Autonomous System Numbers

How to describe Routing Policy
Overview

- What is an AS?
- Guidelines and procedures
- Policy expression
What is an Autonomous System?

- Collection of networks with same routing policy
- Usually under single ownership, trust and administrative control
ASN Guidelines

• When do I need an AS?
  • Multi-homed network to different providers and
  • Routing policy different to external peers

• Factors that don’t count
  • Transition and ‘future proofing’
  • Multi-homing to the same upstream
    • RFC2270: A dedicated AS for sites homed to a single provider

• Service differentiation
  • RFC1997: BGP Communities attribute

• Recommended reading
  • RFC1930: Guidelines for creation, selection and registration of an Autonomous System
Requesting an ASN

- Complete the request form
  - RIPE NCC
    - http://www.ripe.net/ripencc/mem-services/registration
  - ARIN
    - http://www.arin.net/regserv/templates/asntemplate.txt

- RIPE NCC request form
  - Must include routing policy
  - Is now based on RPSL description
Routing Policy Specification Language

- Specified in rfc2622
  - [http://www.isi.edu/ra/rps/training/rfc2622.txt](http://www.isi.edu/ra/rps/training/rfc2622.txt)

- On-line tutorial
  - [http://www.isi.edu/ra/rps/training](http://www.isi.edu/ra/rps/training)

- Defines object structure
  - For AS objects
  - For route objects
  - And more.....
### An example

<table>
<thead>
<tr>
<th>Policy</th>
<th>RPSL</th>
</tr>
</thead>
<tbody>
<tr>
<td>aut-num:</td>
<td>AS4777</td>
</tr>
<tr>
<td>as-name:</td>
<td>APNIC-NSPIXP2-AS</td>
</tr>
<tr>
<td>descr:</td>
<td>Asia Pacific Network Information Centre</td>
</tr>
<tr>
<td>descr:</td>
<td>AS for NSPIXP2, remote facilities site</td>
</tr>
<tr>
<td>as-in:</td>
<td>from AS2500 action pref=100 accept ANY</td>
</tr>
<tr>
<td>as-in:</td>
<td>from AS2524 action pref=100 accept ANY</td>
</tr>
<tr>
<td>as-in:</td>
<td>from AS2514 action pref=100 accept ANY</td>
</tr>
<tr>
<td>as-out:</td>
<td>to AS2500 announce AS4777</td>
</tr>
<tr>
<td>as-out:</td>
<td>to AS2524 announce AS4777</td>
</tr>
<tr>
<td>as-out:</td>
<td>to AS2514 announce AS4777</td>
</tr>
<tr>
<td>default:</td>
<td>AS2500 100</td>
</tr>
<tr>
<td>admin-c:</td>
<td>PW35-AP</td>
</tr>
<tr>
<td>tech-c:</td>
<td>NO4-AP</td>
</tr>
<tr>
<td>remarks:</td>
<td>Filtering prefixes longer than /24</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>MAINT-APNIC-AP</td>
</tr>
<tr>
<td>changed:</td>
<td><a href="mailto:paulg@apnic.net">paulg@apnic.net</a> 19981028</td>
</tr>
<tr>
<td>source:</td>
<td>APNIC</td>
</tr>
</tbody>
</table>
**Routing and packet flows**

For AS1 and AS2 networks to communicate

- AS1 must announce to AS2
- AS2 must accept from AS1
- AS2 must announce to AS1
- AS1 must accept from AS2
Representation of Routing Policy

Basic concept

COST per AS shows preference
lower cost means ‘preferred’

aut-num: AS1
<administrivia go here>
import: from AS2 action pref=100 accept AS2
export: to AS2 announce AS1
More complex example

- AS4 gives transit to AS5, AS10
- AS4 gives local routes to AS123
### Representation of Routing Policy

**AS123**  
**AS4**  
**AS5**  
**AS10**

- **aut-num:** AS4  
- **import:** from AS123 action pref=100 accept AS123  
- **import:** from AS5 action pref=100 accept AS5  
- **import:** from AS10 action pref=100 accept AS10  
- **export:** to AS123 announce AS4  
- **export:** to AS5 announce AS4 AS10  
- **export:** to AS10 announce AS4 AS5

*Not a path*
Representation of Routing Policy

More complex example

- AS4 and AS6 private link1
- AS4 and AS123 main transit link2
- backup all traffic over link1 and link3 in event of link2 failure
**Representation of Routing Policy**

**AS representation**

- **aut-num:** AS4
- **import:** from AS123, action pref=100, accept ANY
- **import:** from AS6, action pref=50, accept AS6
- **import:** from AS6, action pref=200, accept ANY
- **export:** to AS6, announce AS4
- **export:** to AS123, announce AS4

**Routing Details:**

- **import:** from AS123, action pref=100, accept ANY
- **import:** from AS6, action pref=50, accept AS6
- **import:** from AS6, action pref=200, accept ANY
- **export:** to AS6, announce AS4
- **export:** to AS123, announce AS4

**Notes:**

- Transit traffic over link2
- Private link1
- Full routing received
- Higher cost for backup route
More Information

- http://www.ripe.net/ripencc/pubservices/db/rpsl/

RIPE-181 to RPSL Migration Information

Index:

- News
- Upcoming Dates
- Query the New RPSL WhoIs Database
- FAQ
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- Compliance Test
- Documentation
- Software
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- Mailing List

News:

- Migration to the v3 database software now completed (23 April 2001).
- Migration Issues
- Bugfix patch release (1 March, 2001)
- Version 3.0 released (5 April 2001)

Upcoming Dates:
Questions?