



RIPE NCC

RIPE NETWORK COORDINATION CENTRE

Local Internet Registry

Training Course

January 2025

RIPE NCC Learning & Development



09:00 - 09:30

Coffee, Tea

11:00 - 11:15

Break

13:00 - 14:00

Lunch

15:30 - 15:45

Break

17:30

End



Introductions

- **Name**
- **Experience** with the RIPE NCC
- **Goals** for today



Overview

- The Internet Registry System
- Participating
- Being an LIR
 - Activity: Create an Access Account
- The RIPE Database
 - Activity: Querying the RIPE DB
- Getting Resources
- Transfers
- Distributing Resources
 - Activity: Making Assignments
 - Activity: Registering Assignments
- Managing Resources
 - Activity: Being an LIR Contact
- Tips and Tools



RIPE NCC Training Material

Please find your training material at the following link

<https://www.ripe.net/training-material>





The Internet Registry System

Section 1

The Internet Registry System

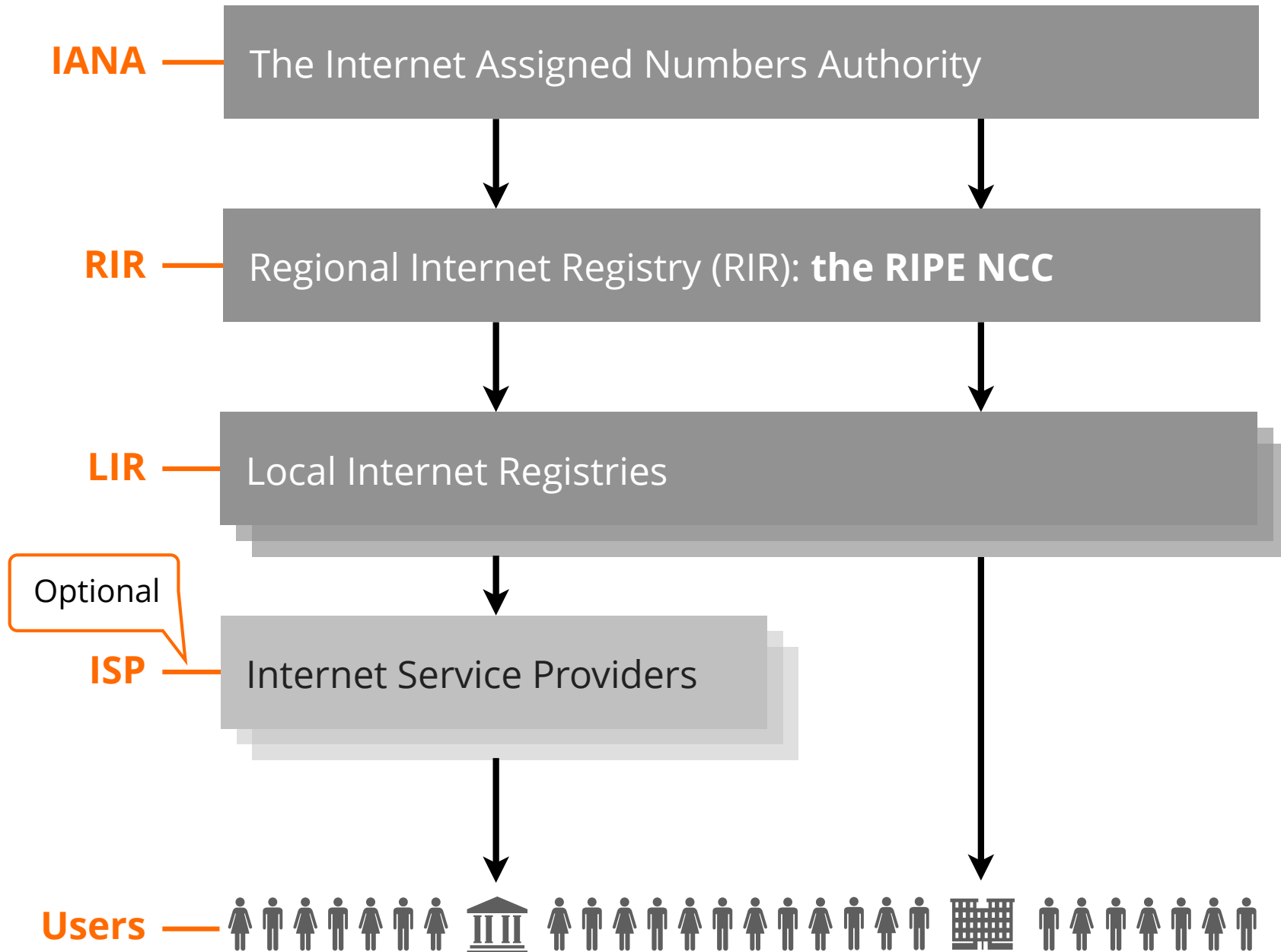


Internet Assigned Numbers Authority





Distribution Hierarchy





Regional Internet Registries

- Five RIRs worldwide
 - Not-for-profit organisations
 - Funded by membership fees
 - Policies decided by regional communities
 - Neutral, Impartial, Open, Transparent
- RIRs Goals: Registration, Aggregation, Conservation



Goals: Registration

- **Why?**

- Ensure uniqueness of Internet number resources
- Provide contact information

- **How?**

