RIPE Database

Training Course

April 2019
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 09:30</td>
<td>Coffee, Tea</td>
</tr>
<tr>
<td>11:00 - 11:15</td>
<td>Break</td>
</tr>
<tr>
<td>13:00 - 14:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>15:30 - 15:45</td>
<td>Break</td>
</tr>
<tr>
<td>17:30</td>
<td>End</td>
</tr>
</tbody>
</table>
Introductions

• Name

• Experience with:
  - Being an LIR
  - The RIPE Database

• Goals
Overview

• What is the RIPE Database?
• How does it work?
• How to update it?
• Delegating address space to others
• RIPE Routing Registry
• Reverse DNS
• More RIPE Database
• Play Time!
• The RESTful API
Prepare Yourself!

- Get your laptop up and running

- Make sure you have an Internet connection
  - and a RIPE NCC Access account!

- Go to the TEST Database: https://apps-test.db.ripe.net
  - Open several tabs in the browser, if you want
Make sure you are in the TEST Database!
• Take out the exercise booklet

• When you see the green square, there is an activity for you to do!

= Activity time!

• Get ready to type a lot!

• Don’t forget to take notes in the notebook ;-)
The Story

• Your colleague Jean Blue opened an LIR account

• Jean Blue already did some things in the Database

• You were requested to take over some tasks

• You decided to come to this training course!
The RIPE Database
What is it?
Your LIR Account Was Activated

1. Read the email 1
   - from the RIPE NCC Customer Services department

2. Go to https://apps-test.db.ripe.net

3. Search for the person object from the email
What Do You See?

• What do you get as a result?
• Which lines are not easy to understand?
What You Are Seeing

A person object has data that can be used to contact a real person.
The RIPE Database

Public Internet resource and routing registry database

Ask Pedro to remake this concept.
Purpose of the RIPE Database

- Registry of **WHO** holds IPs and ASNs
- Keep **contact** information
  - For troubleshooting, notifying of outages, etc.
- Publishing **routing** policies
- Provisioning **reverse DNS**
RIPE Database Objects

IPs and ASNs
- inetnum
- inet6num
- aut-num

Routing
- route
- route6
- as-set

Contact Information
- organisation
- person
- role

Reverse DNS
- domain

Object Protection
- mntner
Looking Up Object Templates

1. Go to http://apps-test.db.ripe.net

2. Search for the following:

   -t person

   • Alternatively, check the manual:

     https://www.ripe.net/manage-ips-and-asns/db/support/documentation/ripe-database-documentation/
What Do You See?

- What do you get as a result?
- What is not easy to understand?
# Anatomy of an Object

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>person:</td>
<td>Jean Blue</td>
</tr>
<tr>
<td>address:</td>
<td>Long Street 123</td>
</tr>
<tr>
<td>address:</td>
<td>76543 Big City</td>
</tr>
<tr>
<td>e-mail:</td>
<td><a href="mailto:j.blue@example.com">j.blue@example.com</a></td>
</tr>
<tr>
<td>nic-hdl:</td>
<td>JB0123-RIPE</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>SECURITY-MNT</td>
</tr>
<tr>
<td>created:</td>
<td>(date &amp; time)</td>
</tr>
<tr>
<td>last-modified:</td>
<td>(date &amp; time)</td>
</tr>
<tr>
<td>source:</td>
<td>RIPE</td>
</tr>
</tbody>
</table>
## Object Templates

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>person</td>
<td>mandatory</td>
<td>[single]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[lookup key]</td>
</tr>
<tr>
<td>address</td>
<td>mandatory</td>
<td>[multiple]</td>
</tr>
<tr>
<td>phone</td>
<td>mandatory</td>
<td>[multiple]</td>
</tr>
<tr>
<td>fax-no</td>
<td>optional</td>
<td>[multiple]</td>
</tr>
<tr>
<td>e-mail</td>
<td>optional</td>
<td>[multiple]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[lookup key]</td>
</tr>
<tr>
<td>org</td>
<td>optional</td>
<td>[multiple]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[inverse key]</td>
</tr>
<tr>
<td>nic-hdl</td>
<td>mandatory</td>
<td>[single]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[primary/lookup key]</td>
</tr>
<tr>
<td>remarks</td>
<td>optional</td>
<td>[multiple]</td>
</tr>
<tr>
<td>notify</td>
<td>optional</td>
<td>[multiple]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[inverse key]</td>
</tr>
<tr>
<td>mnt-by</td>
<td>mandatory</td>
<td>[multiple]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[inverse key]</td>
</tr>
<tr>
<td>created</td>
<td>generated</td>
<td>[single]</td>
</tr>
<tr>
<td>last-modified</td>
<td>generated</td>
<td>[single]</td>
</tr>
<tr>
<td>source</td>
<td>mandatory</td>
<td>[single]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[ ]</td>
</tr>
</tbody>
</table>
Primary Key

- Every object has one Primary Key
- It makes the object unique
  - Different from other objects of the same type
## Lookup Keys

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>person:</td>
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<tr>
<td>address:</td>
<td>Long Street 123</td>
</tr>
<tr>
<td>address:</td>
<td>76543 Big City</td>
</tr>
<tr>
<td>e-mail:</td>
<td><a href="mailto:j.blue@example.com">j.blue@example.com</a></td>
</tr>
<tr>
<td>nic-hdl:</td>
<td>JB0123-RIPE</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>SECURITY-MNT</td>
</tr>
<tr>
<td>created:</td>
<td>(date &amp; time)</td>
</tr>
<tr>
<td>last-modified:</td>
<td>(date &amp; time)</td>
</tr>
<tr>
<td>source:</td>
<td>RIPE</td>
</tr>
</tbody>
</table>
Search For Your Organisation

1. Read the email 1 again

2. Go to https://apps-test.db.ripe.net

3. Search for the organisation object
What Do You See?

• What does the organisation object represent?

• Notice the “admin-c:” and “tech-c:” attributes

• What are their values?
What You Are Seeing

An organisation object has data about a company, institution or any other kind of organisation that has IP addresses and AS Numbers.

This is how you can contact ORG and who is responsible.
Objects Are Linked To Each Other

IP block

organisation

person

org:

contact:

org:

contact:
**admin-c**

- Appears in most types of objects
- Name of *administrative* contact person(s)
- This is someone who will be contacted about administrative questions such as network registration, etc.
tech-c

- Appears in most types of objects
- Name of technical contact person(s)
- This is someone to be contacted for technical problems such as routing, (mis)behavior of hosts on the net, etc.
Search For Your Role Object

1. Read the email 1 again

2. Go to https://apps-test.db.ripe.net

3. Search for the role object
What Do You See?

- Notice the “admin-c:” and “tech-c:” attributes
- What are their values?
- Do you see any attribute that catches the eye?
Two Functions for the Role Object

Group of Persons

Abuse Contact

role

admin-c:
tech-c:
abuse-mailbox:
Role Object: Abuse Contact

- The **role** object contains the “abuse-mailbox:”
- Objects reference the **role** in “abuse-c:”
- RIPE Database shows the abuse contact in WHOIS query results

![Diagram showing the role object, abuse-c, abuse-mailbox, and abuse-reporting fields]

- **abuse-c:** AR0555-RIPE
- **role:** Abuse Reports
  - **nic-hdl:** AR0555-RIPE
  - **abuse-mailbox:** report-it@example.com
Role Object: Group of Persons

person: Jean Blue
  nic-hdl: JB123-RIPE
  address: Long Street 5
  phone: +31 20 555 0101
  email: jean@example.net
  mnt-by: LIR-MNT

role: LIR Admin
  nic-hdl: LA789-RIPE
  admin-c: JB123-RIPE
  tech-c: JB123-RIPE
  mnt-by: LIR-MNT

person: Betty White
  nic-hdl: BW531-RIPE
  address: Long Street 5
  phone: +31 20 555 0101
  email: betty@example.net
  mnt-by: LIR-MNT

IP block
  admin-c: LA789-RIPE
  tech-c: LA789-RIPE

IP block
  admin-c: LA789-RIPE
  tech-c: LA789-RIPE

IP block
  admin-c: LA789-RIPE
  tech-c: LA789-RIPE

IP block
  admin-c: LA789-RIPE
  tech-c: LA789-RIPE

IP block
  admin-c: LA789-RIPE
  tech-c: LA789-RIPE

mnt-by: LIR-MNT
Questions
How Does It Work?

