

The RIPE Database & The Internet Routing Registry

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Outline

- Purpose of the RIPE database
- Description of Database Objects
- Querying the Database
- Creating, Updating and Deleting Objects
- Authorization and Authentication

Outline 2

- Hierarchical Object Protection
- Mirroring the RIPE Database
- Non-production databases at the RIPE NCC

Purpose of the RIPE Database

- To support NIC's/NOC's in Europe and surrounding areas to perform their tasks
- Available to the public for **agreed** Internet operational purposes.

Four Registries

- IP address
- Domains (including in-addr.arpa)
- Routing
- Contact information

The IP Registry

- Information about IP address space
- Allocations and assignments
- Inetnum object



Inetnum Object

```
inetnum: 193.0.0.0 - 193.0.0.255
netname: RIPE-NCC
descr: RIPE-Network Coordination Centre
country: Amsterdam, Netherlands
admin-c: JLC2-RIPE
tech-c: OPS4-RIPE
rev-srv: ns.ripe.net
rev-srv: ns.eu.net
status: ASSIGNED PA
mnt-by: RIPE-NCC-MNT
changed: orange@ripe.net 19960815
changed: mir@ripe.net 19970506
changed: ripe-dbm@ripe.net 19970819
source: RIPE
```

different formats possible for inetnum value



The Domain Registry

- The domain object
- Includes Reverse Delegations
- The Domain Registry is a convenient reference
- It is not the registry that is maintained by the ccTLD's (country code Top Level Domain) Administrators.



Domain Object

```
domain: over.ripe.net
descr: RIPE Network Coordination Centre
descr: Singel 258
descr: NL-1016 AB Amsterdam
descr: The Netherlands
admin-c: AMRM1-RIPE
tech-c: RD132-RIPE
zone-c: RD132-RIPE
remarks: example object only
notify: amrm@ripe.net
changed: ripe-dbm@ripe.net 19970115
source: TEST
```



The Routing Registry

- Autonomous Systems
- Internet Routes
- Supports checking of inconsistencies
- Refers to contact person information



The Routing Registry 2

- Aut-Num (represents Autonomous System)
- Route
- AS-Macro
- Community
- Inet-Rtr (internet router)



Route Object

```
route: 193.0.0/24
descr: RIPE-NCC
origin: AS3333
mnt-by: RIPE-NCC-MNT
changed: olaf@ripe.net 19981208
source: RIPE
```

- represents a "route" in the Internet
- contains all "membership" information
- this route is originated in AS3333
- only one origin possible

The Aut-Num Object

- Describes the import and export policies of an Autonomous System (AS).
- An AS has a single and clearly defined routing policy.
- Not an administrative object
- Scalable

The AS Object

An example (RIPE-181 format):

```

aut-num: AS3333
descr: RIPE NCC
as-in: from AS286 120 accept ANY
as-in: from AS1104 120 accept AS1104
as-out: to AS286 announce AS3333
as-out: to AS1104 announce AS3333
cross-nfy: OPS4-RIPE
cross-mnt: RIPE-NCC-MNT
admin-c: OK65
tech-c: OPS4-RIPE
mnt-by: RIPE-NCC-MNT
changed: olaf@ripe.net 19981208
source: RIPE
    
```

Overlapping routes

- The sender is always notified of overlaps.
- Cross-notification attributes can be added
- The set of sources that are searched for these conflicts is defined in the configuration file.

Cross-notification

- When the prefix of a **new** route object overlaps with that in any other route object in the RR,
- when the prefix of a **deleted** route object overlapped with that in any other route object in the RR,
- notification is sent to contact referenced in “cross-nfy” and/or “cross-mnt” attribute of “overlapped” object(s).

“cross-nfy” attribute

- Points to a NIC-handle (cf. admin-c, tech-c)
 - can point to the NIC-handle of a role object
- The e-mail address of this NIC-handle will get the notification.

“cross-mnt” attribute

- Points to a mntner (cf. “mnt-by”, “mnt-lwr”).
- The notification is sent to the mailbox in the “mnt-nfy” attribute of the mntner in “cross-mnt”
- No authentication checks are done, only for notification.