- RIR whois databases

- **Results:**

- IP address space used only by one organisation
- Information available on users of Internet number resources



Goals: Aggregation

- **Why?**

- Routing tables growing too fast
- Provide scalable routing solution for Internet

- **How?**

- Encourage announcement of whole allocations
- Introduction of Classless Inter Domain Routing (CIDR)

- **Result:**

- Growth of routing tables has slowed a bit



Goals: Conservation

- **Why?**

- IP addresses and AS Numbers are limited resources
- These resources were not used efficiently in the past

- **How?**

- Introduction of CIDR
- Policies to ensure fair usage

- **Results:**

- Growth in IP address space usage slowed down
- Resources were distributed based on need



RIPE NCC

- Began operating in **1992**
- Not-for-profit **membership** organisation
- 21,000+ Local Internet Registries (LIRs)
- Neutral, Impartial, Open, Transparent
- Provides administrative support to **RIPE**



RIPE NCC
RIPE NETWORK COORDINATION CENTRE

Réseaux IP Européens (RIPE) Community



- Since **1989** discussion forum **open** to all parties interested
- **Not** a legal entity and **no** formal membership
- Develops **policies**
- Work done in **Working Groups**
- Activities are performed on a **voluntary** basis
- Decisions formed by **consensus**
- **RIPE meetings** twice a year



Réseaux IP Européens (RIPE)