Looking for data in the Database
Search For Your Allocations

1. Read emails 2 and 3
   - from the Registration Services department

2. Go to http://apps-test.db.ripe.net

3. Search for the **inetnum** and **inet6num** objects
   - Open two tabs or windows if needed!
   - Use the text in the “**inetnum:**” and “**inet6num:**” lines
     - i.e. 10.XX.0.0 - 10.XX.3.255
     - i.e. 2002:ffXX::/32
What Do You See?

• Look at the first object in the results
• What do you see?
• How many objects did you get?
## Network Objects

**IPv4 = inetnum**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>inetnum:</td>
<td>192.30.0.0 - 192.30.3.255</td>
</tr>
<tr>
<td>netname:</td>
<td>NL-NETWORK-20170101</td>
</tr>
<tr>
<td>country:</td>
<td>NL</td>
</tr>
<tr>
<td>org:</td>
<td>ORG-EE2-RIPE</td>
</tr>
<tr>
<td>admin-c:</td>
<td>DV789-RIPE</td>
</tr>
<tr>
<td>tech-c:</td>
<td>JS123-RIPE</td>
</tr>
<tr>
<td>status:</td>
<td>ALLOCATED PA</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>RIPE-NCC-HM-MNT</td>
</tr>
<tr>
<td>source:</td>
<td>RIPE</td>
</tr>
</tbody>
</table>

**IPv6 = inet6num**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>inet6num:</td>
<td>2001:db8::/32</td>
</tr>
<tr>
<td>netname:</td>
<td>NL-NETWORK-20170101</td>
</tr>
<tr>
<td>country:</td>
<td>NL</td>
</tr>
<tr>
<td>org:</td>
<td>ORG-EE2-RIPE</td>
</tr>
<tr>
<td>admin-c:</td>
<td>DV789-RIPE</td>
</tr>
<tr>
<td>tech-c:</td>
<td>JS123-RIPE</td>
</tr>
<tr>
<td>status:</td>
<td>ALLOCATED-BY-RIR</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>RIPE-NCC-HM-MNT</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>DEFAULT-LIR-MNT</td>
</tr>
<tr>
<td>source:</td>
<td>RIPE</td>
</tr>
</tbody>
</table>
• Same object structure for IPv4 and IPv6

Network

Contact information

Type of address space

Protection of object

- **inetnum:** IPv4 RANGE
- **inet6num:** IPv6 PREFIX
- **netname:** NETWORK-NAME
- **country:** ZZ
- **org:** ORG-ZZ123-RIPE
- **admin-c:** AD321-RIPE
- **tech-c:** TE123-RIPE
- **status:** ALLOC-ASSIGN
- **mnt-by:** RIPE-NCC-HM-MNT
- **mnt-by:** DEFAULT-LIR-MNT
- **source:** RIPE
Hierarchical Distribution

IANA → RIR → LIR → End User

Allocation, PA Assignment, PI Assignment

Sponsoring LIR
Object Status Hierarchy

IPv4

IPv6
Default Query Results

- When you query for an **IP address** or **prefix**…

<table>
<thead>
<tr>
<th>Least Specific</th>
<th>Most Specific</th>
</tr>
</thead>
</table>

![Diagram showing IP address hierarchy with least specific at the top and most specific at the bottom.](image)
Default Query Results

• When you query for simple **text**...
Filtered Query Results

- All email addresses are filtered
- Show them with -B flag in query
  - Or turn on “Show full object details”
- “auth:” attribute values are always filtered

<table>
<thead>
<tr>
<th>person:</th>
<th>Jean Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>nic-hdl:</td>
<td>JB123-RIPE</td>
</tr>
<tr>
<td>address:</td>
<td>Long Street 5</td>
</tr>
<tr>
<td>phone:</td>
<td>+31 20 555 0101</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>LIR-MNT</td>
</tr>
<tr>
<td>source:</td>
<td>RIPE # Filtered</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>mntner:</th>
<th>LIR-MNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin-c:</td>
<td>JB123-RIPE</td>
</tr>
<tr>
<td>auth:</td>
<td>MD5-PW # Filtered</td>
</tr>
<tr>
<td>auth:</td>
<td>SSO # Filtered</td>
</tr>
<tr>
<td>auth:</td>
<td>PGP-KEY-54321</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>LIR-MNT</td>
</tr>
<tr>
<td>source:</td>
<td>RIPE # Filtered</td>
</tr>
</tbody>
</table>
Results Without Related Objects

Search term: -r 193.0.24.1

inetnum: 193.0.24.0 - 193.0.30.255

admin-c: BRD-RIPE

 tech-c: OPS4-RIPE

route: 193.0.24.0/21

genesis: AS2121
Results With Related Objects

Search term: 193.0.24.1

**inetnum:** 193.0.24.0 - 193.0.30.255

**admin-c:** BRD-RIPE

**tech-c:** OPS4-RIPE

**role:** RIPE NCC Operations

**person:** Brian Riddle

**address:** Stationsplein 11

**address:** 1012 AB Amsterdam

**phone:** +31 20 535 4444

**e-mail:** brian@ripe.net

**nic-hdl:** BRD-RIPE

**nic-hdl:** OPS4-RIPE

**route:** 193.0.24.0/21

**origin:** AS2121
Making Better Queries

- Reduce the amount of objects returned
- Use options and flags to optimise the results
- Avoid getting blocked!
Selecting Object Types

- Choose the types of objects you want to see
- This results in fewer objects to process

- Using a flag: -T inetnum
Search For Your Allocations Again

1. In the previous query windows, turn off “Do not retrieve related objects”

2. Search again for the inetnum and inet6num objects
What Do You See?

- Look at all the objects in the results
- How many objects did you get now?
- Which objects are now in the results?
Navigating the Hierarchy

• Using flags, you can find what is under or above an inet(6)num object
  - Under = More Specific
  - Above = Less Specific

• The flags: -m, -M, -l, -L

• Also in the “Hierarchy Flags” tab
More Specific inetnums:  -m

- m 193.0.24.0/21
More Specific inetnums: -M

-M 193.0.24.0/21
Less Specific inetnums:  -l

- l 193.0.25.0/24

193.0.24.0/21

193.0.25.0/24
Less Specific inetnums:  -L

-\textsc{L} 193.0.25.0/24

193.0.24.0/21

193.0.25.0/24
Search For Your Allocations Again

1. In the previous query windows, add “-m” to the search text
   - i.e. -m 10.XX.0.0 - 10.XX.3.255
   - i.e. -m 2002:ffXX::/32

2. Search again for the **inetnum** and **inet6num** objects
What Do You See?

- Look at the objects in the results
- How many objects did you get now?
- Different from what you got before?
  - Notice the “status:” attribute
What You Are Seeing

IPv4

<table>
<thead>
<tr>
<th>LIR</th>
<th>ALLOCATED PA</th>
<th>/22</th>
</tr>
</thead>
<tbody>
<tr>
<td>End User</td>
<td>ASSIGNED PA</td>
<td>/25</td>
</tr>
</tbody>
</table>

