RPKI Workshop
Routing Lab

NANOG / Denver
2011.06.12

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Lab Overview

RPKI Portal GUI

Prefix View

ROA requests

Cache

RCynic Gatherer

BGP Decision Process

RPKI to Rtr Protocol

django

RPKI Engine

Publication Protocol

Repository Mgt

Repository Mgt

Cache

Range: 98.128.0.0/24
Suballocated from: 98.128.0.0/16
Received from: aut
Validity: -

ASN | Max Length |
--- | --- |---
4128 | 24 | delete

2011.06.12 RPKI Router Lab
BGP Feeds into Lab

AS65000  AS65001

Global Internet

AS3130  AS4128

Seattle  Dallas

98.128.0.0/16
98.128.0.0/24
98.128.1.0/24
...
98.128.31.0/24

98.128.0.0/16
98.128.0.0/24
98.128.1.0/24
98.128.31.0/24
IP Address Allocation

98.128.0.0/16    ARIN Experimental Alloc
98.128.0.0/24    instructors play
98.128.1.0/24    labuser01
98.128.2.0/24    labuser02
...
98.128.32.0/24    labuser32
GUI Accounts

https://demo.rpki.net/

<table>
<thead>
<tr>
<th>UserID</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>labuser01</td>
<td>fnord</td>
</tr>
<tr>
<td>labuser02</td>
<td>fnord</td>
</tr>
<tr>
<td>labuser03</td>
<td>fnord</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>labuser32</td>
<td>fnord</td>
</tr>
</tbody>
</table>
Dashboard

Parents

- rgnet

<table>
<thead>
<tr>
<th>Accepted Resource</th>
<th>Not Before</th>
<th>Not After</th>
</tr>
</thead>
<tbody>
<tr>
<td>98.128.1.0/24</td>
<td>May 2, 2011, 8:44 a.m.</td>
<td>Feb. 18, 2012, 10:02 p.m.</td>
</tr>
</tbody>
</table>

Children

none

Export (csv): asns | prefixes

ROA Requests

none

export (csv)

Ghostbuster Requests

none

add

Unallocated Resources

- 98.128.1.0/24 | give | split | roa
One Prefix

RPKI Portal GUI

labuser01 > Prefix View > 98.128.1.0/24

Prefix View

<table>
<thead>
<tr>
<th>Range:</th>
<th>98.128.1.0/24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received from:</td>
<td>rgnet</td>
</tr>
<tr>
<td>Validity:</td>
<td>May 2, 2011, 8:44 a.m. - Feb. 18, 2012, 10:02 p.m.</td>
</tr>
</tbody>
</table>

Unallocated

- 98.128.1.0/24
Issue a ROA

RPKI Portal GUI

Prefix View

Range: 98.128.1.0/24
Received from: rgnet
Validity: May 2, 2011, 8:44 a.m. - Feb. 18, 2012, 10:02 p.m.

Unallocated
- 98.128.1.0/24

Issue ROA

Asns: 3130 (Comma-separated list of ASNs)
Max length: 

Submit Query
Looks Good

RPKI Portal GUI

<table>
<thead>
<tr>
<th>split</th>
<th>roa</th>
</tr>
</thead>
</table>

labuser01 > Prefix View > 98.128.1.0/24

Prefix View

<table>
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<tr>
<th>Range:</th>
<th>98.128.1.0/24</th>
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<tr>
<td>Validity:</td>
<td>May 2, 2011, 8:44 a.m. - Feb. 18, 2012, 10:02 p.m.</td>
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</tbody>
</table>

ROA requests

<table>
<thead>
<tr>
<th>ASN</th>
<th>Max Length</th>
<th>delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>3130</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>
Router Accounts

% ssh juniper@rxx.jlab.rpki.net

(where xx is your UserID)

juniper@r1.jlab.rpki.net's password: Juniper

--- JUNOS 10.3I built 2011-06-04 02:59:04 UTC

juniper@R1>
**Router Configuration**

- BGP peerings etc. should be up
  - AS 65000 – connected to b0 to Seattle
  - AS 65001 – connected to b1 to Dallas

- Please confirm

  ```
  juniper@R1> show bgp summary | match ^10
  10.0.0.253 65000 ... 1d 1:13:07 15/42/42/0 0/0/0/0
  10.0.0.254 65001 ... 1d 1:12:38 27/41/41/0 0/0/0/0
  ```
juniper@R1> show configuration routing-options | find validation
validation {
  traceoptions {
    file rpki.log;
    flag all detail;
    flag error detail;  }
  group test {
    session 198.180.150.1 {
      traceoptions {
        file r.log size 10m;
        flag error;
        flag state;
        flag packets;  }
      refresh-time 120;
      hold-time 180;
      port 42420;
      local-address <ip-address of em0>;
      connect-retry 10; }  }  }  }