RIPE Discussion forum open to everybody interested

The RIPE community

The RIPE Network Coordination Centre



RIPE NCC
RIPE NETWORK COORDINATION CENTRE

- ~160 employees
- Offices in Amsterdam and Dubai

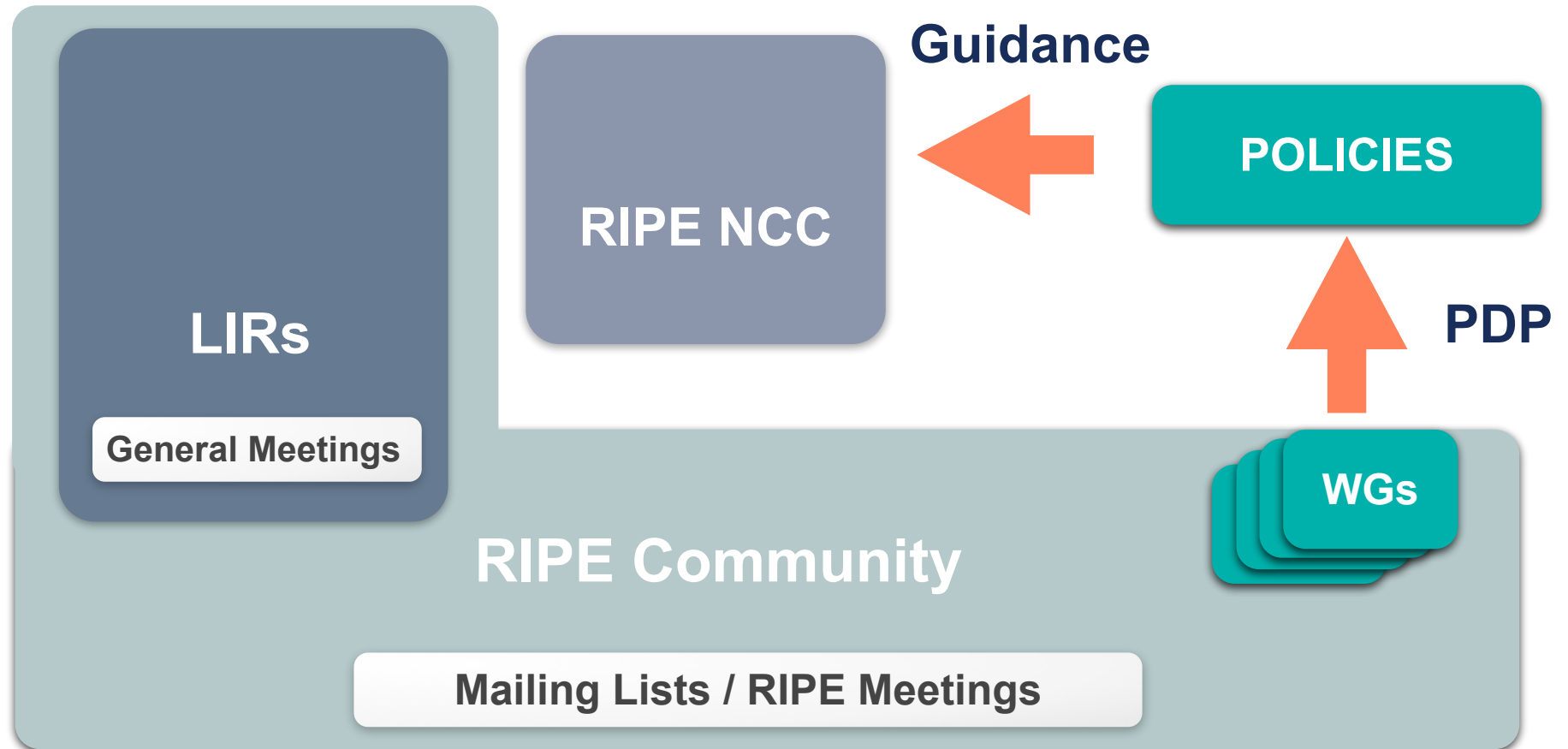


Participating

Section 2



RIR Bottom-up Model





Working Groups

- Address Policy
- Routing
- Database
- Security
- Cooperation
- DNS
- IPv6
- RIPE NCC Services
- Connect
- Open Source
- Measurement, Analysis and Tools
- IoT



Policy Development Process

- Open
 - Anyone can participate
 - On mailing lists and at meetings
- Transparent
 - List discussions archived publicly
 - Meetings transcribed
- Developed bottom-up
 - **YOU** make the policies
 - The RIPE NCC implements them





Participating in the PDP

- Sign up for the **Policy Development Process Announcements** mailing list
- Join in discussions about policy proposals
- Stay up-to-date with new policies
- Propose a new policy



When to Start a Policy Proposal?