IPv6

<table>
<thead>
<tr>
<th>LIR</th>
<th>ALLOCATED-BY-RIR</th>
<th>/32</th>
</tr>
</thead>
<tbody>
<tr>
<td>End User</td>
<td>ASSIGNED</td>
<td>/40</td>
</tr>
</tbody>
</table>
Questions
How To Update It?
Updating the RIPE Database
Part 1
Updating: What You Need

• To **update** the RIPE Database you must have:
  
  - a RIPE NCC **Access** account
  
  - a **maintainer** object
  
  - the **need** to create, update or delete an object!
Search for LIR Maintainer Object

1. Read the email 5
   - from your colleague Jean Blue

2. Go to http://apps-test.db.ripe.net

3. Search for the maintainer object
   - i.e. SMXX-MNT
What Do You See?

• Look at the “mnt-by:” attribute
• What is the value?
• Look at the “auth:” attribute
• What is the value?
Maintainers: Protecting Objects

person: Jean Blue
address: My Street 9876
address: Office 123
phone: +31 20 876 5432
e-mail: jean@example.net
nic-hdl: JB123-RIPE
mnt-by: LIR-MNT

mntner: LIR-MNT
admin-c: JB123-RIPE
notify: noc@example.org
upd-to: noc@example.org
auth: MD5-PW $1$crypto-stuff
auth: SSO email@domain.com
auth: PGP-KEY-<key ID>
mnt-by: LIR-MNT
Maintainers: Authentication

- **SSO**
  - default authentication mechanism
  - uses RIPE NCC Access account
  - to authenticate: login on RIPE NCC website

- **PGP**
  - uses PGP key pair
  - to authenticate: sign updates with private PGP key

- **MD5-PW**
  - uses a MD5 hashed password
  - to authenticate: provide clear text password
Maintainers: Associating an Account

- Your LIR maintainer has a MD5 password
- You want to add your Access as an “auth:” line

```
mntner: SMXX-MNT

  admin-c: JBXX-TEST
  tech-c: JBXX-TEST
  upd-to: j.blue@example.com
  mnt-by: SMXX-MNT
  auth: MD5-PW $1$crypto-stuff
  auth: SSO email@domain.com
```

Your Access account is now associated!
Maintainers: Associating an Account

You can easily associate your Access account

- if the maintainer is using MD5-PW authentication

1. Try to update the maintainer object
   - Log in to your Access account!

2. You will be asked to provide the password

3. Authorise your RIPE NCC Access account for this maintainer
Multiple Maintainers

mntner: ONE-MNT

admin-c: LA789-RIPE
tech-c: LA789-RIPE
mnt-by: ONE-MNT
auth: SSO email@domain.com
auth: PGPKEY-AE6FBTI7

mntner: TWO-MNT

admin-c: XY456-RIPE
tech-c: XY456-RIPE
mnt-by: TWO-MNT
auth: MD5-PW $1$crypto-stuff

person: Jean Blue

address: My Street 9876
phone: +31 20 876 5432
e-mail: jean@example.net
nic-hdl: JB123-RIPE
mnt-by: ONE-MNT
mnt-by: TWO-MNT
Default Maintainer for LIRs

- Allows partial control over Allocation and ORG
- Can be selected in the LIR Account Details
- Automatically reflected in the RIPE Database

**mntner:** DEFAULT-LIR-MNT

auth: MD5-PW $1$abC789#1
auth: SSO lir-admin@email.net
mnt-by: DEFAULT-LIR-MNT

**IP Address Allocation**

mnt-by: RIPE-NCC-HM-MNT
mnt-by: DEFAULT-LIR-MNT

**LIR Organisation**

mnt-by: RIPE-NCC-HM-MNT
mnt-by: DEFAULT-LIR-MNT
Personal vs Shared

LIR objects, shared maintainer

- **mntner**: DEFAULT-LIR-MNT
- **auth**: MD5-PW $1$abC789#1
- **auth**: SSO johndoe@email.net
- **auth**: SSO clara@network.com

IP Address Allocation

- **mnt-by**: RIPE-NCC-HM-MNT
- **mnt-by**: DEFAULT-LIR-MNT

LIR Organisation

- **mnt-by**: RIPE-NCC-HM-MNT
- **mnt-by**: DEFAULT-LIR-MNT

Your person, your maintainer

- **mntner**: PERSONAL-MNT
- **auth**: SSO johndoe@email.net

Person

- **mnt-by**: PERSONAL-MNT
Maintainer and Person

**person:** John Doe

- **address:** My Street 9876
- **phone:** +31 20 876 5432
- **e-mail:** johndoe@email.net
- **nic-hdl:** JD963-RIPE
- **mnt-by:** PERSONAL-MNT

**mntner:** PERSONAL-MNT

- **admin-c:** JD963-RIPE
- **descr:** Startup maintainer
- **auth:** SSO jean@example.net
- **mnt-by:** PERSONAL-MNT
Creating Your Person/Mntner Pair

1. Read again the email 5 from your colleague Jean Blue
2. Go to http://apps-test.db.ripe.net
3. On the left side, click on “Create an object”
4. Choose ”person and maintainer pair”
5. Click on [Create]
What Do You See?

• Which attributes do you see in the empty template?
• Which lines are not easy to understand?

• Fill in the template and click on [Submit]
• Write down the nic-hdl and the mntner
What You Are Seeing

• Congratulations! You just created your first objects in the RIPE (TEST) Database!

• You now have your own person object and your own personal maintainer
Creating a Role Object

It’s a **good habit** to use a **role** for the admin-c and tech-c attributes of LIR objects

1. Go to [http://apps-test.db.ripe.net](http://apps-test.db.ripe.net)
2. On the left side, click on “Create an object”
3. Choose “role” and click on [Create]
3. Choose which maintainer will protect the new object

4. Click on the X to remove a maintainer

Please enter the maintainers you would like to use as mnt-by

LIR-MNT ★ | X | PERSONAL-MNT ★ | X

★ = Associated with your Access account
5. Fill in the template with data

- Use your LIR maintainer (SMXX-MNT)
- Use role: Tech Team
- Leave nic-hdl as it is: AUTO-1
6. Click on the [+] button next to “email”
   - Choose “admin-c” from the drop-down list
   - Click on [Add]
   - You now have an empty “admin-c:” attribute

7. Do the same steps in 6) and add a “tech-c:”
8. Fill in the admin-c and tech-c with data
   - admin-c: JBXX-TEST
   - tech-c: YOUR PERSON OBJECT

9. Click on the [Submit] button

• If all was correctly filled in, you have a role object!
• Write down the nic-hdl of the object
## What You Just Did

<table>
<thead>
<tr>
<th><strong>person:</strong></th>
<th>Jean Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>address:</strong></td>
<td>My Street 9876</td>
</tr>
<tr>
<td><strong>phone:</strong></td>
<td>+31 20 876 5432</td>
</tr>
<tr>
<td><strong>e-mail:</strong></td>
<td><a href="mailto:jean@example.net">jean@example.net</a></td>
</tr>
<tr>
<td><strong>nic-hdl:</strong></td>
<td>JBXX-TEST</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>SMXX-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>person:</strong></th>
<th>Your Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>address:</strong></td>
<td>Your Address</td>
</tr>
<tr>
<td><strong>phone:</strong></td>
<td>Your phone number</td>
</tr>
<tr>
<td><strong>e-mail:</strong></td>
<td>Your email address</td>
</tr>
<tr>
<td><strong>nic-hdl:</strong></td>
<td>YOUR NIC-HDL</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>YOUR-PERSONAL-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>role:</strong></th>
<th>Tech Team</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>nic-hdl:</strong></td>
<td>TT123-TEST</td>
</tr>
<tr>
<td><strong>admin-c:</strong></td>
<td>JBXX-TEST</td>
</tr>
<tr>
<td><strong>tech-c:</strong></td>
<td>YOUR NIC-HDL</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>SMXX-MNT</td>
</tr>
</tbody>
</table>
Questions
How To Update It?
Updating the RIPE Database
Part 2
Registering IPv4 and IPv6

1. Let’s go back to the email 5
   - from your colleague Jean Blue
2. Go to http://apps-test.db.ripe.net
3. On the left side, click on “Create an object”
4. Choose ”inetnum” or “inet6num”
5. Click on [Create]
What Do You See?