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Lab Cheat Sheets & JunoSphere Literature

http://rpki.net/junos/
juniper@R1> show configuration policy-options | find validation
policy-statement route-validation {
    term valid {
        from {
            protocol bgp;
            validation-state valid;  }
        then {
            local-preference 110;
            validation-state valid;
            accept;}}}
term invalid {
    from {
        protocol bgp;
        validation-state invalid; }
    then {
        local-preference 90;
        validation-state invalid;
        accept; } }
term unknown {
    from {
        protocol bgp;
        validation-state unknown; }
    then {validation-state unknown;
        accept; } } }
Apply the Policy

juniper@r00> show configuration protocols
bgp {
  import route-validation;
  group as65000 {
    local-address 10.0.0.102;
    export none;
    peer-as 65000;
    neighbor 10.0.0.253;
  }
  group as65001 {
    local-address 10.0.0.102;
    export none;
    peer-as 65001;
    neighbor 10.0.0.254;
  }
}
juniper@R1> show validation session brief
Session 198.180.150.1, State: up
  Group: test, Preference: 100
  Port: 42420
  Refresh time: 120s
  Hold time: 180s
  Record Life time: 3600s
  Serial (Full Update): 1307272205
  Serial (Incremental Update): 1307272205
  IPv4 prefix count: 81
  IPv6 prefix count: 29
juniper@R1> show validation database brief
RV database for instance master
  Total IPv4 records: 81
  Total IPv6 records: 29

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Origin</th>
<th>Session</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>67.21.36.0/24-24</td>
<td>3970</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.0.0/16-16</td>
<td>3130</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.0.0/24-24</td>
<td>4128</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.1.0/24-24</td>
<td>3130</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.2.0/24-24</td>
<td>3130</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.3.0/24-24</td>
<td>4128</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.4.0/24-24</td>
<td>3130</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.5.0/24-24</td>
<td>3130</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.6.0/24-24</td>
<td>4128</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.7.0/24-24</td>
<td>3130</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
<tr>
<td>98.128.8.0/24-24</td>
<td>4128</td>
<td>198.180.150.1</td>
<td>valid</td>
</tr>
</tbody>
</table>
Look at a Prefix

juniper@R1> show route 98.128.1.0 detail

98.128.1.0/24 (2 entries, 1 announced)
  *BGP Preference: 170/-111
  Source: 10.0.0.253
  Validation State: valid
  AS path: 65000 3130 I

  BGP Preference: 170/-101
  Source: 10.0.0.254
  Validation State: invalid
  AS path: 65001 4128 I
Go Play
With Policy
Fat-Finger Detected

```
show route 98.128.0.0/16 detail
```

```
98.128.0.0/16
AS 3130
```

```
Global Internet
```

```
98.128.0.0/16
```

```
Seattle
AS3130
AS 4128
```

```
Dallas
AS65000
AS65001
```

```
98.128.0.0/16
AS 3130
ROA
```

```
rpki-rtr protocol
```

```
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```
Find [In]Valid Routes

juniper@R1> show route validation-state invalid terse

A  V  Destination     ...     AS  path
I  98.128.0.0/16     ...     65001 4128 I
I  98.128.0.0/24     ...     65000 3130 I
I  98.128.1.0/24     ...     65001 4128 I

juniper@R1> show route validation-state valid terse

A  V  Destination     ...     AS  path
*  V  98.128.0.0/16     ...     65000 3130 I
*  V  98.128.0.0/24     ...     65001 4128 I
*  V  98.128.1.0/24     ...     65000 3130 I

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Clearing Sessions

clear validation session <ip-address> \ 
soft-inbound

clear validation session <ip-address>

Due to a bug, we have to soft clear sessions to get database changes
ROA Controls Validity

show route 98.128.0.0/16 detail

rpki-rtr protocol

Global Internet

AS4128

98.128.0.0/16

AS 4128

98.128.0.0/16

AS 4128

AS65000

AS65001

Seattle

Dallas

98.128.0.0/16

98.128.0.0/16
Try Your Own /24

show route 98.128.0.0/16 detail
show route 98.128.x.0/24 detail

ROA
98.128.0.0/16
AS 4128
ROA
98.128.x.0/24
AS 3130

98.128.x.0/24

Global Internet

rpki-rtr protocol

AS3130
AS65000
AS4128
AS65001
LocalPref is Set

juniper@R1> show route 98.128.0.0/24 detail

98.128.0.0/24 (2 entries, 1 announced)

  *BGP  Preference: 170/-111
  Source: 10.0.0.254
  Validation State: valid
  AS path: 65001 4128 I
  Localpref: 110

  BGP  Preference: 170/-101
  Source: 10.0.0.253
  Validation State: invalid
  AS path: 65000 3130 I
  Localpref: 100