RIPE ncc

Representation of IP Routing Policies in the RIPE database

RIPE ncc

Overview

- Motivation
- Policies
- Autonomous System (AS)
- Community
- Representation of AS
- Some Examples
- What's different ?
- What doesn't it solve ?

RIPE ncc

Motivation

- Current routing recommendation reviewed
- Add Clarity by using objects more explainable/ understandable to network operators
- Provide an easier mapping to the way network operators think about routing policy
- To educate network operators by giving guidance
- Still keep generics but also look at enhancing to make use of new routing protocols
- Try to align functionality with previous paper
- Cut down on complexity where possible
- Provide the platform for building diagnostic tools, for example in terms of policy information

RIPE ncc

Policies

- General Representation
  - Effort to clarify terms and be consistent
  - Networks

    -- Layer 3 entities NOT organizations
  - Network Operators

    -- Service Providers

    -- Customers

    -- Not always a clear cut distinction
  - Autonomous System (AS)

    -- A group of networks having a single defined **routing policy**

Policies

- Routing Policies
  - Interaction of routing exchanges between peering ASes
  - Set for various reasons
  - Need to be documented
  - All routing policies are based on network number
  - Defined in terms of groups of networks
- Access Policies
  - Rarely defined in terms of routing policy
  - Need to be documented
  - Several examples (AUP, Closed user groups, etc)

Autonomous System (AS)

- Paper gives guidance for creation, engineering and maintenance of an AS
- Key point is a network can only belong to one AS
- By having an AS object we can document clearly the routing policy of that AS when exchanging reachability information with any other AS
- The AS tag can only be created/updated by the “guardian” of the AS. This ensures control and consistency at the AS level
- Provides two basic key things:
  - A manageable group of networks
  - A description of admin detail and routing policy information

Autonomous System (AS)

- Can be used to generate **network** based routing filters
- Can be used with newer protocols supporting AS path information
- **Doesn’t rely on using BGP**, however BGP is recommended wherever possible

Community

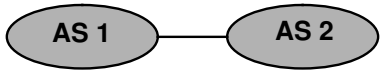
- A network can be part of more than one community
- Group of networks that cannot be represented by an AS
- Other uses...
  - Special/restricted access policies
  - Accountability -- Statistics, accounting, etc
- Global relevance
- Should not be tied to any single AS
- The community tag can only be created/updated by the guardian of the community object

Representation of AS

- Routing policies of an AS represented in the AS object
- Details of how routing exchanges take place between ASes
- Based on network number, NOT AS paths, purely on originating AS
- Detail incoming and outbound information for any AS peers an AS has
- Additional preference information

Representation of AS

Basic idea

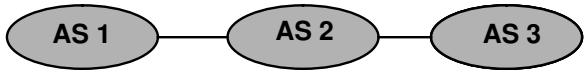



```
as: AS1
<administrivia go here>
as-out: AS2 = AS1 # announce all networks in AS1 to AS2
as-in: AS2 = 100 AS2 # accept all AS2 networks from AS2

as: AS2
<administrivia go here>
as-out: AS1 = AS2 # announce all networks in AS2 to AS1
as-in: AS1 = 100 AS1 # accept all AS1 networks from AS1
```

The value of **100** is a measure of preference AND is always used in “as-in” tag

Representation of AS

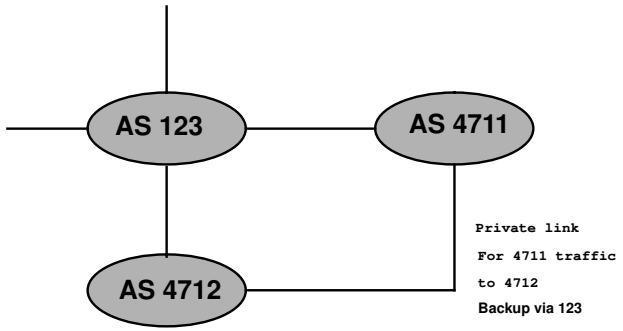
A simple example




```
as: AS1
<administrivia go here>
as-out: AS2 = AS1                 # announce all networks in AS1 to AS2
as-in: AS2 = 100 AS2 AS3          # accept AS2 and AS3 networks from AS2

as: AS2
<administrivia go here>
as-out: AS1 = AS2 AS3         # announce all networks in AS2 and AS3 to AS1
as-in: AS1 = 100 AS1          # accept all AS1 networks from AS1
as-out: AS3 = AS2 AS1
as-in: AS3 = 100 AS3

as: AS3
<administrivia go here>
as-out: AS2 = AS3              # announce all networks in AS3 to AS2
as-in: AS2 = 100 AS1 AS2       # accept AS2 and AS1 networks from AS2
```


