ROAs (Route Origin Authorizations)

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Motivation

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

• Mitigates erroneous route entries
  – Limits human errors
  – Prioritize routes with certificates
AS1 (ISP of Victim)

AS4 (Large ISP)

AS3 (ISP of Hijacker)

BGP:2001:DB8::/32
BGP:2001:DB8::/48

BGP:2001:DB8::/32

BGP:2001:DB8::/48

AS2 (Legitimate owner of 2001:DB8::/32)
AS4 (Large ISP)

BGP:2001:DB8::/32

AS1 (ISP of Victim)

BGP:2001:DB8::/32

AS2
(Legitimate owner of 2001:DB8::/32)

BGP:2001:DB8::/48

AS3 (ISP of Hijacker)

BGP:2001:DB8::/32
Real Life Example: YouTube Hijacking

• Took place in 2008
• AS17557 (Pakistan Telecom) started announcing 208.65.153.0/24 (YouTube)

![Diagram]

- Internet
- 208.65.152.0/22
- 208.65.153.0/24
- Youtube
- Pakistan Telecom
YouTube – Life as normal
After misconfiguration
Resource Certification, ROA, RPKI

• APNIC offers Resource Certification as a tool to Members to create Route Origin Authorizations (ROAs) in MyAPNIC

• A ROA is a digitally signed, cryptographic object generated by the Resource Certification service

• The Resource Public Key Infrastructure (RPKI) is the framework that enables users of public networks to verify the authenticity of data that has been digitally signed by the originator of the data
What is a ROA object?

• 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: “ISP 4 permits AS 65000 to originate a route for the prefix 192.2.200.0/24”
ROA and MyAPNIC

• What you need to have before creating a ROA
  – Must be an APNIC Member
  – Have access to MyAPNIC
  – Digital Certificate installed

• Takes only 5 minutes to create, and 10 minutes to be visible to the public
Activate Resource Certification

To start using the Resource Certification feature, click on the Certification menu under Resources.
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
Creating your ROA

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

2) Click Suggest ROA button

3) Click Commit
Creating your ROA

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
Created your ROA, what’s next?

• Maintain your ROAs
  - Changed BGP announcement
  - New delegation
  - Transferred resources

• RPKI validator
  - https://trac.rpki.net/wiki/doc/RPKI
Success Story

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

http://rpki.surfnet.nl/bd.html
## World Leaderboard

### Breakdown per Country

![Table showing breakdown per country](http://rpki.surfnet.nl/country.html)

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

http://rpki.surfnet.nl/country.html
Story in Oceania

Resource certification enabled
Story in Oceania

ROA count

AU 26
NZ 37
NC 2
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
Questions?

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