



# The new RIPE Database software

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# Outline

- What's different in the new implementation ?
- Project status
  - functionality
  - test servers
- Transition
  - transition plan
  - transition issues



# What's different

- Objects and Attributes
- Querying the Database
- Near Real-Time Mirroring
- Submissions to the Database
- Accounting and Access Control



# New objects

- peering-set
- filter-set
- rtr-set
- as-block

# New attributes

- RPSL:
  - member-of, mbrs-by-ref
- RPS-auth:
  - mnt-routes: <mnt\_name> [ rpsl list of prefixes | ANY]
  - referral-by: <mnt\_name>
  - auth-override: YYYYMMDD



# Modifications to all objects

- Line continuation
- Attribute order is relevant
- Support for end of line comments
- Handling of empty attributes
- Legend:

|            |            |            |                          |
|------------|------------|------------|--------------------------|
| holes:     | [optional] | [multiple] | automatically translated |
| member-of: | [optional] | [multiple] | new                      |
| cross-nfy: | [optional] | [multiple] | preserved                |
| community: | [optional] | [multiple] | deprecated               |

# Modified objects

- mntner object

|                |             |            |                       |                  |
|----------------|-------------|------------|-----------------------|------------------|
| mntner:        | [mandatory] | [single]   | [primary/look-up key] |                  |
| descr:         | [mandatory] | [multiple] | [ ]                   |                  |
| admin-c:       | [mandatory] | [multiple] | [inverse key]         |                  |
| tech-c:        | [optional]  | [multiple] | [inverse key]         |                  |
| upd-to:        | [mandatory] | [multiple] | [inverse key]         |                  |
| mnt-nfy:       | [optional]  | [multiple] | [inverse key]         |                  |
| auth:          | [mandatory] | [multiple] | [ ]                   |                  |
| remarks:       | [optional]  | [multiple] | [ ]                   |                  |
| notify:        | [optional]  | [multiple] | [inverse key]         |                  |
| mnt-by:        | [mandatory] | [multiple] | [inverse key]         |                  |
| auth-override: | [optional]  | [single]   | [ ]                   | *** RPS auth *** |
| referral-by:   | [mandatory] | [single]   | [inverse key]         | *** RPS auth *** |
| changed:       | [mandatory] | [multiple] | [ ]                   |                  |
| source:        | [mandatory] | [single]   | [ ]                   |                  |

# Modified objects

- route object

|               |             |            |                       |                          |
|---------------|-------------|------------|-----------------------|--------------------------|
| route:        | [mandatory] | [single]   | [primary/look-up key] |                          |
| descr:        | [mandatory] | [multiple] | [ ]                   |                          |
| origin:       | [mandatory] | [single]   | [primary/inverse key] |                          |
| holes:        | [optional]  | [multiple] | [ ]                   | *** hole in RIPE 181 *** |
| withdrawn:    | [optional]  | [single]   | [ ]                   |                          |
| comm-list:    | [optional]  | [multiple] | [ ]                   |                          |
| advisory:     | [optional]  | [multiple] | [ ]                   |                          |
| member-of:    | [optional]  | [multiple] | [inverse key]         | *** RPSL ***             |
| inject:       | [optional]  | [multiple] | [ ]                   | *** RPSL ***             |
| aggr-mtd:     | [optional]  | [single]   | [ ]                   | *** RPSL ***             |
| aggr-bndry:   | [optional]  | [single]   | [ ]                   | *** RPSL ***             |
| export-comps: | [optional]  | [single]   | [ ]                   | *** RPSL ***             |
| components:   | [optional]  | [single]   | [ ]                   | *** RPSL ***             |
| cross-nfy:    | [optional]  | [multiple] | [inverse key]         |                          |
| community:    | [optional]  | [multiple] | [ ]                   |                          |
| mnt-lower:    | [optional]  | [multiple] | [inverse key]         | *** RPS auth ***         |
| mnt-routes:   | [optional]  | [multiple] | [inverse key]         | *** RPS auth ***         |
| mnt-by:       | [mandatory] | [multiple] | [inverse key]         |                          |
| changed:      | [mandatory] | [multiple] | [ ]                   |                          |
| source:       | [mandatory] | [single]   | [ ]                   |                          |