Representation of AS

More complex example



Representation of AS

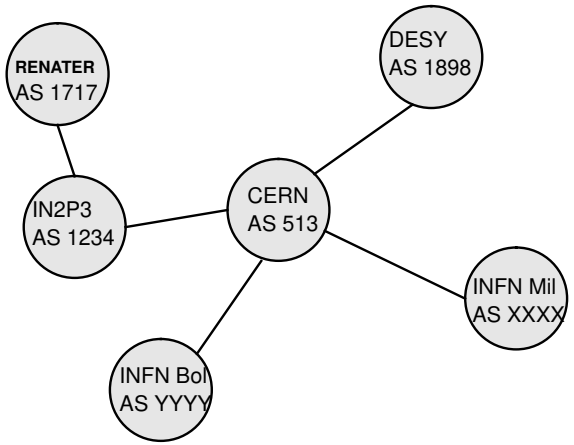
```
as: AS4711
as-in: AS123 = 100 ALL # accept all routes from AS123
as-out: AS123 = AS4711
as-in: AS4712 = 99 AS4712 # accept AS4712 only from AS4712
as-out: AS4712 = AS4711 # announce only own nets to AS4712

as: AS123
as-in: AS4711 = 100 AS4711
as-out: AS4711 = ALL
as-in: AS4712 = 100 AS4712
as-out: AS4712 = ALL

as: AS4712
as-in: AS123 = 100 ALL
as-out: AS123 = AS4712
as-in: AS4711 = 99 AS4711
as-out: AS4711 = AS4712
```

The preference is now used to show routing policy

The **greater** the preference value the **more preferred** the route is

Representation of AS

A REAL LIFE EXAMLPLE



Representation of AS

```
AUT-SYS: AS1234
AS-IN:   AS513 = 50 DEFAULT
AS-OUT:  AS513 = AS1234
AS-IN:   AS1717 = 50 AS1717
AS-OUT:  AS1717 = AS1234

AUT-SYS: AS1898
AS-IN:   AS513 = 50 DEFAULT
AS-OUT:  AS513 = AS1898
```

AS XXXX and AS YYYY as AS1898 !!!


```
AUT-SYS: AS513
AS-IN:   AS1234 = 150 AS1234
AS-OUT:  AS1234 = DEFAULT
AS-IN:   AS1898 = 150 AS1898
AS-OUT:  AS1898 = DEFAULT
AS-IN:   ASXXXX = 150 ASXXXX
AS-OUT:  ASXXXX = DEFAULT
AS-IN:   ASYYYY = 150 ASYYYY
AS-OUT:  ASYYYY = DEFAULT
AS-OUT:  AS1755 = AS513 AS1898 AS1234
                  ASXXXX ASYYYY
AS-IN:   AS1755 = 100 RIPE-DB AND NOT
                  (LOCAL AS1234 AS513
                  ASXXXX ASYYYY AS1898)
```

RIPE ncc

What's different ?

- **Essentially similar to old proposal**

  AS object <=> Routing Centre

  Community object <=> Routing Privilege

  NOTE: Experience showed "routing privilege" object was rarely using for routing

- BUT, gives the **added clarity**, is more **understandable** for operators and provides the basis for creating and deriving a full picture of routing flow within Europe
- Allows added functionality when used with newer protocols such BGP
- Should be seen as an update rather than something totally new

RIPE ncc

What doesn't it solve?

- Cannot deal with routing policies based on transit information
  - Whole concept is based on originating AS
- Cannot deal with routing policies for networks which are not in the RIPE database
- Cannot deal with "half baked" routing policies
- Because of the lack of information may not give the whole picture of an ASes routing policy becasue it can't !