• Which attributes do you see in the template?

• Notice the first line (mnt-by:)

• How many maintainers appear here?

• Which lines are not easy to understand?
Registering Assignments

**inetnum: 10.XX.0.0 - 10.XX.3.255**
- mnt-by: TEST-NCC-HM-MNT
- mnt-by: SMXX-MNT
- status: ALLOCATED PA

**inetnum: 10.XX.2.0 - 10.XX.2.255**
- mnt-by: SMXX-MNT
- status: ASSIGNED PA

**inet6num: 2002:ffXX::/32**
- mnt-by: RIPE-NCC-HM-MNT
- mnt-by: SMXX-MNT
- status: ALLOCATED-BY-RIR

**inet6num: 2002:ffXX:1001::/48**
- mnt-by: SMXX-MNT
- status: ASSIGNED
Registering Assignments

- To create an assignment, you must have authorisation from the allocation
- Here, “mnt-by:” has control over the allocation object and the space under the object
Registering Assignments

- If “mnt-lower:” is present, then it has permission to create objects in the space under the object - but it cannot update the allocation! (mnt-by:)

**IP Address Allocation**

- mnt-by: RIPE-NCC-HM-MNT
- mnt-by: DEFAULT-LIR-MNT
- mnt-lower: ANOTHER-MNT

**ASSIGNMENT**

- mnt-by: ANOTHER-MNT
  - status: ASSIGNMENT

- mnt-by: ANOTHER-MNT
  - status: ASSIGNMENT

- mnt-by: ANOTHER-MNT
  - status: ASSIGNMENT
Filling In The Template

• Choose which maintainer will protect the new object

• Click on the X to remove a maintainer

Please enter the maintainers you would like to use as mnt-by

LIR-MNT★ | X  PERSONAL-MNT★ | X

★ = Associated with your Access account
Filling In The Template

Same object structure for IPv4 and IPv6

Address space and
Network name

Country and
Contact information

Type of address space

inetnum: IPv4 RANGE
inet6num: IPv6 PREFIX
netname: NETWORK-NNAME

country: ZZ
admin-c: AD321-RIPE
techn: TE123-RIPE

status: ASSIGNMENT

mnt-by: DEFAULT-LIR-MNT
source: RIPE
Object Creation Success

If the values in the object template are correct, then the RIPE Database will create the object

**inetnum:** 10.30.2.0 - 10.30.2.255
- **netname:** LAIKA-NET-01
- **country:** ZZ
- **admin-c:** MB54321-TEST
- **tech-c:** ROLE-NIC-HDL
- **status:** ASSIGNED PA
- **mnt-by:** SMXX-MNT

✔

**inet6num:** 2002:ff30:1001::/48
- **netname:** LAIKA-NET-01
- **country:** ZZ
- **admin-c:** MB54321-TEST
- **tech-c:** ROLE-NIC-HDL
- **status:** ASSIGNED
- **mnt-by:** SMXX-MNT

✔
Deleting Objects

1. Let’s go back to the email 5
   - from your colleague Jean Blue

2. Go to http://apps-test.db.ripe.net

3. Search for all the assignments:
   - i.e. -m 10.XX.0.0 - 10.XX.3.255
   - i.e. -m 2002:ffXX::/32
4. You should see Jean Blue’s assignments and your newly registered assignments

5. Look for the **wrong** objects in the results

6. Click on **[Update object]**

7. Click on the **[Delete this object]** button

8. Provide a “reason” and click on **[Confirm delete]**
LIR Keeps Control

- LIR Default Maintainer has control over the whole address space
- Use “Force Delete” to remove lost objects
### When You Cannot Delete

- If an object is referenced in another object, you must first remove the reference.

<table>
<thead>
<tr>
<th>This object cannot be deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>You can only delete unreferenced objects. Please remove the references from these objects first:</td>
</tr>
<tr>
<td>• mntner - SM30-MNT</td>
</tr>
<tr>
<td>• inetnum - 10.30.0.0 - 10.30.3.255</td>
</tr>
<tr>
<td>• inet6num - 2002:ff30::/32</td>
</tr>
<tr>
<td>• organisation - ORG-IC30-TEST</td>
</tr>
<tr>
<td>• aut-num - AS65530</td>
</tr>
</tbody>
</table>

[Return to object]
Summary

- You have now updated the RIPE Database:
  - Associated your Access with the LIR maintainer
  - Created your own person/maintainer pair
  - Created a role object for the LIR
  - Registered assignments by creating inet(6)num objects
  - Deleted the wrong inet(6)num objects
Questions
Delegating To Others
Giving control to someone else
Register a IPv6 Sub-Allocation

1. Go to http://apps-test.db.ripe.net

2. On the left side, click on “Create an object”

3. Choose “inet6num” and click on [Create]
4. Fill in the template:

- inet6num: 2002:ffXX:a000::/36
- netname: SUBALLOCATION
- country: your neighbor’s country
- Use your person object as “admin-c:”
- Use your neighbor’s person object as “tech-c:”
5. Add a “mnt-lower:” attribute
   - Use your neighbor’s maintainer as value

6. Choose the status **ALLOCATED-BY-LIR**

7. Click on **[Submit]**
Sub-Allocations

- Block for a downstream customer
- Branch office or department
Delegating Control

- "mnt-lower:" attribute gives permission to create more specific objects
Registering Sub-Allocations

Use the appropriate “status:”

IPv4  =  SUB-ALLOCATED PA
IPv6  =  ALLOCATED-BY-LIR

<table>
<thead>
<tr>
<th>inetnum: 10.0.1.0 - 10.0.2.255</th>
</tr>
</thead>
<tbody>
<tr>
<td>netname: Branch-office-1</td>
</tr>
<tr>
<td>country: NL</td>
</tr>
<tr>
<td>admin-c: LA789-RIPE</td>
</tr>
<tr>
<td>tech-c: LA789-RIPE</td>
</tr>
<tr>
<td>status: SUB-ALLOCATED PA</td>
</tr>
<tr>
<td>mnt-by: LIR-MNT</td>
</tr>
<tr>
<td>mnt-lower: BRANCH-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>inet6num: 2002:ff00:a000::/36</th>
</tr>
</thead>
<tbody>
<tr>
<td>netname: Branch-office-1</td>
</tr>
<tr>
<td>country: NL</td>
</tr>
<tr>
<td>admin-c: LA789-RIPE</td>
</tr>
<tr>
<td>tech-c: LA789-RIPE</td>
</tr>
<tr>
<td>status: ALLOCATED-BY-LIR</td>
</tr>
<tr>
<td>mnt-by: LIR-MNT</td>
</tr>
<tr>
<td>mnt-lower: BRANCH-MNT</td>
</tr>
</tbody>
</table>
Create an Assignment

1. Go to http://apps-test.db.ripe.net

2. On the left side, click on “Create an object”

3. Choose “inet6num” and click on [Create]

4. Fill in the template:
   - inet6num: 2002:ffzz:a000::/48
   - zz = number of your neighbor
   - status: ASSIGNED

5. You know how to do the rest! ;-)
What You Just Did

Allocation: 2002:ff30::/32

mnt-by: TEST-NCC-HM-MNT
mnt-by: SM30-MNT

Sub-Allocation: 2002:ff30:a000::/36

mnt-by: SM30-MNT
mnt-lower: SM15-MNT

Assignment

mnt-by: SM15-MNT
Questions
RIPE Routing Registry

aut-num, route and route6 objects
Search For Your aut-num Object

1. Read the email 6

2. Go to http://apps-test.db.ripe.net

3. Search for AS655XX
What Do You See?

- What does this object represent?
- Which attributes call your attention?
Autonomous Number Objects