“cross-nfy” attribute in Route Object

```

route: 193.0.0/24
origin: AS3333
cross-nfy: OPS4-RIPE

route: 193.0.0.0/32 (new)

role: RIPE NCC OPERATIONS
nic-hdl: OPS4-RIPE
email: ops@ripe.net

```

<ops@ripe.net> gets a notification.



“cross-mnt” attribute in Route Object

```

route: 193.0.0/24
origin: AS3333
cross-mnt: RIPE-NCC-MNT

route: 193.0.0.0/32 (new)

mntner: RIPE-NCC-MNT
descr: RIPE-NCC Maintainer
mnt-nfy: ops@ripe.net

```

<ops@ripe.net> gets a notification.



“cross-nfy” attribute in Aut-num Object

```

route: 193.0.0/24
origin: AS3333
route: 193.0.0.0/25 (new)
origin: AS1234

aut-num: AS3333
cross-nfy: OPS4-RIPE

role: RIPE NCC OPERATIONS
nic-hdl: OPS4-RIPE
email: ops@ripe.net

```

<ops@ripe.net> gets a notification.



“cross-mnt” attribute in Aut-num Object

```

route: 193.0.0/24
origin: AS3333
route: 193.0.0.0/25 (new)
origin: AS1234

aut-num: AS3333
cross-mnt: RIPE-NCC-MNT

mntner: RIPE-NCC-MNT
mnt-nfy: ops-fyi@ripe.net

```

<ops-fyi@ripe.net> gets a notification.



The Aut-Num Object in RPSL

- These attributes remain in all RPSL object types:
 - descr, admin-c, tech-c, remarks, notify, changed, source
- These attributes are used in RPSL aut-num object:
 - as-name, import, export, default and member of.
- More later



Route object in RPSL

- Extra attributes in the route object
- member-of
- inject
- components
- aggr-bndry
- aggr-mtd
- export-comps

The AS-Macro Object

as-macro: AS-ACONET
 descr: ACONET AS Macro
 descr: ASes served by SUNET
as-list: AS-UDNVIE AS1853 AS1205 AS2131
 admin-c: WK42
 tech-c: EJ63
 tech-c: CP8-RIPE
 mnt-by: AS1853-MNT
 changed: Panigl@cc.univie.ac.at 950516
 source: RIPE

- Contains no policy information, only provides additional information for communities networks can belong to.

AS-Macro Object in RPSL

- Not used in RPSL
- Replaced by as-set
- as-set is more flexible than AS-Macro

CommunityObject

community: HEPNET
 descr: High Energy Physics Network
 authority: HEPnet technical committee IP
 (HTC-IP)
 guardian: farrache@ccpnxt5.in2p3.fr
 admin-c: Gilles Farrache
 tech-c: Gilles Farrache
 changed: farrache@ccpnxt5.in2p3.fr
 19940222
 source: RIPE

Community Object in RPSL

- Not in RPSL
- Replaced by rs-set

Contact information Registry

- Person
- Role
- Mntner
- Minor changes with RPSL

Person Object

person: Mirjam Kuehne
 address: RIPE NCC
 address: Singel 258
 address: NL - 1016 AB Amsterdam
 address: Netherlands
 phone: +31 20 535 4444
 fax-no: +31 20 535 4445
 e-mail: mir@ripe.net
nic-hdl: MK16-RIPE
 notify: mir@ripe.net
 changed: mir@ripe.net 19950411
 changed: mir@ripe.net 19970616
 source: RIPE

Role Object

role: RIPE DBM
 address: RIPE NCC, Singel 258
 address: NL - 1016 AB / Amsterdam, Netherlands
 phone: +31 20 535 4444
 fax-no: +31 20 535 4445
e-mail: ripe-dbm@ripe.net
 trouble: Information: <http://www.ripe.net/db/index.html>
 trouble: Documentation: <http://www.ripe.net/docs/ripe-157.html>
 trouble: Questions and bug reports ... <mailto:ripe-dbm@ripe.net>
 admin-c: AMRM1-RIPE
 tech-c: AMRM1-RIPE
nic-hdl: **RD132-RIPE**
 changed: ripe-dbm@ripe.net 19970115
 source: RIPE

