Route Origin Authorization (ROA) using RPKI

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Resource Public Key Infrastructure

What is RPKI?

• A robust security framework for verifying the association between resource holders and their Internet resources

• Uses x.509 certificates with RFC3779 extensions

• Collaborative effort by all RIRs to help secure Internet routing by validating routes
RFCs on RPKI

• RFC 6810 – The Resource Public Key Infrastructure (RPKI) to Router Protocol (January 2013) – Standard

• RFC 6480 – An Infrastructure to Support Secure Internet Routing (Feb 2012) - informational

• RFC 6481 – A Profile for Resource Certificate Repository Structure (Feb 2012) - standard

• RFC 6491 – RPKI Objects Issued by IANA

• RFC 6493 – The RPKI Ghostbusters Record

• RFC 6487 – A Profile for X.509 PKIX Resource Certificate
APNIC’s involvement in RPKI

• Initial phase introduced by RIRs in 2009

• Initiative from APNIC aimed at
  – Improving the security of inter-domain routing
  – Augmenting the information published in the Whois database
Motivation

• Prevent route hijacking
  – Only the rightful custodian can originate the prefix announcement
  – ISPs filter prefixes they propagate

• Minimize common routing errors
  – Limits human errors
  – Prioritize routes with certificates
Real-life routing incidents

• **June 2015** - Telecom Malaysia causes large-scale routing issues due to route leak

• **April 2014** - Indosat leaked 32,000 routes

• **April 2010** - China Telecom advertisement causes 15% of Internet traffic to pass through Chinese servers

• **February 2008** - Pakistan Telecom announces 208.65.153.0/24 (YouTube prefix)
Route Origin Authorization (ROA)

- What’s contained in a ROA
  - The AS number you have authorized
  - The prefix that is being originated from it
  - The most specific prefix (maximum length) that the AS may announce

For example: “AS64496 originates a route for the prefix 2001:DB8::/32 with a maximum prefix length of /40)”
Creating ROA in MyAPNIC

• What you need to have before creating a ROA
  – Must be an APNIC Member
  – Have access to MyAPNIC with 2 factor authentication

• Takes only 5 minutes to create, and 10 minutes to be visible to the public
Activate RPKI Engine

Select if you want to operate in the MyAPNIC RPKI portal or if you want to host your own certificate authority.

Enable Resource Certification

Currently, you have not enabled resource certification for your registry.

- I want to operate in the MyAPNIC RPKI portal.
- I want to host my own certification authority and run an RPKI engine myself.

Next
Create your ROA (Using suggestions)

1) Select your BGP route(s) from the list

2) Click Suggest ROA button

3) Click Commit
Create your ROA (Manual)

1) Enter the Origin ASN you authorize to announce routes for your IP prefix

2) Enter your IP prefix that is being announced

3) Enter the Max Length of prefix that you authorize for this ROA

4) Click Add
Created your ROA, what’s next?

• **Maintain your ROAs**
  - Changed BGP announcements
  - New delegations
  - Transferred resources

• **RPKI validator**
  - [https://trac.rpki.net/wiki/doc/RPKI](https://trac.rpki.net/wiki/doc/RPKI)
  - Valid
  - Invalid
  - Unknown
Success Story

• May 2015: APNIC Outreach in Bangladesh
  – 13 organizations visited
  – Onsite support to create ROA objects

http://rpki.surfnet.nl/bd.html

561 valid prefixes (24%)
## World Leaderboard

<table>
<thead>
<tr>
<th>Country</th>
<th>Total</th>
<th>Valid</th>
<th>Invalid</th>
<th>Unknown</th>
<th>Accuracy</th>
<th>RPKI Adoption Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD</td>
<td>2336 (100%)</td>
<td>617 (26.41%)</td>
<td>5 (0.21%)</td>
<td>1714 (73.37%)</td>
<td>99.2%</td>
<td>26.63%</td>
</tr>
<tr>
<td>NL</td>
<td>5028 (100%)</td>
<td>656 (13.05%)</td>
<td>25 (0.5%)</td>
<td>4347 (86.46%)</td>
<td>96.33%</td>
<td>13.54%</td>
</tr>
<tr>
<td>FR</td>
<td>5834 (100%)</td>
<td>1154 (19.78%)</td>
<td>105 (1.8%)</td>
<td>4575 (78.42%)</td>
<td>91.66%</td>
<td>21.58%</td>
</tr>
<tr>
<td>US</td>
<td>174637 (100%)</td>
<td>1084 (0.62%)</td>
<td>331 (0.19%)</td>
<td>173222 (99.19%)</td>
<td>76.61%</td>
<td>0.81%</td>
</tr>
</tbody>
</table>

As of June 10, 2015

http://rpki.surfnet.nl/country.html
Story in South Asia

Resource Certification enabled members

As at 26/07/2015

- Bangladesh: 22.03%
- Bhutan: 40.00%
- India: 11.51%
- Sri Lanka: 53.33%
- Nepal: 13.16%
- Pakistan: 15.31%
RPKI Initiatives

10 face-to-face and elearning RPKI training courses delivered

RPKI presentations to NOGs and conferences

Development of the ‘Ready to ROA’ Campaign – hands on sessions to help Members create ROAs

New shirts, stickers, web content to promote campaign

Ready to ROA launched in 2015
Have your say on MyAPNIC

• APNIC is gathering feedback to ensure MyAPNIC provides you with the best possible user experience and features.
  - https://fluidsurveys.com/s/apnic/myapnicsurvey
  - Lucky draw to win 1 of 20 wireless presenters
THANK YOU