# Modified objects

- autnum object

|              |             |            |                                   |
|--------------|-------------|------------|-----------------------------------|
| aut-num:     | [mandatory] | [single]   | [primary/look-up key]             |
| as-name:     | [mandatory] | [single]   |                                   |
| descr:       | [mandatory] | [multiple] |                                   |
| as-in:       | [optional]  | [multiple] | [ ]                               |
| as-out:      | [optional]  | [multiple] | [ ]                               |
| interas-in:  | [optional]  | [multiple] | [ ]                               |
| interas-out: | [optional]  | [multiple] | [ ]                               |
| as-exclude:  | [optional]  | [multiple] | [ ]                               |
| member-of:   | [optional]  | [multiple] | [inverse key] *** New in RPSL *** |
| import:      | [optional]  | [multiple] | *** as-in in RIPE 181 ***         |
| export:      | [optional]  | [multiple] | *** as-out in RIPE 181 ***        |
| default:     | [optional]  | [multiple] |                                   |
| remarks:     | [optional]  | [multiple] |                                   |
| admin-c:     | [mandatory] | [multiple] | [inverse key]                     |
| tech-c:      | [mandatory] | [multiple] | [inverse key]                     |
| cross-mnt:   | [optional]  | [multiple] | [inverse key]                     |
| cross-nfy:   | [optional]  | [multiple] | [inverse key]                     |
| notify:      | [optional]  | [multiple] | [inverse key]                     |
| mnt-lower:   | [optional]  | [multiple] | [inverse key] *** RPS auth ***    |
| mnt-routes:  | [optional]  | [multiple] | [inverse key] *** RPS auth ***    |
| mnt-by:      | [mandatory] | [multiple] | [inverse key]                     |
| changed:     | [mandatory] | [multiple] |                                   |
| source:      | [mandatory] | [single]   |                                   |

# Modified objects

- as-set (previously as- macro)

|              |             |            |                                                    |
|--------------|-------------|------------|----------------------------------------------------|
| as-set:      | [mandatory] | [single]   | [primary/look-up key] *** as-macro in RIPE 181 *** |
| descr:       | [mandatory] | [multiple] |                                                    |
| members:     | [optional]  | [multiple] | *** as-list in RIPE 181 ***                        |
| mbrs-by-ref: | [optional]  | [multiple] | [inverse key] *** New in RPSL ***                  |
| remarks:     | [optional]  | [multiple] |                                                    |
| tech-c:      | [mandatory] | [multiple] | [inverse key]                                      |
| admin-c:     | [mandatory] | [multiple] | [inverse key]                                      |
| notify:      | [optional]  | [multiple] | [inverse key]                                      |
| mnt-by:      | [mandatory] | [multiple] | [inverse key]                                      |
| changed:     | [mandatory] | [multiple] |                                                    |
| source:      | [mandatory] | [single]   |                                                    |

# Modified objects

- route-set (previously community)

|              |             |            |                       |                               |
|--------------|-------------|------------|-----------------------|-------------------------------|
| route-set:   | [mandatory] | [single]   | [primary/look-up key] | *** community in RIPE 181 *** |
| descr:       | [mandatory] | [multiple] |                       |                               |
| members:     | [optional]  | [multiple] |                       | *** New in RPSL ***           |
| mbrs-by-ref: | [optional]  | [multiple] | [inverse key]         | *** New in RPSL ***           |
| remarks:     | [optional]  | [multiple] |                       |                               |
| tech-c:      | [mandatory] | [multiple] | [inverse key]         |                               |
| admin-c:     | [mandatory] | [multiple] | [inverse key]         |                               |
| notify:      | [optional]  | [multiple] | [inverse key]         |                               |
| mnt-by:      | [mandatory] | [multiple] | [inverse key]         |                               |
| changed:     | [mandatory] | [multiple] |                       |                               |
| source:      | [mandatory] | [single]   |                       |                               |

# Modified objects

- inet-rtr

|            |             |            |                       |                             |
|------------|-------------|------------|-----------------------|-----------------------------|
| inet-rtr:  | [mandatory] | [single]   | [primary/look-up key] |                             |
| descr:     | [mandatory] | [multiple] |                       |                             |
| alias:     | [optional]  | [multiple] |                       | *** New in RPSL ***         |
| local-as:  | [mandatory] | [single]   | [inverse key]         | *** localas in RIPE 181 *** |
| ifaddr:    | [mandatory] | [multiple] | [look-up key]         |                             |
| peer:      | [optional]  | [multiple] |                       |                             |
| member-of: | [optional]  | [multiple] | [inverse key]         | *** New in RPSL ***         |
| remarks:   | [optional]  | [multiple] |                       |                             |
| admin-c:   | [mandatory] | [multiple] | [inverse key]         |                             |
| tech-c:    | [mandatory] | [multiple] | [inverse key]         |                             |
| notify:    | [optional]  | [multiple] | [inverse key]         |                             |
| mnt-by:    | [mandatory] | [multiple] | [inverse key]         |                             |
| changed:   | [mandatory] | [multiple] |                       |                             |
| source:    | [mandatory] | [single]   |                       |                             |