- When something is **missing, outdated** or can be **improved** in the policies
- When **not** to do it?
 - Disagreement with RIPE NCCs request evaluation
First: Revision/Escalation
 - Changes to the RIPE NCC membership (charging, rules)
Solution: RIPE NCC General Meeting



RIPE NCC General Meeting

- During RIPE Meetings
- RIPE NCC members (LIRs) participate
- Discuss the RIPE NCC operations and activities
- Give feedback on the Budget and Activity Plan
- Vote on:
 - Charging Scheme, Resolutions
 - Executive Board membership
 - Financial Report





Who Does What ?

- **The RIPE community**
 - Creates & discuss proposals
 - Seeks consensus
- **Working Group (WG) chairs**
 - Accept proposals
 - Chair the discussions
 - Decide if consensus has been reached
- **The RIPE NCC**
 - Acts as the secretariat to support the process
 - Publishes policies documents and implement them



Questions



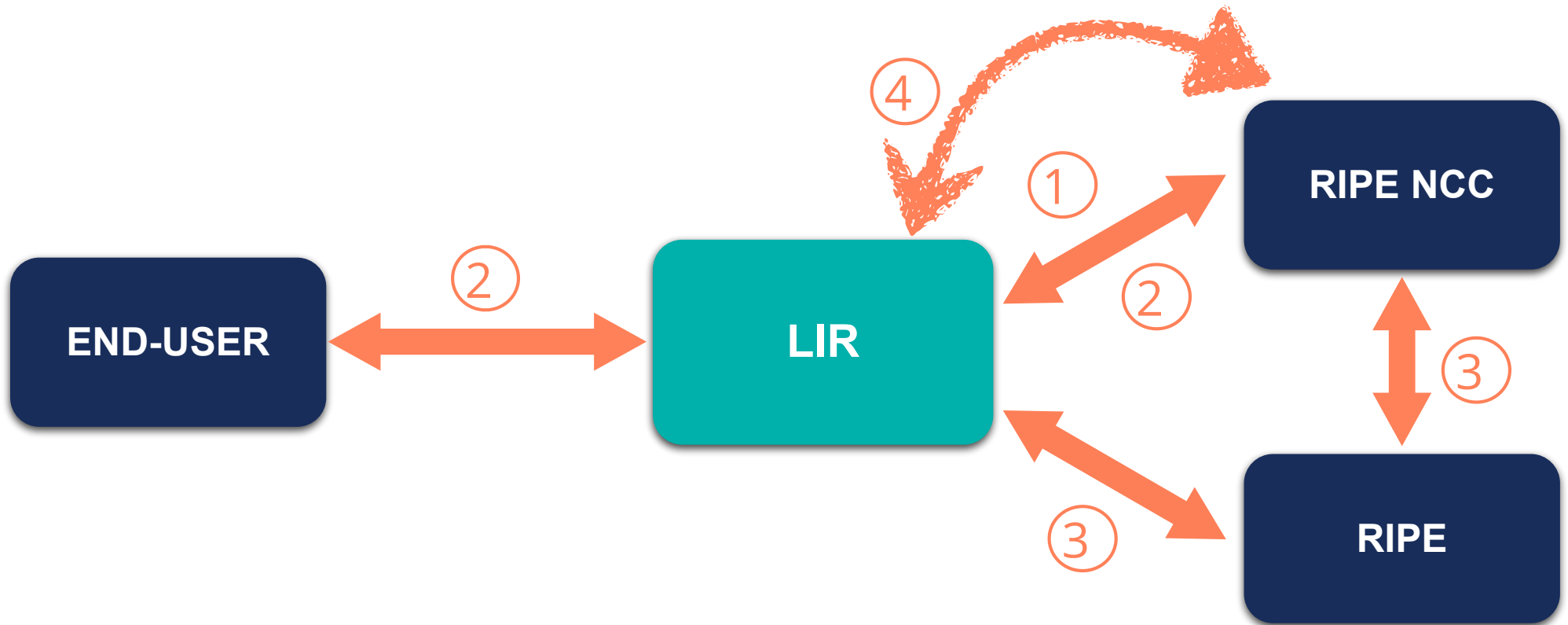


Being an LIR

Section 3



Being an LIR



① Register (fee)
Updated LIR Info

② IPs and ASNs Management
Update DB

③ PDP

④ RIPE NCC Services / Tools

What is in the Local Internet Registry?