- Known as **aut-num** objects
- Register **who** holds an AS Number and the routing policy for that AS

<table>
<thead>
<tr>
<th>aut-num:</th>
<th>AS12345</th>
</tr>
</thead>
<tbody>
<tr>
<td>as-name:</td>
<td>YOUR-AS-NAME</td>
</tr>
<tr>
<td>org:</td>
<td>ORG-EE2-RIPE</td>
</tr>
<tr>
<td>import:</td>
<td>from AS1010 accept ANY</td>
</tr>
<tr>
<td>export:</td>
<td>to AS1010 announce AS12345</td>
</tr>
<tr>
<td>import:</td>
<td>from AS987 accept ANY</td>
</tr>
<tr>
<td>export:</td>
<td>to AS987 announce AS12345</td>
</tr>
<tr>
<td>admin-c:</td>
<td>DV789-RIPE</td>
</tr>
<tr>
<td>tech-c:</td>
<td>JS123-RIPE</td>
</tr>
<tr>
<td>status:</td>
<td>ASSIGNED</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>RIPE-NCC-END-MNT</td>
</tr>
<tr>
<td>mnt-by:</td>
<td>DEFAULT-LIR-MNT</td>
</tr>
<tr>
<td>source:</td>
<td>RIPE</td>
</tr>
</tbody>
</table>
Routing Policy

aut-num: AS1
import: from AS2 accept ANY
export: to AS2 announce AS1 AS3
import: from AS3 accept AS3
export: to AS3 announce ANY
import: from AS4 accept AS4
export: to AS4 announce AS1 AS3
Building An aut-num Object

aut-num: AS2
import: from AS1 accept AS1
export: to AS1 announce AS2

aut-num: AS1
export: to AS2 announce AS1
import: from AS2 accept AS2
import: from AS3 accept ANY
export: to AS3 announce AS1

aut-num: AS3
export: to AS1 announce ANY
import: from AS1 accept AS1
Search For route(6) Objects

1. Read the email 6

2. Go to http://apps-test.db.ripe.net

3. Search for the **route(6)** objects
   - Use the “-T” flag to show the route(6) objects
     - i.e. -T route 10.xx.0.0/22
     - i.e. -T route6 2002:ffxx::/32
What Do You See?

• Did you get any objects in the results?

• No? Then there are no route(6) objects yet!
What Are route(6) Objects?

- **route(6)** objects register which IPv4/IPv6 prefix will be announced by which AS number
- Used for creating BGP filters

**RIPE Database**
- **route**: IPv4 prefix
- **origin**: AS Number
- **route6**: IPv6 prefix
- **origin**: AS Number

**Router configuration**
- BGP Filters
- From AS Number accept:
  - IPv4 prefix
  - IPv6 prefix
How To Create route(6) Objects

• You need permission from:
  1. inetnum or inet6num
  2. route or route6

* mnt-routes delegates the creation of route(6) objects
Registering IPv4 Routes

inetnum: 10.30.0.0 - 10.30.3.255

mnt-by: TEST-NCC-HM-MNT
mnt-by: SM30-MNT

route: 10.30.0.0/22

origin: AS65530
mnt-by: SM30-MNT
Registering IPv6 Routes

inet6num: 2002:ff30::/32

mnt-by: TEST-NCC-HM-MNT

mnt-by: SM30-MNT

route6: 2002:ff30::/32

origin: AS65530

mnt-by: SM30-MNT
AS-Sets

as-set: AS3333:AS-EXAMPLE
members: AS65530
members: AS65535
members: AS65552

route: 10.30.0.0/22
origin: AS65530

route: 192.168.0.0/22
origin: AS65535

route: 169.254.0.0/16
origin: AS65552
AS-Sets

**As-set:** AS3333:AS-EXAMPLE

- **members:** AS65530
- **members:** AS-CUST1

**Route:** 10.30.0.0/22
- **Origin:** AS65530

**As-set:** AS-CUST1

- **members:** AS23456

**Route:** 192.168.0.0/21
- **Origin:** AS23456

**Route:** 192.0.0.0/24
- **Origin:** AS23456
Create route(6) Objects

1. Go to http://apps-test.db.ripe.net

2. On the left side, click on “Create an object”

3. Choose “route” or “route6” and click on [Create]

4. Fill in the template:
   - route: 10.XX.0.0/22
   - route6: 2002:ffXX::/32
   - origin: AS655XX
Questions
Reverse DNS

Setting up reverse delegation
Looking For Domain Objects

1. Read the email

2. Go to http://apps-test.db.ripe.net

3. Search for your IPv4 allocation

4. Use the flags “-r -m -d” in the query
   - “-d” flag includes domain objects in results
   - i.e. -r -m -d 10.XX.0.0/22

You can try this with your own real allocation!
What Do You See?

- Do you see any **domain** objects in the results?

- No? Then Reverse Delegation is not set up yet!
DNS Tree Structure

- At the top is the root (.)
- Then the ccTLDs and gTLDs
- Each domain/sub-domain is stored in a DNS zone
What is Reverse DNS?

Mapping of IP addresses to host names

193.2.6.139 → www.ripe.net
2001:67c:2e8:22::c100:68b
Purpose of Reverse DNS

- Reverse DNS is used for:
  - Identifying Spam
  - Network Diagnostics
  - Controlling Access to a Network

Mail Server X
IP Address 1.2.3.4

From: example.com

You shall not pass!

Reverse DNS 1.2.3.4?

www.bogus.net
How does Reverse DNS Work?

Which host is pointing to 193.0.6.139?
Reverse Delegation Basics

IPv4

in-addr.arpa zone

/24 or /16 blocks

IPv6

ip6.arpa zone

Multiple of 4 bits

/28, /32, /36, /40, /44, /48
Setting up Reverse Delegation

• Configure your DNS servers
  - at least two name servers in different subnets
  - create a zone file on each for each chunk

• Check your zones:  http://dnscheck.ripe.net
Domain Objects

- Create records on RIPE NCC DNS servers
- They point to name servers that will be authoritative for the zone

For this zone, go to these DNS servers:

```
nserver1
nserver2
```
Creating Domain Objects

- Which maintainers are on the address space?

```
Address Space
mnt-by: SOME-BIG-MNT
mnt-lower: ANOTHER-MNT
mnt-domains: DNS-ZONE-MNT
```

- **mnt-domains** allows to delegate creation of domain objects to another maintainer
Reverse DNS for IPv4

192.33.28.0

/24 → 28.33.192.in-addr.arpa

/16 → 33.192.in-addr.arpa

/8 → 192.in-addr.arpa
IPv4 and Domain Objects

- **IPv4 prefix:** 192.33.28.0/24
- **Domain object:**
  
  ```plaintext
domain: 28.33.192.in-addr.arpa
descr: rDNS for my IPv4 network
admin-c: NOC12-RIPE
tech-c: NOC12-RIPE
zone-c: NOC12-RIPE
nserver: pri.example.net
nserver: sns.company.org
ds-rdata: 45062 8 2 275d9acbf3d3fec11b6d6...
mnt-by: EXAMPLE-LIR-MNT
created: 2015-01-21T13:52:29Z
last-modified: 2016-02-07T15:09:46Z
source: RIPE
```
Reverse DNS for IPv6