# Modified objects

- inetnum

|                    |                   |                 |                                       |
|--------------------|-------------------|-----------------|---------------------------------------|
| inetnum:           | [mandatory]       | [single]        | [primary/look-up key]                 |
| netname:           | [mandatory]       | [single]        | [lookup key]                          |
| descr:             | [mandatory]       | [multiple]      | [ ]                                   |
| country:           | [mandatory]       | [multiple]      | [ ]                                   |
| admin-c:           | [mandatory]       | [multiple]      | [inverse key]                         |
| tech-c:            | [mandatory]       | [multiple]      | [inverse key]                         |
| rev-srv:           | [optional]        | [multiple]      | [inverse key]                         |
| status:            | [generated]       | [single]        | [ ]                                   |
| remarks:           | [optional]        | [multiple]      | [ ]                                   |
| notify:            | [optional]        | [multiple]      | [inverse key]                         |
| mnt-by:            | [mandatory]       | [multiple]      | [inverse key]                         |
| mnt-lower:         | [optional]        | [multiple]      | [inverse key]                         |
| <b>mnt-routes:</b> | <b>[optional]</b> | <b>[single]</b> | <b>[inverse key] *** RPS auth ***</b> |
| changed:           | [mandatory]       | [multiple]      | [ ]                                   |
| source:            | [mandatory]       | [single]        | [ ]                                   |

# Queries

- New queries
  - -l <ip range>
  - -x <ip range>
  - -K
  - -d
  - -q sources [<source>]
  - -q version
- Inverse queries
- Other differences

## `-l <ip range>`

- One level less specific
- Does not return the exact match
- Returns the smallest IP range that is bigger than the supplied range and that fully contains it
- `whois -r -Tin 193.0.0.0/23`
- `whois -r -Tin -l 193.0.0.0/23`
- `whois -r -Tin -L 193.0.0.0/23`

*-x <ip range>*

- Exact match
- If no matching object is found nothing is returned
- whois -r -Tin 193.0.2.0/24
- whois -r -Tin -x 193.0.2.0/24



## -K

- Only primary keys are returned
- Exception is a set object, where the *members* attribute is also returned
- Does not apply to person and role objects
- whois -Trt -K -M 193.0.0.0/16
- whois -K -imo RS-HEPNET
- whois -K AS-WORLD

## -d (proposed)

- Triggers inclusion of in-addr.arpa and ip6.int domain objects in the result of IP lookup
- More/less specific lookups are possible
- whois -r -d 193.0.2.0
- whois -d -Tdn -K -M 193.0.0.0/20



# -q sources [*<source>*]

*(proposed)*

- Lists all databases (sources) available from the server
- Additional information regarding mirroring
  - *<source>:<NRTM\_proto\_ver>:<mirroring>:<first>:<last>*
  - *<mirroring>* : Y|N|X : can mirror| cannot | n/a
- whois -q sources



## -q version

- Displays version number of the server software
- whois -q version

# Inverse queries

- `-i admin_c`      `<nic_hdl | name>`
- `-i tech_c`      `<nic_hdl | name>`
- `-i zone_c`      `<nic_hdl | name>`
- `-i author`      `<nic_hdl | name>`
- `-i cross_nfy` `<nic_hdl | name>`
- `-i person`      `<nic_hdl | name>`
  - `(= -i ac,tc,zc,ah,cn)`
- `-i notify`      `<e-mail>`
- `-i upd-to`      `<e-mail>`
- `-i mnt-nfy`      `<e-mail>`

## Inverse queries (2)

- **-i mnt-by** <maintainer name>
- **-i mnt-lower** <maintainer name>
- **-i mbrs-by-ref** <maintainer name>
- **-i mnt-routes** <maintainer name>
- **-i cross-mnt** <maintainer name>
- **-i referral-by** <maintainer name>
- **-i origin** <AS key>
- **-i local-as** <AS key>
- **-i member-of** <set name>
- **-i rev-srv** <hostname | IP address>
- **-i nserver** <hostname | IP address>
- **-i sub-dom** <domain name>