Role Object

- More stable than person objects
- "trouble" attribute
- Nic-handle attribute of role and person objects share the same name space
- A role object can be used as admin-c

Maintainer Object

mntner: RIPE-NCC-MNT
 descr: RIPE-NCC Maintainer
 admin-c: JLC2-RIPE
 tech-c: MK16-RIPE
 upd-to: ripe-dbm@ripe.net
 mnt-nfy: ripe-dbm@ripe.net
 auth: MAIL-FROM .*ripe\.net
mnt-by: **RIPE-NCC-MNT**
 changed: geertj@ripe.net 19941013
 changed: GeertJan.deGroot@ripe.net 19941125
 source: RIPE

- manual registration of object necessary
- send object to <ripe-dbm@ripe.net>

Querying the Database

- The RIPE whois client
 - available by anonymous ftp
 - <ftp://ftp.ripe.net/tools/ripe-whois-tools-2.4.tar.gz>
 - Make sure that you have the newest version
- Web Interface

The RIPE whois client

- Search keys
- Options

Querying the Database

- Search keys (Look-up Keys)
 - **person** name, nic-hdl, e-mail
 - **role** name, nic-hdl, e-mail
 - **maintainer** maintainer name
 - **inetnum** network number, network name
 - **domain** domain name
 - **aut-num** AS number
 - **as-macro** AS-macro name
 - **community** community name
 - **route** route value

Example query

- whois 193.0.0.0
 - inetnum: 193.0.0.0 - 193.0.0.255
 - netname: RIPE-NCC
 - admin-c: DK58
 - tech-c: OPS4-RIPE
- route: 193.0.0.0/24
- descr: RIPE-NCC
- role: RIPE NCC Operations
- address: Singel 258
- person: Daniel Karrenberg
- address: RIPE Network Coordination Centre (NCC)

RIPE Whois Options

- **I** inverse lookup for specified attributes
- **c** see the changed field attribute
- **L** find all Less specific matches
- **m** find first level more specific matches
- **M** find all More specific matches
- **r** turn off recursive lookups
- **T** type only look for objects of type (inetnum, route, etc..)
- **R** force to show local copy of the domain object even if it contains referral

RIPE Whois Options 2

- **a** also search all databases mirrored by RIPE
- **h** hostname search alternate server
- **t** show template for object of type "type"
- **v** verbose information for object of type "type"
- see **whois help** for other options (will get you a howto on searching the database)

Whois -a and -h Options

- whois -h query a specific host
 - *whois -h whois.ripe.net*
 - *whois -h whois.arin.net*
- whois -a includes the following sources
 - RADB
 - CANET
 - MCI
 - ANS
 - APNIC
 - RIPE
 - The NCC mirrors RADB, CANET, MCI, ANS, APNIC

Whois -t Option

person: [mandatory] [single] [primary/look-up key]
 address: [mandatory] [multiple] []
 phone: [mandatory] [multiple] []
 fax-no: [optional] [multiple] []
 e-mail: [optional] [multiple] [look-up key]
 nic-hdl: [mandatory] [single] [primary/look-up key]
 remarks: [optional] [multiple] []
 notify: [optional] [multiple] [inverse key]
 mnt-by: [optional] [multiple] [inverse key]
 changed: [mandatory] [multiple] []
 source: [mandatory] [single] []

- Used when creating objects

Web Interface

- RIPE Database homepage:
 - <http://www.ripe.net/ripenncc/pub-services/db/>
- Whois on the Web:
 - <http://www.ripe.net/cgi-bin/whois>
- GLIMPSE raw text search:
 - <http://www.ripe.net/cgi-bin/ripedbsearch>

Managing Objects

- Creating, Updating and Deleting Objects

Creating Objects

- Make a copy of the template of the object
 - use **whois -t <object-type>**
- Write in your details
- Mandatory attributes **must** have a value
- Optional attributes may be undefined, but they are removed by the “robot” :-)
- **Generated attributes**