2001:0db8:003e:ef11:0000:0000:c100:004d

/48 → e.3.0.0.8.b.d.0.1.0.0.2.ip6.arpa
/44 → 3.0.0.8.b.d.0.1.0.0.2.ip6.arpa
/40 → 0.0.8.b.d.0.1.0.0.2.ip6.arpa
/36 → 0.8.b.d.0.1.0.0.2.ip6.arpa
/32 → 8.b.d.0.1.0.0.2.ip6.arpa
/28 → b.d.0.1.0.0.2.ip6.arpa
IPv6 and Domain Objects

- IPv6 prefix: 2001:db8::/32
- Domain object:

  domain: 8.b.d.0.1.0.0.2.ip6.arpa
descr: rDNS for my IPv6 network
admin-c: NOC12-RIPE
tech-c: NOC12-RIPE
zone-c: NOC12-RIPE
nserver: pri.example.net
nserver: sns.company.org
ds-rdata: 45062 8 2 275d9acbf3d3fec11b6d6...
mnt-by: EXAMPLE-LIR—MNT
created: 2015-01-21T13:52:29Z
last-modified: 2016-02-07T15:09:46Z
source: RIPE
Create Domain Objects Wizard

Create "domain" objects

Please enter the maintainers you would like to use as mnt-by

EXAMPLE-MNT

Prefix looks OK

Prefix: 10.155.16.0/22

Server looks OK

nservers:
- tinnie.arin.net
- sec3.apnic.net

Reverse zones:
- 16.155.10.in-addr.arpa
- 17.155.10.in-addr.arpa
- 18.155.10.in-addr.arpa
- 19.155.10.in-addr.arpa

mnt-by: EXAMPLE-MNT
nservers:
- tinnie.arin.net
- sec3.apnic.net

domain: 16.155.10.in-addr.arpa

domain: 17.155.10.in-addr.arpa

domain: 18.155.10.in-addr.arpa

domain: 19.155.10.in-addr.arpa
Exercise
How many domain objects?
Calculate How Many Objects

• You have the following address space:
  - 192.12.32.0/22
  - 2a00:38::/29

• How many domain objects do you have to create?
  - Use the largest block size possible

• What are the first and last domain objects for each?
And For The Customer?

• What are the two domain objects for Marc Bromski’s address space?

IPv4: 10.xx.2.0 – 10.xx.2.255

Questions
More RIPE Database
Inverse Lookups, Free Text Search, Notifications, RIPE Database WG
Looking For References

You want to replace the reference to Jean Blue’s *person* object in all the LIR objects with your new LIR *role* object

1. Go to [http://apps-test.db.ripe.net](http://apps-test.db.ripe.net)

2. Search for “-i person JBXXX-TEST”
What Do You See?

- Which objects are in the query results?
- Where do you see JBXX-TEST?
Inverse Lookups

Finding all objects in which an object is referenced
Inverse Lookup: admin-c

**inet6num:** 2001:db8::/32

- **org:** ORG-BB2-RIPE
- **admin-c:** BW280-RIPE
- **tech-c:** JB1-RIPE
- **mnt-by:** RIPE-NCC-HM-MNT
- **mnt-by:** DEFAULT-LIR-MNT

**aut-num:** AS64551

- **org:** ORG-BB2-RIPE
- **admin-c:** JB1-RIPE
- **tech-c:** TT789-RIPE
- **mnt-by:** RIPE-NCC-END-MNT
- **mnt-by:** DEFAULT-LIR-MNT

**mntner:** DEFAULT-LIR-MNT

- **admin-c:** JB1-RIPE
- **tech-c:** TT789-RIPE
- **mnt-by:** DEFAULT-LIR-MNT

**role:** Tech Team

- **nic-hdl:** TT789-RIPE
- **admin-c:** JB1-RIPE
- **tech-c:** KH404-RIPE
- **mnt-by:** DEFAULT-LIR-MNT

**person:** Jean Blue

- **address:** Big Street 45
- **phone:** +31 20 345 6854
- **e-mail:** jean.blue@example.net
- **nic-hdl:** JB1-RIPE
- **mnt-by:** BLUE-MNT
Inverse Lookup: person

- **person JB1-RIPE**

<table>
<thead>
<tr>
<th><strong>inet6num:</strong></th>
<th>2001:db8::/32</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>org:</strong></td>
<td>ORG-BB2-RIPE</td>
</tr>
<tr>
<td><strong>admin-c:</strong></td>
<td>BW280-RIPE</td>
</tr>
<tr>
<td><strong>tech-c:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>RIPE-NCC-HM-MNT</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>DEFAULT-LIR-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>aut-num:</strong></th>
<th>AS64551</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>org:</strong></td>
<td>ORG-BB2-RIPE</td>
</tr>
<tr>
<td><strong>admin-c:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>tech-c:</strong></td>
<td>TT789-RIPE</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>RIPE-NCC-END-MNT</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>DEFAULT-LIR-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>mntner:</strong></th>
<th>DEFAULT-LIR-MNT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>admin-c:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>tech-c:</strong></td>
<td>TT789-RIPE</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>DEFAULT-LIR-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>role:</strong></th>
<th>Tech Team</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>nic-hdl:</strong></td>
<td>TT789-RIPE</td>
</tr>
<tr>
<td><strong>admin-c:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>tech-c:</strong></td>
<td>KH404-RIPE</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>DEFAULT-LIR-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>person:</strong></th>
<th>Jean Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>address:</strong></td>
<td>Big Street 45</td>
</tr>
<tr>
<td><strong>phone:</strong></td>
<td>+31 20 345 6854</td>
</tr>
<tr>
<td><strong>e-mail:</strong></td>
<td><a href="mailto:jean.blue@example.net">jean.blue@example.net</a></td>
</tr>
<tr>
<td><strong>nic-hdl:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>BLUE-MNT</td>
</tr>
</tbody>
</table>
Inverse Lookup: organisation

- **organisation:** ORG-BB2-RIPE
  - **org-name:** Internet Company
  - **admin-c:** BW280-RIPE
  - **tech-c:** JB1-RIPE
  - **abuse-c:** ac56-RIPE
  - **mnt-by:** DEFAULT-LIR-MNT

**inet6num:** 2001:db8::/32
- **descr:** My IPv6 allocation
- **org:** ORG-BB2-RIPE
- **admin-c:** BW280-RIPE
- **tech-c:** JB1-RIPE

**inetnum:** 188.23.16.0/21
- **descr:** My IPv4 allocation
- **org:** ORG-BB2-RIPE
- **admin-c:** BW280-RIPE
- **tech-c:** JB1-RIPE

**inetnum:** 37.4.128.0/22
- **descr:** My Other IPv4 alloc.
- **org:** ORG-BB2-RIPE
- **admin-c:** BW280-RIPE
- **tech-c:** JB1-RIPE

**aut-num:** AS64551
- **descr:** My Other IPv4 alloc.
- **org:** ORG-BB2-RIPE
- **admin-c:** BW280-RIPE
- **tech-c:** JB1-RIPE
### Inverse Lookup: mnt-by

<table>
<thead>
<tr>
<th><strong>inetnum:</strong></th>
<th>2001:db8::/32</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>org:</strong></td>
<td>ORG-BB2-RIPE</td>
</tr>
<tr>
<td><strong>admin-c:</strong></td>
<td>BW280-RIPE</td>
</tr>
<tr>
<td><strong>tech-c:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>RIPE-NCC-HM-MNT</td>
</tr>
<tr>
<td><strong>mnt-lower:</strong></td>
<td>ANOTHER-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>aut-num:</strong></th>
<th>AS64551</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>org:</strong></td>
<td>ORG-BB2-RIPE</td>
</tr>
<tr>
<td><strong>admin-c:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>tech-c:</strong></td>
<td>TT789-RIPE</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>RIPE-NCC-END-MNT</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>ANOTHER-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>person:</strong></th>
<th>Jean Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>nic-hdl:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>phone:</strong></td>
<td>+31 20 543 9640</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>ANOTHER-MNT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>role:</strong></th>
<th>Other Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>nic-hdl:</strong></td>
<td>OG10-RIPE</td>
</tr>
<tr>
<td><strong>admin-c:</strong></td>
<td>JB1-RIPE</td>
</tr>
<tr>
<td><strong>tech-c:</strong></td>
<td>SZ72-RIPE</td>
</tr>
<tr>
<td><strong>mnt-by:</strong></td>
<td>ANOTHER-MNT</td>
</tr>
</tbody>
</table>

