

# Using Routing Registry and Related Tools for Configuring Routers

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# Introduction: RIPE & RIPE NCC

- RIPE (1989)
- Open forum
- Collaborative operators' community
- Working Group discussions
  - Meetings, Mailing lists
- Developing policies
  - Input to RIPE NCC
- *“European APRICOT”*
- RIPE NCC (1992)
- Membership org.
  - Not-for-profit, neutral
- Regional Internet Registry
  - Distributing IP resources
  - Training courses (also RR)
- Public services
  - RIPE whois Database
  - ENUM, K-root, etc
- *“European APNIC”*

# Benefits of Documenting Routing Policy

- Recreate policy in case of loss of hardware / administrators
  - Less downtime
- Scaling, troubleshooting
- RPSL: “Routing Policy Specification Language”
  - Abstract, object-oriented language
  - Not vendor specific
  - Global AS view, not router specific
  - Established standard
  - “Translation” and editing tools available

# Interesting RPSL Details

- **aut-num** object: `import/export` :  
    `from/to <peering> [action <action>]`  
    `accept/announce <filter>`
  - action: `pref=value` / `med=value` / `aspath.prepend (ASN)` ;  
`community.append` / `.delete` / `community = {AS1:999}`
  - filter: `community.contains (AS1:999) AND PeerAS`
- **route** object: announced address prefix
- **as-set** object: members; members-by-ref
  - “**PeerAS**” expression in the aut-num:  
`import: from AS1:AS-CUSTOMERS accept PeerAS`

# Benefits of Publishing Policy in IRR

- Internet Routing Registry (<http://www.irr.net>)
  - distributed public and private databases
- Consistent information between neighbours
- Building filters based on IRR
  - automatic update
  - “**route objects**” (must be) created as “announcements”
- Required by some Transit Providers and /or Exchange Points

# Benefits of Using RIPE RR

- Biggest European RR
  - Part of the IRR
    - we mirror: RADB, APNIC, VERIO, ARIN, JPIRR
- It's free!
  - Automated maintainer creation
  - For resources from other RIRs: “RIPE-NCC-RPSL-MNT”
    - password “RPSL”
- Security:
  - AS numbers & address space allocated by RIPE NCC
  - Strong authentication mechanisms available
  - Hierarchical authorisation schemes implemented
  - Filter-set “fltr-bogons”, maintainer by Team Cymru

# RIPE RR Supporting RPSLng

- Allows IPv6 and multicast routing policies
- New object type: **route6**
  - Currently, ~50 objects created!
  - hierarchical auth. by mnt-routes in inet6num & aut-num
- New aut-num attributes:
  - **mp-import, mp-export, mp-default**
  - “**afi**” – Address Family Identifier: e.g. afi ipv6.unicast
- New attribute for all “**set**”-s: **mp-members**
- New attribute for **filter-set**: **mp-filter**

# IRRToolSet (Demonstration)

- Merit -> RIPE NCC -> [ISC\(.org\)](#)
  - includes: CIDRAdvisor, prtraceroute, etc
- **RtConfig** – translates RPSL into specific router configuration
  - Command-line tool (scriptable)
- **aoe** – **a**ut-num **O**bject (graphical) **e**ditor
  - Translates BGP-dump into RPSL
  - One-click per peer, using pre-configured templates

# Day-to-day Usage of RR & Tools

1. Create **person**, **role** and **maintainer** objects
2. Describe policy in your **aut-num** object (use aoe)
3. Create **route** objects in the database
4. Create various **as-set** objects, to group different categories of neighbours
  - New neighbour: add their ASN to your as-set
5. Create **RtConfig** commands file & other scripts
  - New neighbour: add pair of commands
6. Run RtConfig / scripts to produce router config.
  - Periodically (once a day? once a week?)
  - When changing policy / adding neighbour

# RR Related RIPE NCC services

- Routing Information Service ([www.ripe.net/ris](http://www.ripe.net/ris))
  - Collects and stores BGP announcements from ~400 peers at 12 IXP world-wide (e.g. NSPIXP2, Otemachi)
  - Shows development of global routing table over time
  - RISwhois – matches prefix to origin AS(es)
  - MyASn - notification system for route propagation
  - BGPlay – visualisation tool
- RR Consistency Check ([www.ripe.net/rrcc](http://www.ripe.net/rrcc))
  - Compares RIS data with the RR & suggests corrections

# Other Party's RR Tools

- “IRR Power Tools”
  - Command-line tools (for UNIX-like systems)
  - <http://sourceforge.net/projects/irrpt/>
  
- “Nemecis” (from July 2004)
  - Analysis of internal consistency of RR
  - <http://ira.cs.ucr.edu:8080/Nemecis>

# Routing Registry: Conclusions

- Please publish your policy in IRR
- Please keep your policy up-to-date
  - New route objects
  - New peers & new relations towards peers' prefixes
- Benefit from the information and tools available
  - Diagnose & troubleshoot network problems
  - Automatically configure routers or create filters
  - Ultimately: easier network maintenance