# Other differences

- `-i role` is not supported *(proposed)*
- inverse queries do not follow referral *(proposed)*
- `-k` is also accepted without an argument  
(next empty `-k` will close the connection)

# NRTM

- NRTM server listens on a separate port
- No selective mirroring is possible (do we need it?)
- Queries
  - -q sources
  - -g <source>:<NRTM\_proto\_ver>:<from>-<to>
- Errors
  - %ERROR:1: Syntax error
  - %ERROR:2: Invalid range: Not within <first>-<last>
  - %ERROR:3: You are not authorized to mirror the database
  - %ERROR:4: Unknown source





# Submissions to the Database

- MIME support
  - text/plain, application/pgp-signature, application/pgp
  - multipart/mixed, multipart/alternative,
  - multipart/signed, message/rfc822
  - each MIME part is treated as a separate submission
- PGP support
  - GnuPG
  - multipart/signed MIME encapsulation



# Accounting and Access Control

- Access to “public” and “contact” data is accounted differently
- Contact data:
  - $\text{limit} = f(\text{max\_limit1}, \text{objects\_received}, \text{query\_rate})$
  - when limit is hit - the query is aborted
  - # of times the limit may be hit before permanent denial
- Public data:
  - $\text{limit} = \text{max\_limit2}$
- Trusted proxies: accounting is based on client's IP



# Project Status

- Version 0.5β was released last week
  - 20/146 downloads
- External functionality is complete
- Our beta testers (Thanks for your input !)
  - Harald Michl
  - Marc Roger



# Project Status(2)

- What's missing:
  - Server infrastructure (backup, cleanup, logging, etc.)
- What needs further development:
  - MIME support
  - Server configuration/administration
  - Software portability



# Prototype servers

- Near real-time mirror of the RIPE Database
  - `whois -h rpsl.ripe.net`
  - contains live RIPE Database in RPSL format
- Test server for submissions
  - mail `<auto-rip@ripe.net>`
  - `whois -h rpsl.ripe.net -p 4343`



# Contact information

- Mailing list
  - <db-beta@ripe.net>
- RIPE NCC development team
  - <dbrip@ripe.net>
- Web page:
  - <http://www.ripe.net/ripenncc/pub-services/db/reimp/>



# Transition plan

- Phase I: started in February
  - New server mirrors live database and translates IRR objects to RPSL.
- Phase II: End June 2000
  - NRTM of the RIPE Database (RPSL format)
  - New server processes updates on a test database
  - Extensive testing

# Transition Plan (2)

- Phase III: 2000. Dependant on confidence and consensus
  - New server becomes the authoritative RIPE Database.
  - DB files at ftp.ripe.net are in RPSL format
  - RPSL submissions at <auto-rpsl@ripe.net>
  - RIPE-181 submissions at <auto-dbm@ripe.net>
    - are translated into RPSL
    - only creations and modifications (NOT deletions!)
- Phase IV
  - RPSL submissions at <auto-dbm@ripe.net>
  - RIPE-181 submissions at <auto-181@ripe.net>
- Phase V
  - Only RPSL submissions at <auto-dbm@ripe.net>



# Transition issues

- Sets
  - as-macro: <macro\_name> => as-set: <macro\_name>
  - community: <comm\_name> => route-set: RS-<comm\_name>
- Reserved prefixes (RP)
  - AS-, RS-, RTRS-, FLTR-, PRNG-
  - mntner: <RP><mt\_name> => mntner: MNT-<RP><mt\_name>
- Mandatory attribute: mnt-by (except dn, pn, ro)
  - no mnt-by => mnt-by: RIPE-NCC-NONE-MNT
- New attribute: referral-by
  - => referral-by: RIPE-DBM-MNT

# Questions?



# New object: peering-set

- Peering-set

|                     |                    |                   |                              |
|---------------------|--------------------|-------------------|------------------------------|
| <b>peering-set:</b> | <b>[mandatory]</b> | <b>[single]</b>   | <b>[primary/look-up key]</b> |
| descr:              | [mandatory]        | [multiple]        |                              |
| <b>peering:</b>     | <b>[mandatory]</b> | <b>[multiple]</b> |                              |
| remarks:            | [optional]         | [multiple]        |                              |
| tech-c:             | [mandatory]        | [multiple]        | [inverse key]                |
| admin-c:            | [mandatory]        | [multiple]        | [inverse key]                |
| notify:             | [optional]         | [multiple]        | [inverse key]                |
| mnt-by:             | [mandatory]        | [multiple]        | [inverse key]                |
| changed:            | [mandatory]        | [multiple]        |                              |
| source:             | [mandatory]        | [single]          |                              |