**mntner:** ANOTHER-MNT
- **admin-c:** JB1-RIPE
- **auth:** MD5-PW
- **auth:** SSO
- **upd-to:** jean.blue@example.net
- **mnt-by:** ANOTHER-MNT
Search For A Word

You want to look for every object that has the word “uplink” in any of the attributes

1. Go to https://apps.db.ripe.net/search/full-text.html

2. Click on the left menu on “Full Text Search”

3. Search for “uplink”
What Do You See?

• Do you get any objects in the results?
• How many objects do you get?
• Can you see the whole object?
Full Text Search

RIPE Database text search

This service allows searches over the full text of the RIPE Database object data.

The search is done on object text without regard for any relationships. Multiple search terms should be separated with a space.

```
bluelight
```

Advanced Search

By submitting this form you explicitly express your agreement with the RIPE Database Terms and Conditions

Search results

This is the RIPE Database full text search service.
The RIPE Database is subject to Terms and Conditions.

[1] 2 3

domain: 205.149.82.in-addr.arpa
desc=Reverse delegation for Bluelight 2nd/24

domain: 210.149.82.in-addr.arpa
desc=Reverse delegation for Bluelight 2nd/24

domain: 201.156.178.IN-ADDR.ARPA
mnt-by=RO-BLUELIGHT, descr=BLUELIGHT

domain: 200.156.178.IN-ADDR.ARPA
mnt-by=RO-BLUELIGHT, descr=BLUELIGHT

inetnum: 2a01:4f8:201:31ea::/64
netname=BLUE-LIGHT
Full Text Search - Advanced

Search term

**Basic Search**
- All
- Any
- Exact Match

Search only within the following objects:
- as-block
- as-set
- aut-num
- domain
- filter-set
- inet-rtr
- inet6num
- **inetnum**
- irt
- key-cert
- mntner
- organisation
- peering-set
- person
- poem
- poetic-form
- role
- route
- route-set
- route6
- rtr-set

Search within the following fields:
- admin-c
- changed
- country
- created
- descr
- geoloc
- inetnum
- language
- last-modified
- mnt-by
- mnt-domains
- mnt-irt
- mnt-lower
- mnt-routes
- netname
- notify
- org
- remarks
- source
- sponsoring-org
- status
- tech-c

By submitting this form you explicitly express your agreement with the RIPE Database Terms and Conditions

Search
Think About This…

- The RIPE Database is a **public** database
- **Anybody** can search in the database
- **Who** can make updates?
- How can you **know** if somebody updates your objects?
Notifications: “notify:”

The RIPE Database has several ways to trigger notifications about updates

- “notify:” attribute
  - Can be used on any object
  - An email is sent when the object is updated

<table>
<thead>
<tr>
<th>Person</th>
<th>IP Address Block</th>
<th>LIR Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>notify: <a href="mailto:email@example.com">email@example.com</a></td>
<td>notify: <a href="mailto:noc-team@example.com">noc-team@example.com</a></td>
<td>notify: <a href="mailto:admin@example.com">admin@example.com</a></td>
</tr>
</tbody>
</table>
Notifications: Maintainers

Maintainers have special attributes

<table>
<thead>
<tr>
<th>mntner:</th>
<th>LIR-MNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>upd-to:</td>
<td><a href="mailto:db-alerts@example.com">db-alerts@example.com</a></td>
</tr>
<tr>
<td>mnt-nfy:</td>
<td><a href="mailto:db-success@example.com">db-success@example.com</a></td>
</tr>
</tbody>
</table>

- **“upd-to:”**
  - For **failed** attempts to update objects

- **“mnt-nfy:”**
  - For **successful** attempts to update objects
RIPE Database Working Group

- Influence the development of the RIPE Database software and operations
- Participate in the Database WG discussions!
- https://www.ripe.net/participate/ripe/wg/db
More RIPE Database Resources

• The RIPE Database page on ripe.net
  - https://www.ripe.net/manage-ips-and-asns/db

• Other RIPE Database query methods
Questions
Play Time!
Practice What You Learned
Choose Your Own Adventure

- From the **Play Time!** list of tasks, choose what you would like to practice
- Review the course slides and your own notes
- Ask the trainers or other participants to assist, if you need help
Beyond The Database

The RESTful API
Your company has a provisioning software that assigns address blocks to customers from a pool.

The RIPE policies require you to register these blocks with contact data in the RIPE Database.

Can you save time by letting the software create the required objects in the RIPE Database?
RIPE Database RESTful API

- Allows **REST-compliant** systems to access the RIPE Database
- Data is exchanged in **XML** or **JSON** format
- Standard **query limits** apply
RIPE Database RESTful API

**Supported Methods**
- POST: create
- GET: lookup
- PUT: update
- DELETE: delete

**HTTP/1.1 Content Negotiation**
- Accept: application/xml
- Accept: application/json

**URI for each Database Object**
URI Format:
https://rest.db.ripe.net/{source}/{objecttype}/{key}
URI Format:
https://rest.db.ripe.net/{source}/{objecttype}/{key}

- **{source}**
  - *ripe*: RIPE database
  - *test*: TEST database

- **{objecttype}**
  - person, role, organisation
  - inet(6)num, aut-num
  - route(6), domain, mntner, etc.

- **{key}**
  - Primary key of the object
  - unfiltered, unformatted
## HTTP Status Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bad Request (400)</strong></td>
<td>The service is unable to understand and process the request.</td>
</tr>
<tr>
<td><strong>Forbidden (403)</strong></td>
<td>Query limit exceeded.</td>
</tr>
<tr>
<td><strong>Not Found (404)</strong></td>
<td>No results were found (on a search request), or object specified in URI does not exist.</td>
</tr>
<tr>
<td><strong>Conflict (409)</strong></td>
<td>Integrity constraint was violated (e.g. when creating, object already exists).</td>
</tr>
<tr>
<td><strong>Internal Server Error (500)</strong></td>
<td>The server encountered an unexpected condition which prevented it from fulfilling the request.</td>
</tr>
</tbody>
</table>
Method: GET

http(s)://rest.db.ripe.net/{source}/{objectType}/{key}

- 200 Object found
- 400 Bad request
- 404 No valid object
Examples

curl 'http://rest.db.ripe.net/ripe/mntner/RIPE-DBM-MNT'

curl -H 'Accept: application/json' 'http://rest.db.ripe.net/ripe/mntner/RIPE-DBM-MNT'

curl 'http://rest-test.db.ripe.net/test/person/AA1-TEST?unfiltered'

curl 'http://rest.db.ripe.net/ripe/inetnum/193.0.0.0%20-%20193.0.7.255.json'
Method: PUT

https://rest.db.ripe.net/{source}/{objectType}/{key}?password={password}…

- **200** Successful update
- **400** Bad request: incorrect object type or key
- **401** Incorrect password
- **404** Object not found
Examples

curl -X PUT -H 'Content-Type: application/xml' --data @form.txt 'https://rest.db.ripe.net/ripe/person/PP1-RIPE?password=...'