Name of the organisation
or person operating the LIR



Contact Information

- Postal address
- Phone numbers
- Email addresses



User Accounts



Billing details

- Allocations
- PI assignments



IPv4 & IPv6

- Allocations
- PI assignments



AS Numbers



Preferences

What Should the RIPE NCC Know?



- If any of these change:
 - **Company name**
 - **VAT number**
- Company acquisitions and mergers
- Bankruptcy
- Transfer of resources to another organisation



Closing LIRs

- The RIPE NCC may close an LIR if:
 - The LIR cannot be contacted by the RIPE NCC for a significant period of time
 - The LIR consistently violates RIPE community's policies
 - The LIR does not pay its fee
 - The LIR does not cooperate with RIPE NCC audits (ARC)
- The RIPE NCC takes on responsibility for address space held by closing LIRs



RIPE NCC Access Account

- For RIPE NCC **services**
- **Free** to create
- Can be **associated** with one or more LIRs

The screenshot shows the RIPE NCC website interface. At the top, the browser address bar displays 'ripe.net'. The RIPE NCC logo is on the left, and a search bar is on the right. A user account menu is visible in the top right corner, circled in orange, showing the name 'John Smith' and a profile picture. Below the header, there is a navigation bar with links: 'Manage IPs and ASNs', 'Analyse', 'Participate', 'Get Support', and 'Publications'. A banner below the navigation bar asks 'How trustworthy is your network?' and promotes the 'RPKI Test'. At the bottom, there are four icons representing different services: 'My Resources', 'Become a Member', 'Report Hacking and Spamming', and 'What is an IP Address?'.



Create an Access Account

Activity 1



LIR Portal

Demonstration



Demo: LIR Portal Overview

- Account details
- Resources details
- Communicating with the RIPE NCC:
 - Request resources
 - Create tickets
 - Sign up for a training or webinar

Demo

LIR Portal: <https://my.ripe.net>



The RIPE Database

Section 4

The purpose of the RIPE Database



- Registry of **who** holds IP addresses and ASNs
- Keeps **contact** information
 - For troubleshooting, notifying outages, etc.
- Publishing **routing** policies
- Provisioning **reverse DNS**