# New object: filter-set

- defines a set of routes that are matched by its filter

|                    |                    |                   |                              |
|--------------------|--------------------|-------------------|------------------------------|
| <b>filter-set:</b> | <b>[mandatory]</b> | <b>[single]</b>   | <b>[primary/look-up key]</b> |
| <b>descr:</b>      | <b>[mandatory]</b> | <b>[multiple]</b> |                              |
| <b>filter:</b>     | <b>[mandatory]</b> | <b>[single]</b>   |                              |
| <b>remarks:</b>    | <b>[optional]</b>  | <b>[multiple]</b> |                              |
| <b>tech-c:</b>     | <b>[mandatory]</b> | <b>[multiple]</b> | <b>[inverse key]</b>         |
| <b>admin-c:</b>    | <b>[mandatory]</b> | <b>[multiple]</b> | <b>[inverse key]</b>         |
| <b>notify:</b>     | <b>[optional]</b>  | <b>[multiple]</b> | <b>[inverse key]</b>         |
| <b>mnt-by:</b>     | <b>[mandatory]</b> | <b>[multiple]</b> | <b>[inverse key]</b>         |
| <b>changed:</b>    | <b>[mandatory]</b> | <b>[multiple]</b> |                              |
| <b>source:</b>     | <b>[mandatory]</b> | <b>[single]</b>   |                              |

# New object: rtr-set

- defines a set of routers specified by inet-rtr names, ipv4\_addresses or other rtr-set names

|                     |                    |                   |                              |
|---------------------|--------------------|-------------------|------------------------------|
| <b>rtr-set:</b>     | <b>[mandatory]</b> | <b>[single]</b>   | <b>[primary/look-up key]</b> |
| <b>descr:</b>       | <b>[mandatory]</b> | <b>[multiple]</b> |                              |
| <b>members:</b>     | <b>[optional]</b>  | <b>[multiple]</b> |                              |
| <b>mbrs-by-ref:</b> | <b>[optional]</b>  | <b>[multiple]</b> |                              |
| <b>remarks:</b>     | <b>[optional]</b>  | <b>[multiple]</b> |                              |
| <b>tech-c:</b>      | <b>[mandatory]</b> | <b>[multiple]</b> | <b>[inverse key]</b>         |
| <b>admin-c:</b>     | <b>[mandatory]</b> | <b>[multiple]</b> | <b>[inverse key]</b>         |
| <b>notify:</b>      | <b>[optional]</b>  | <b>[multiple]</b> | <b>[inverse key]</b>         |
| <b>mnt-by:</b>      | <b>[mandatory]</b> | <b>[multiple]</b> | <b>[inverse key]</b>         |
| <b>changed:</b>     | <b>[mandatory]</b> | <b>[multiple]</b> |                              |
| <b>source:</b>      | <b>[mandatory]</b> | <b>[single]</b>   |                              |

# New object: as-block

- Defines a range of AS numbers delegated to a given repository

|                  |                    |                 |                              |
|------------------|--------------------|-----------------|------------------------------|
| <b>as-block:</b> | <b>[mandatory]</b> | <b>[single]</b> | <b>[primary/look-up key]</b> |
| descr:           | [optional]         | [multiple]      |                              |
| remarks:         | [optional]         | [multiple]      |                              |
| tech-c:          | [mandatory]        | [multiple]      | [inverse key]                |
| admin-c:         | [mandatory]        | [multiple]      | [inverse key]                |
| notify:          | [optional]         | [multiple]      | [inverse key]                |
| mnt-lower:       | [optional]         | [multiple]      | [inverse key]                |
| mnt-by:          | [mandatory]        | [multiple]      | [inverse key]                |
| changed:         | [mandatory]        | [multiple]      |                              |
| source:          | [mandatory]        | [single]        |                              |

# Membership of set objects

```
route-set:    RS-F00
mbrs-by-ref:  MNT-FOOBAR
...
```

```
route:        193.0.0.0/22
origin:       AS3333
member-of:    RS-F00
mnt-by:       MNT-FOOBAR
...
```

```
route:        192.168.0.0/24
origin:       AS3333
member-of:    RS-F00
...
```

```
as-set:       AS-BAR
members:      AS3333
mbrs-by-ref:  MNT-FOOBAR
...
```

```
aut-num:      AS3333
...
```

```
aut-num:      AS3267
mnt-by:       MNT-FOOBAR
...
```