curl -X PUT -H 'Content-Type: application/json' -H 'Accept:application/json' --data @form.txt 'https://rest.db.ripe.net/ripe/person/PP1-RIPE?password=...'

curl -X PUT --data @form.txt 'https://rest.db.ripe.net/ripe/person/TP1-RIPE?dry-run&password=...'
Method: POST

https://rest.db.ripe.net/{source}/{objectType}?password={password}…

200  Success (object created)
400  Bad request
401  Incorrect password
409  Object already exists
Examples

curl -X POST -H 'Content-Type: application/xml' --data @form.txt 'https://rest.db.ripe.net/ripe/person?password=...'

curl -X POST -H 'Content-Type: application/json' -H 'Accept: application/json' --data @form.txt 'https://rest.db.ripe.net/ripe/person?password=...'

curl -X POST --data @form.txt 'https://rest.db.ripe.net/ripe/person?dry-run&password=...'
Method: DELETE

https://rest.db.ripe.net/{source}/{objectType}/{key}?password={password}…&reason={reason}

- **200** Successful delete
- **400** Bad request: invalid object type or key
- **401** Incorrect password
- **404** Object not found
Examples

curl -X DELETE 'https://rest.db.ripe.net/ripe/person/pp1-ripe?password=123'

curl -X PUT --data @form.txt 'https://rest.db.ripe.net/ripe/person/TP1-RIPE?dry-run&password=...'
## Additional Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Search</strong></td>
<td>RIPE database whois search service</td>
</tr>
<tr>
<td><strong>Metadata</strong></td>
<td>List available sources</td>
</tr>
<tr>
<td></td>
<td>Object type template</td>
</tr>
<tr>
<td><strong>Geolocation</strong></td>
<td>Geolocation and language attributes for IPv4/IPv6 Address</td>
</tr>
<tr>
<td><strong>Abuse Contact</strong></td>
<td>Lookup abuse contact for Internet Resource</td>
</tr>
</tbody>
</table>
Examples


curl http://rest.db.ripe.net/metadata/templates/person.xml

curl http://rest-test.db.ripe.net/abuse-contact/AS3333
References

• GitHub WHOIS REST API:
  https://github.com/RIPE-NCC/whois/wiki/WHOIS-REST-API

• GitHub WHOIS REST API WhoisResources:
  https://github.com/RIPE-NCC/whois/wiki/WHOIS-REST-API-WhoisResources
Doing it for real!

Demo
Create an inet6num object

<table>
<thead>
<tr>
<th>TEST Database</th>
<th>Location: rest-test.db.ripe.net</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Source: test</td>
</tr>
<tr>
<td>Object Type</td>
<td>Type: inet6num (ASSIGNED)</td>
</tr>
<tr>
<td>Key</td>
<td>Key: 2001:ff29:1234::/48</td>
</tr>
<tr>
<td>Format</td>
<td>XML</td>
</tr>
</tbody>
</table>
Query and Fail

curl 'http://rest-test.db.ripe.net/test/inet6num/2001:ff29:1234::/48'

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<whois-resources xmlns:xlink="http://www.w3.org/1999/xlink">
  <errormessages>
    <errormessage severity="Error" text="ERROR:101: no entries found\xA\xA;No entries found in source %s.\xA;">
      <args value="TEST"/>
    </errormessage>
    <errormessages>
    <terms-and-conditions xlink:type="locator" xlink:href="http://www.ripe.net/db/support/db-terms-conditions.pdf"/>
</whois-resources>
```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<whois-resources>
  <objects>
    <object type="inet6num">
      <source id="ripe"/>
      <attributes>
        <attribute name="inet6num" value="2001:ff29:1234::/48"/>
        <attribute name="netname" value="MyNewNET"/>
        <attribute name="country" value="NL"/>
        <attribute name="admin-c" value="TP29-TEST"/>
        <attribute name="tech-c" value="TP29-TEST"/>
        <attribute name="status" value="ASSIGNED"/>
        <attribute name="mnt-by" value="CM29-MNT"/>
        <attribute name="source" value="TEST"/>
      </attributes>
    </object>
  </objects>
</whois-resources>
Create inet6num Object

curl -X POST -H 'Content-Type: application/xml' --data @form-create.txt 'https://rest-test.db.ripe.net/test/inet6num?password=secret29'

<?xml version="1.0" encoding="UTF-8"?>
<whois-resources xmlns:xlink="http://www.w3.org/1999/xlink">
  <link xlink:type="locator" xlink:href="http://rest-test.db.ripe.net/test/inet6num"/>
  <objects>
    <object type="inet6num">
      <source id="test"/>
      <primary-key>
        <attribute name="inet6num" value="2001:ff29:1234::/48"/>
      </primary-key>
      <attributes>
        <attribute name="inet6num" value="2001:ff29:1234::/48"/>
        <attribute name="netname" value="MyNewNET"/>
        <attribute name="country" value="NL"/>
        <attribute name="admin-c" value="TP29-TEST" referenced-type="person">
          <link xlink:type="locator" xlink:href="http://rest-test.db.ripe.net/test/person/TP29-TEST"/>
        </attribute>
        <attribute name="tech-c" value="TP29-TEST" referenced-type="person">
          <link xlink:type="locator" xlink:href="http://rest-test.db.ripe.net/test/person/TP29-TEST"/>
        </attribute>
        <attribute name="status" value="ASSIGNED"/>
        <attribute name="mnt-by" value="CM29-MNT" referenced-type="mntner">
          <link xlink:type="locator" xlink:href="http://rest-test.db.ripe.net/test/mntner/CM29-MNT"/>
        </attribute>
        <attribute name="created" value="2019-02-08T11:16:16Z"/>
        <attribute name="last-modified" value="2019-02-08T11:16:16Z"/>
        <attribute name="source" value="TEST"/>
      </attributes>
    </object>
  </objects>
  <terms-and-conditions xlink:type="locator" xlink:href="http://www.ripe.net/db/support/db-terms-conditions.pdf"/>
</whois-resources>
Query and Succeed!

curl 'http://rest-test.db.ripe.net/test/inet6num/2001:ff29:1234::/48'

```xml
<?xml version="1.0" encoding="UTF-8"?>
<whois-resources xmlns:xlink="http://www.w3.org/1999/xlink">
<objects>
<object type="inet6num">
  <source id="test"/>
  <primary-key>
    <attribute name="inet6num" value="2001:ff29:1234::/48"/>
  </primary-key>
  <attributes>
    <attribute name="inet6num" value="2001:ff29:1234::/48"/>
    <attribute name="netname" value="MyNewNET"/>
    <attribute name="country" value="NL"/>
    <attribute name="admin-c" value="TP29-TEST" referenced-type="person">
      <link xlink:type="locator" xlink:href="http://rest-test.db.ripe.net/test/person/TP29-TEST"/>
    </attribute>
    <attribute name="tech-c" value="TP29-TEST" referenced-type="person">
      <link xlink:type="locator" xlink:href="http://rest-test.db.ripe.net/test/person/TP29-TEST"/>
    </attribute>
    <attribute name="status" value="ASSIGNED"/>
    <attribute name="mnt-by" value="CM29-MNT" referenced-type="mntner">
      <link xlink:type="locator" xlink:href="http://rest-test.db.ripe.net/test/mntner/CM29-MNT"/>
    </attribute>
    <attribute name="created" value="2019-02-08T11:16:16Z"/>
    <attribute name="last-modified" value="2019-02-08T11:16:16Z"/>
    <attribute name="source" value="TEST"/>
  </attributes>
</object>
<objects>
<terms-and-conditions xlink:type="locator" xlink:href="http://www.ripe.net/db/support/db-terms-conditions.pdf"/>
</whois-resources>
```
Questions
Feedback!

https://www.ripe.net/training/rdb/survey
RIPE NCC
Academy

academy.ripe.net

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