



RPSL in the Wild

Presentation to Apricot 2000, Seoul, Korea

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Agenda

- Overview of environment in Australia
- Summary of Connect's routing policy
- Why use RPSL?
- Examples
- Problems

Background

- Four major IAPs in Australia
 - Telstra
 - UUnet Australia (OzEmail)
 - connect.com.au
 - Cable & Wireless Optus
- Charge customers for bytes received
- Differentiate by source, domestic v's international (terrestrial or satellite)

Background

- Small/Medium ISPs try to minimise their costs for traffic
 - Multiple providers
 - Peer at (Australian) regional *IXes
 - Satellite links (asymmetric flows)
- Little BGP experience
- Small routers (cisco 2500's common)

Connect's Filter Philosophy

- Filter routing announcement on import to Connect's network
- Classify route and colour with BGP community
- Announce routes based on BGP community

Connect's Route Import Policy

- Don't trust routing announcements from customers
 - Filter by prefix
 - Filter by AS path
- Filter peers by AS path only, to avoid nasty accidents
- Believe providers will “get it right”

Filter mechanism

- On import we classify traffic type with a number of BGP communities; POP location, route type (customer, peer, domestic or international)
- Also set local preference so customer announced routes are preferred
- Use route type community to determine which prefixes to export

Filter mechanism

- Customers can use communities to signal special actions
 - 2764:1 only export for “cheap” transit
 - 2764:2 don’t export out of local POP
 - 2764:3 to 2764:5 alter local preference
 - 2764:6 tag for domestic transit only
 - 2764:7 don’t export to non customers
 - 2764:8 use external satellite not terrestrial
 - 2764:10 prefer Optus for transit over Telstra

Why use (RPSL) Policy?

- Consistent configuration between BGP peers (peers & customers)
- Expertise encoded in the tools that generate the policy rather than engineer configuring peering session
- Automatic, manageable solution for filter generation

Use of RPSL

- Use RtConfig v4 (part of RAToolSet from ISI) to generate filters based on information stored in our routing registry
 - Avoid filter errors (typos)
 - Filters consistent with documented policy (need to get policy correct though)
 - Engineers don't need to understand filter rules (it just works :-)

Customer Import Policy

```
import: {  
  from AS-ANY  
    action med=0;  
    accept ANY AND NOT { 0.0.0.0/0 };  
  } refine {  
    from AS-ANY  
      action community.append(2764:65408); pref=25;  
      accept community.contains(2764:3) AND NOT AS2764:RS-PROVIDER^-;  
    from AS-ANY  
      action community.append(2764:65408); pref=15;  
      accept community.contains(2764:4) AND NOT AS2764:RS-PROVIDER^-;  
    from AS-ANY  
      action community.append(2764:65408); pref=5;  
      accept community.contains(2764:5);  
    from AS-ANY  
      action community.append(2764:65408); pref=0;  
      accept ANY;  
    } refine {  
    from AS2764:AS-CUSTOMERS  
      accept PeerAS AND <^PeerAS+$>;  
    from AS2764:AS-TRANSIT  
      accept AS2764:AS-CUSTOMERS:PeerAS AND <^PeerAS+ AS2764:AS-CUSTOMERS:PeerAS+$>;  
    }
```



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RtConfig Configuration Template

```
@RtConfig set cisco_map_first_no = 10
@RtConfig set cisco_map_increment_by = 10
@RtConfig set cisco_prefix_acl_no = 130
@RtConfig set cisco_aspath_acl_no = 130
@RtConfig set cisco_pktfilter_acl_no = 130
@RtConfig set cisco_community_acl_no = 30
@RtConfig set cisco_max_preference = 100
!
router bgp 2764
neighbor 203.63.122.193 remote-as 9313
neighbor 203.63.122.193 description On The Net
@RtConfig set cisco_map_name = "AS9313-EXPORT"
@RtConfig export AS2764 203.63.80.230 AS9313 203.63.122.193
@RtConfig set cisco_map_name = "AS9313-IMPORT"
@RtConfig import AS2764 203.63.80.230 AS9313 203.63.122.193
!
end
```

cisco Configuration

```
! access-list 135 – customer routes
!
no ip as-path access-list 130
ip as-path access-list 130 permit ^(_9313)+$
!
no route-map AS9313-IMPORT
!
no ip community-list 32
ip community-list 32 permit 2764:3
!
route-map AS9313-IMPORT permit 20
  match as-path 130
  match community 32
  match ip address 135
  set local-preference 75
!
no ip community-list 33
ip community-list 33 permit 2764:4
!
route-map AS9313-IMPORT permit 30
  match as-path 130
  match community 33
  match ip address 135
  set local-preference 85
```

```
no ip community-list 34
ip community-list 34 permit 2764:5
!
route-map AS9313-IMPORT permit 40
  match as-path 130
  match community 34
  match ip address 135
  set local-preference 95
!
route-map AS9313-IMPORT permit 50
  match as-path 130
  match ip address 135
  set local-preference 100
!
router bgp 2764
  neighbor 203.63.122.193 route-map AS9313-IMPORT in
!
end
```

Problems?

- Policy can easily get very complex and result in even more complex router configuration
- Line limit on cisco AS path filters (need to be careful when using as-sets)
- ISI/Qwest whois server doesn't cope with the community format while Merit's IRRd has problems using AS sets by reference

References

- RPSL - RFC 2622
 - <ftp://munnari.oz.au/rfc/rfc2622.Z>
- Using RPSL in Practice - RFC 2650
 - <ftp://munnari.oz.au/rfc/rfc2650.Z>
- RAToolSet
 - <ftp://ftp.isi.edu/ra/RAToolSet>
- RPSL Training Page
 - <http://www.isi.edu/ra/rps/training>

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