RIPE Database Objects



IPs and ASNs

inetnum

inet6num

aut-num

Contact Information

organisation

person

role

Routing

route

route6

as-set

Reverse DNS

domain

Object Protection

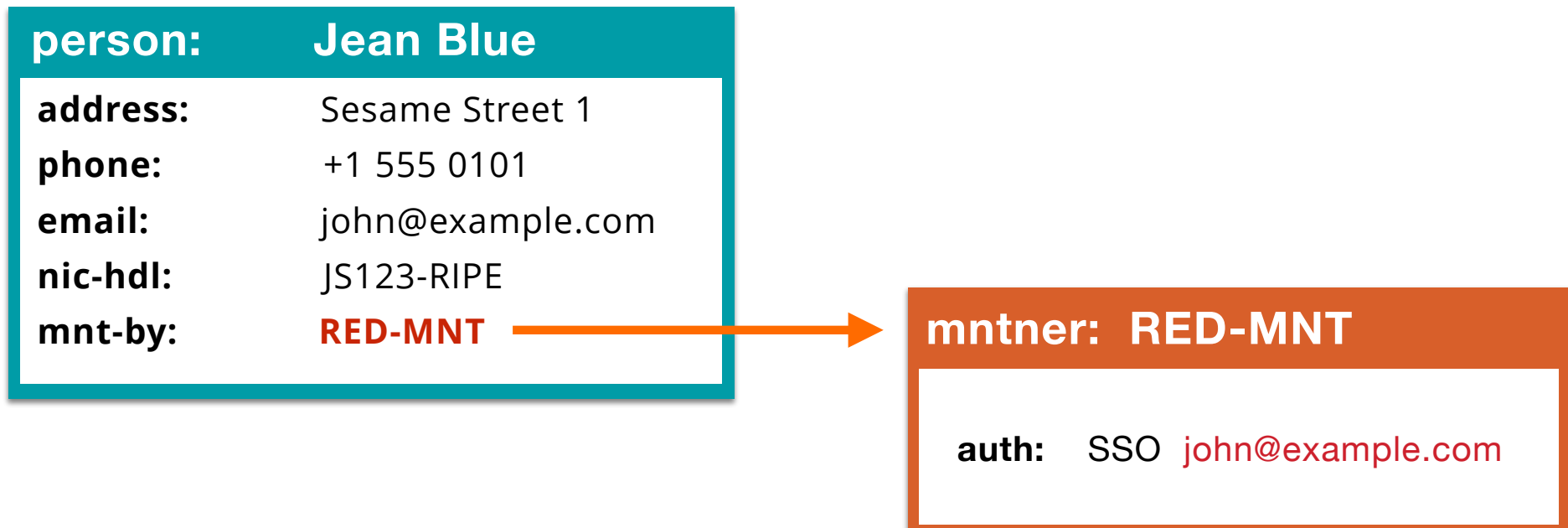
mntner



RIPE Database Attributes

- Information in Objects is stored in pairs:

Attribute-name : Attribute-value





Querying the RIPE Database



Querying the RIPE Database

- Web interface
- Command line
- Full Text Search
- Restful API (XML/JSON)

The screenshot shows the RIPE Database web interface. On the left is a dark blue sidebar with a navigation menu. The top of the sidebar has a close button (X) and the RIPE Database logo. The menu items are: Resources (with a server icon and subtext 'My Resources, Sponsored Resources'), RIPE Database (with a database icon and a dropdown arrow), Query the RIPE Database, Full Text Search, Syncupdates, and Create an Object. The main content area has a white background. At the top, there's a search bar with the placeholder text 'Enter a search term' and a magnifying glass icon. Below the search bar is a disclaimer: 'By submitting this form you explicitly express your agreement with the [RIPE Database Terms and Conditions](#)'. The main heading is 'RIPE Database Query'. Below this, there are two columns of information. The left column is titled 'Querying the RIPE Database' and contains the text: 'You can query the RIPE Database via the web interface, the RESTful API or a command line tool. Learn more about each option by clicking the link below.' followed by a link 'Read documentation' with an external link icon. The right column is titled 'RESTful API' and contains the text: 'The RESTful API can only process one object at a time. If you want to process several objects simultaneously, you need to write a script on the client side to handle the list of objects and feed them.' followed by a link 'Read more about RESTful API' with an external link icon. At the bottom, there's a section titled 'Test Database' with the text: 'You can use this environment to learn and experiment with the RIPE Database. It uses a TEST source. Important: All changes are reverted every day at night.' followed by a link 'Take me to Test Database' with an external link icon.

Resources
My Resources, Sponsored Resources

RIPE Database ✓

Query the RIPE Database

Full Text Search

Syncupdates

Create an Object

Enter a search term

By submitting this form you explicitly express your agreement with the [RIPE Database Terms and Conditions](#)

RIPE Database Query

Querying the RIPE Database

You can query the RIPE Database via the web interface, the RESTful API or a command line tool. Learn more about each option by clicking the link below.

[Read documentation](#)

RESTful API

The RESTful API can only process one object at a time. If you want to process several objects simultaneously, you need to write a script on the client side to handle the list of objects and feed them.

[Read more about RESTful API](#)

Test Database

You can use this environment to learn and experiment with the RIPE Database. It uses a TEST source. Important: All changes are reverted every day at night.