Creating Objects 2

- nic-hdl attribute (“person” and “role” objects):
 - AUTO-1
 - AUTO-1<Your Initials>
- Send the object to **<auto-dbm@ripe.net>**

Updating Objects

- Make a copy of the existing object
- Edit the copy of the existing object
- Add a “changed” line
- Send to **<auto-dbm@ripe.net>**
- If you send an identical object, NOOP
- Good idea to keep the changed lines

Deleting an object

- add delete attribute to **exact** copy of current object

person: Mirjam Kuehne
 address: RIPE NCC
 address: Singel 258
 address: NL - 1016 AB Amsterdam
 address: Netherlands
 phone: +31 20 535 4444
 fax-no: +31 20 535 4445
 e-mail: mir@ripe.net
 nic-hdl: MK16-RIPE
 changed: mir@ripe.net 950411
 source: RIPE
delete: training@ripe.net late for training

E-mail Interface

- **<auto-dbm@ripe.net>**
 - automatic mailbox
 - send all updates to this mailbox
 - can use LONGACK in subject line
 - can use HELP in subject line
- **<ripe-dbm@ripe.net>**
 - send questions and comments to this mailbox

DB Update Procedure

- Syntax checking
 - Warnings
 - object corrected and accepted
 - notification of action taken in acknowledgement
 - Errors
 - object NOT corrected and NOT accepted
 - diagnostics in acknowledgement
 - if you do not understand, send e-mail
 - <ripe-dbm@ripe.net>

Notification/Authorisation

- notify attribute
 - sends notification to email address specified
- mnt-by attribute & mntner object
 - mnt-by attribute can be included in every object
 - mnt-by value references mntner object that describes the maintainer & contains authentication details
 - objects that contain mnt-by must pass the authentication rules in the mntner object
- mnt-lower attribute & mntner object
 - controls the creation of objects one level below in the hierarchy of an object type

Maintainer Object

```

mntner: RIPE-NCC-MNT
descr: RIPE-NCC Maintainer
admin-c: JLC2-RIPE
tech-c: MK16-RIPE
upd-to: ripe-dbm@ripe.net
mnt-nfy: ripe-dbm@ripe.net
auth: MAIL-FROM .*ripe\.net
mnt-by: RIPE-NCC-MNT
changed: geertj@ripe.net 19941013
changed: GeertJan.deGroot@ripe.net 19941125
source: RIPE
  
```

- manual registration of object necessary
- send object to <ripe-dbm@ripe.net>

Maintainer Object

- auth attribute (mandatory)
 - **NONE**
 - **MAIL-FROM** {e-mail address, regular expression}
 - **CRYPT-PW** encrypted password
 - **PGPKEY** -<key-id>
- upd-to attribute (mandatory)
 - notification for failed updates
 - mailbox for requested changes

Maintainer Object 2

- mnt-by attribute (mandatory)
 - can reference the object itself
 - Not always a good idea
- mnt-nfy attribute (optional)
 - works like notify but for all objects that refer to this maintainer object

Hierarchical Authorisation

- You can ask for mnt-lower to be added to allocation object. Send message to <hostmaster@ripe.net>


```

inetnum: 193.1.0.0 - 193.1.31.255
netname: REGISTRY-ALLOCATION
descr: Allocation to Registry
country: EU
admin-c: JLC2-RIPE
tech-c: MK16-RIPE
status: ALLOCATED PA
mnt-by: RIPE-NCC-MNT
mnt-lower: REGISTRY-MNT
changed: hostmaster@ripe.net 19960310
source: RIPE
  
```

Mirroring the RIPE Database

- Real-time mirroring
 - Controlled by an access list
- Person and Role object data:
 - Acceptable Use Policy
- Software available from ftp site
- `ftp://ftp.ripe.net/ripe/dbase/software/ripe-db-2.3.2.tar.gz`

Non-Production Databases

- TEST database
 - `<test-dbm@ripe.net>`
 - `test-whois.ripe.net`
- RPSL server:
 - `<auto-rpsl@ripe.net>`
 - `rpsl.ripe.net`
- Beta-server:
 - `beta-whois.ripe.net`
 - `<auto-beta@ripe.net>`

Questions ?

Answers !