IRR & RPKI feature parity

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IETF 101
What is this about

• Creating more feature parity between IRR and RPKI
• Making provisioning operations easier
• Enabling South America
An IRR route object: the atom

$ whois -h rr.ntt.net 192.147.168.0/24

route:        192.147.168.0/24  
descr:        Job Snijiders       
origin:       AS15562            
notify:       job@instituut.net  
mnt-by:       MAINT-JOB          
changed:      job@ntt.net 20161003  
source:       NTTCOM

(only the bold lines are relevant in
the process)
Generating a prefix filter

job@vurt ~$ whois -h rr.ntt.net '!gAS15562'
A212
165.254.255.132/32 165.254.255.26/32
165.254.255.0/25 165.254.255.144/28
165.254.255.133/32 192.147.168.0/24
165.254.255.160/28 165.254.255.149/32
209.24.0.0/16 204.42.254.192/26
165.254.255.0/24 67.221.245.0/24
C
job@vurt ~$
Same example, with bgpq3

job@vurt ~$ bgpq3 -h rr.ntt.net -l AS15562-in AS15562
no ip prefix-list AS15562-in
ip prefix-list AS15562-in permit 67.221.245.0/24
ip prefix-list AS15562-in permit 165.254.255.0/24
ip prefix-list AS15562-in permit 165.254.255.0/26
ip prefix-list AS15562-in permit 165.254.255.26/32
ip prefix-list AS15562-in permit 165.254.255.64/26
ip prefix-list AS15562-in permit 165.254.255.132/32
ip prefix-list AS15562-in permit 165.254.255.133/32
ip prefix-list AS15562-in permit 165.254.255.144/28
ip prefix-list AS15562-in permit 165.254.255.149/32
ip prefix-list AS15562-in permit 165.254.255.160/28
ip prefix-list AS15562-in permit 192.147.168.0/24
ip prefix-list AS15562-in permit 204.2.30.0/23
ip prefix-list AS15562-in permit 204.42.254.192/26
ip prefix-list AS15562-in permit 209.24.0.0/16
What about RPKI?

• A RPKI ROA kind of looks like a route object
• It has a “prefix” and an “origin”
• RPKI is trustworthy data, we know for sure that the owner of the IP space created the ROA
Provisioning use case for RPKI data?

Validated ROAs

Validated ROAs from APNIC from AFRINIC RPKI Root, APNIC from ARIN RPKI Root, APNIC from IANA RPKI Root, LACNIC RPKI Root, APNIC from RIPE RPKI Root, ARIN RPKI Root, AfriNIC RPKI Root, LACNIC RPKI Root, NCC Pilot (RRDP prefetch), RIPE NCC RPKI Root, RIPE NCC RPKI Root (RRDP prefetch), RIPE NCC prep, prepdev (RRDP prefetch), altca, apnic-testbed.

<table>
<thead>
<tr>
<th>ASN</th>
<th>Prefix</th>
<th>Maximum Length</th>
<th>Trust Anchor</th>
</tr>
</thead>
<tbody>
<tr>
<td>15562</td>
<td>2001:67c:208c::/48</td>
<td>48</td>
<td>RIPE NCC RPKI Root</td>
</tr>
</tbody>
</table>
Simple example

```
job@vurt ~$ ftp -VM -o - \
    http://localcert.ripe.net:8088/export.json \
        | jq '.roas[] | select(.asn | contains("AS15562"))? | .prefix' \
        | uniq
"2001:67c:208c::/48"
job@vurt ~$
```
Grouping ASNs: AS-SETs

$ whois -h rr.ntt.net AS15562:AS-SNIJDERS
as-set: AS15562:AS-SNIJDERS
members: AS15562 # Me
members: AS57436 # Samer
members: AS-KING # Thomas King
members: AS-NETHER # Jared
technical-contact: DUMY-RIPE
admin-contact: DUMY-RIPE
notify: job@instituut.net
organization: ORG-SNIJ1-RIPE
mnt-by: SNIJDERS-MNT
created: 2018-01-16T17:54:54Z
last-modified: 2018-01-16T17:58:36Z
source: RIPE
Programmatic access to AS-SETS

$ whois -h rr.ntt.net '!iAS15562:AS-SNIJDETS,1'
A130
AS15562 AS202539 AS205591 AS205593 AS206479
AS206499 AS206551 AS234 AS267 AS31451 AS41731
AS49697 AS51861 AS57436 AS60003 AS61438
C
$ irrtree AS15562:AS-SNIJDERS
Processed: 0 objects (Elapsed Time: 0:00:00)
IRRTree (1.1.3) report for 'AS15562:AS-SNIJDERS'
(IPv4), using rr.ntt.net at 2018-01-24 16:23
AS15562:AS-SNIJDERS (16 ASNs, 25 pfxs)
  +-- AS-KING (12 ASNs, 8 pfxs)
    |   +-- AS205591 (2 pfxs)
    |   +-- AS206499 (2 pfxs)
    |   +-- AS49697 (2 pfxs)
    |   +-- AS51861 (1 pfxs)
    |   +-- AS60003 (1 pfxs)
  +-- AS-NETHER (2 ASNs, 4 pfxs)
    |   +-- AS267 (2 pfxs)
    |   +-- AS234 (2 pfxs)
  +-- AS15562 (12 pfxs)
    +-- AS57436 (1 pfxs)
Summary so far:

• An AS-SET is resolved into all its member ASNs
• For each ASN we do a reverse lookup to find all route-objects where the ASN is the “origin:”
• The total list of prefixes from the above 2 steps is the input into `bgpq3` and ends up on routers
Problems with AS-SETs

• What if IRR AS-SET exists in multiple IRRs?
  • AS-STEALTH exists in both RIPE and RADB
  • The two are not managed by the same company

• How to discover what AS-SET to use?
  • Ask people in the service order form?
  • Look at PeeringDB?
  • (Virtually nobody looks at import:/export: lines)
PeeringDB currently is probably the best source for this data :-/
My wishlist

• Ease of discovery
  • given ASN X – what list of downstreams should I use in my provisioning system?
• Guarantees that only the owner of the ASN could’ve created that list
• Unilateral declarations (just like AS-SETs)
• Per adjacent ASN granularity:
  • AS 15562 may announce a different set of downstreams to NTT than to GTT
Work in progress: “AS Cones”

Materials here:
https://github.com/bgp/draft-ss-grow-rpki-as-cones