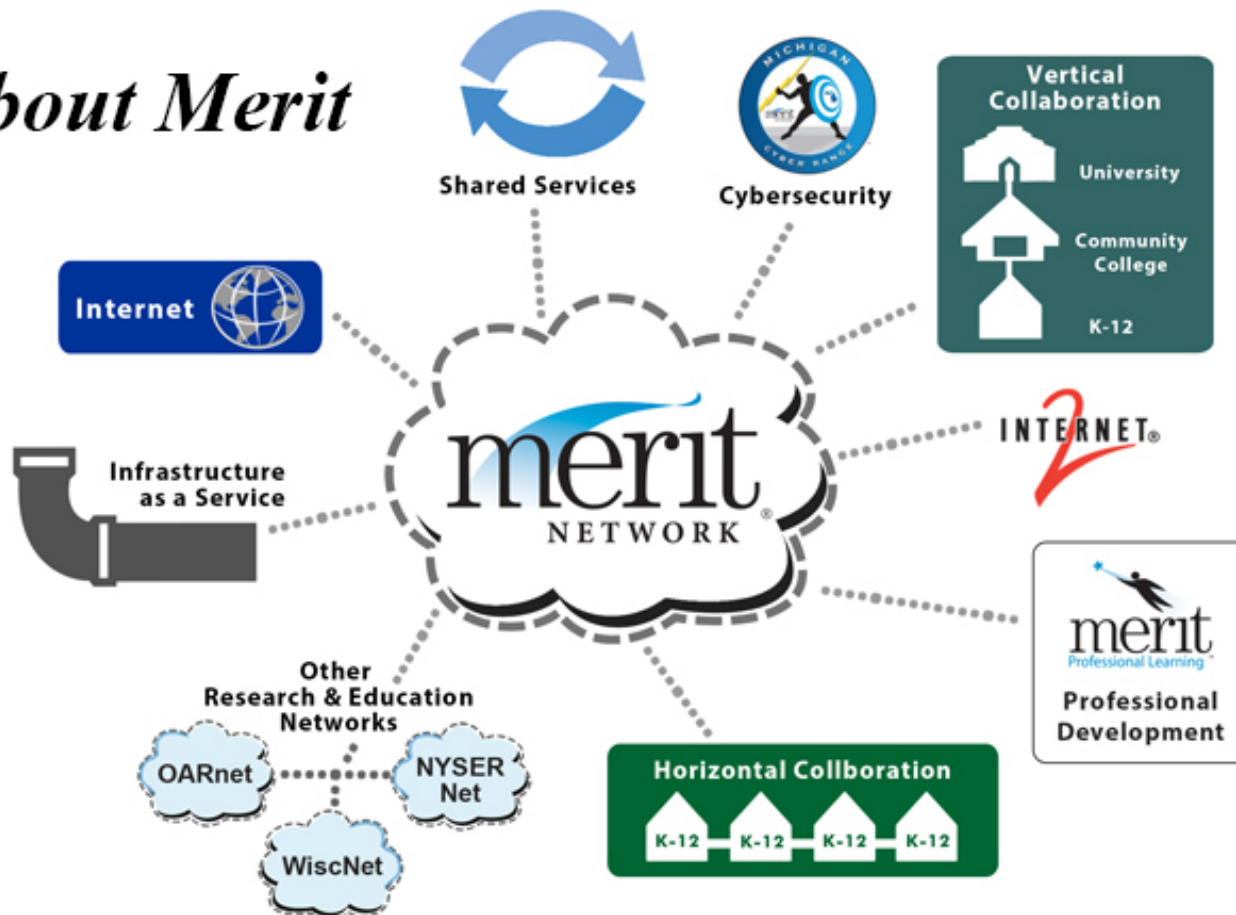
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Homeland Security
Science and Technology

Agenda

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

Team Profile

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 it's 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 <u>lacks basic security</u>

- 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.

Technical Approach

- 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).

Details

- 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

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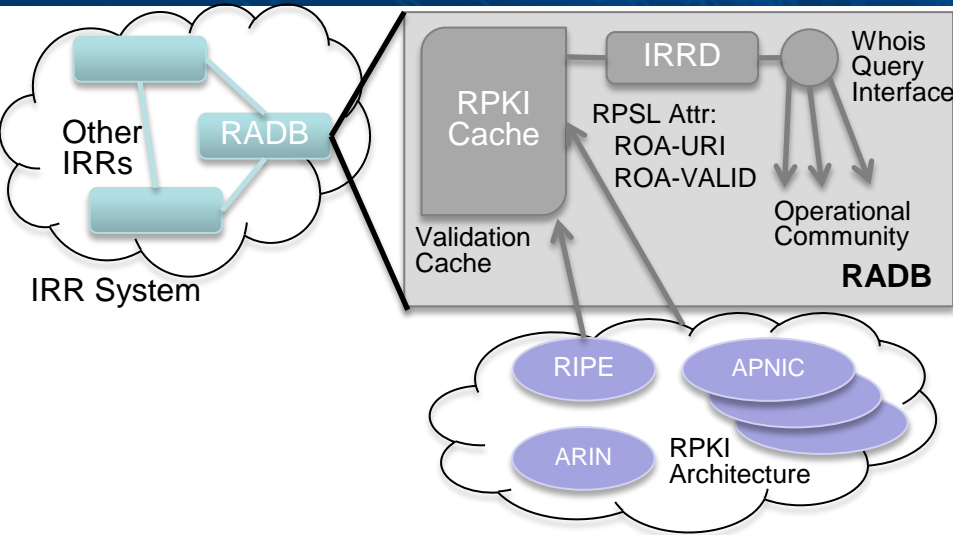Merit Network, Inc.
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Title: Enabling Operational Use of RPKI via
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Offerer Name: Merit Network, Inc.

Date: 2012 – 10 - 10

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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

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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)

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