[Take me to Test Database](#)



Querying with Flags

- For finding additional information
 - Insert flag in front of the query:

-m 193.0.16.0/21
 - Or check appropriate box in a tab

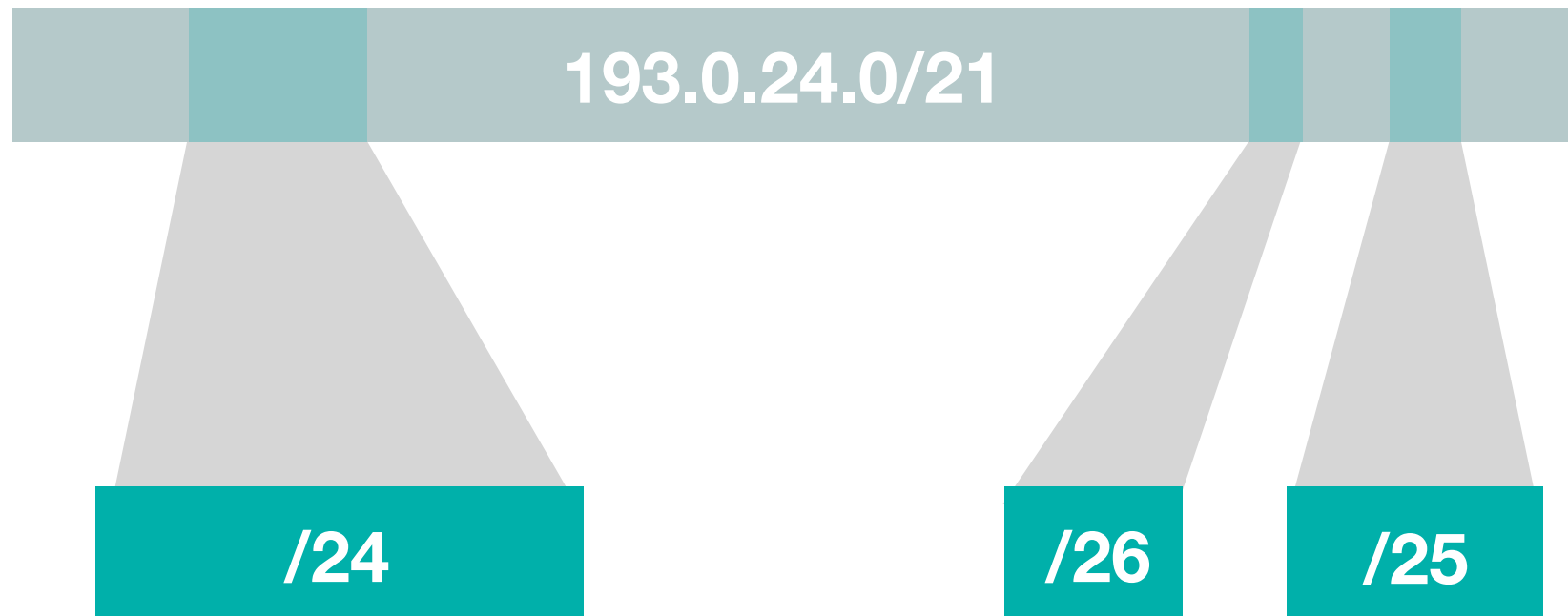
Example, “Hierarchy Flags”:

The screenshot shows the RIPE Database search interface. At the top, there is a search bar with the text "Enter a search term" and "193.0.16.0/21". Below the search bar, there are four tabs: "Types", "Hierarchy flags (1)", "Inverse lookup", and "Advance filter". The "Hierarchy flags (1)" tab is selected, and a dropdown menu is open. The dropdown menu contains the text "Returns first level more specific inetnum, inet6num or route(6) objects, excluding exact matches." Below this text is a horizontal slider with a blue dot positioned at the "m" mark. The slider has labels "No", "l", "L", "m", "M", and "x". Below the slider, there is a checkbox labeled "d -Return address, route and domain object types." and a link labeled "Learn more".

More Specific inetnums: -m



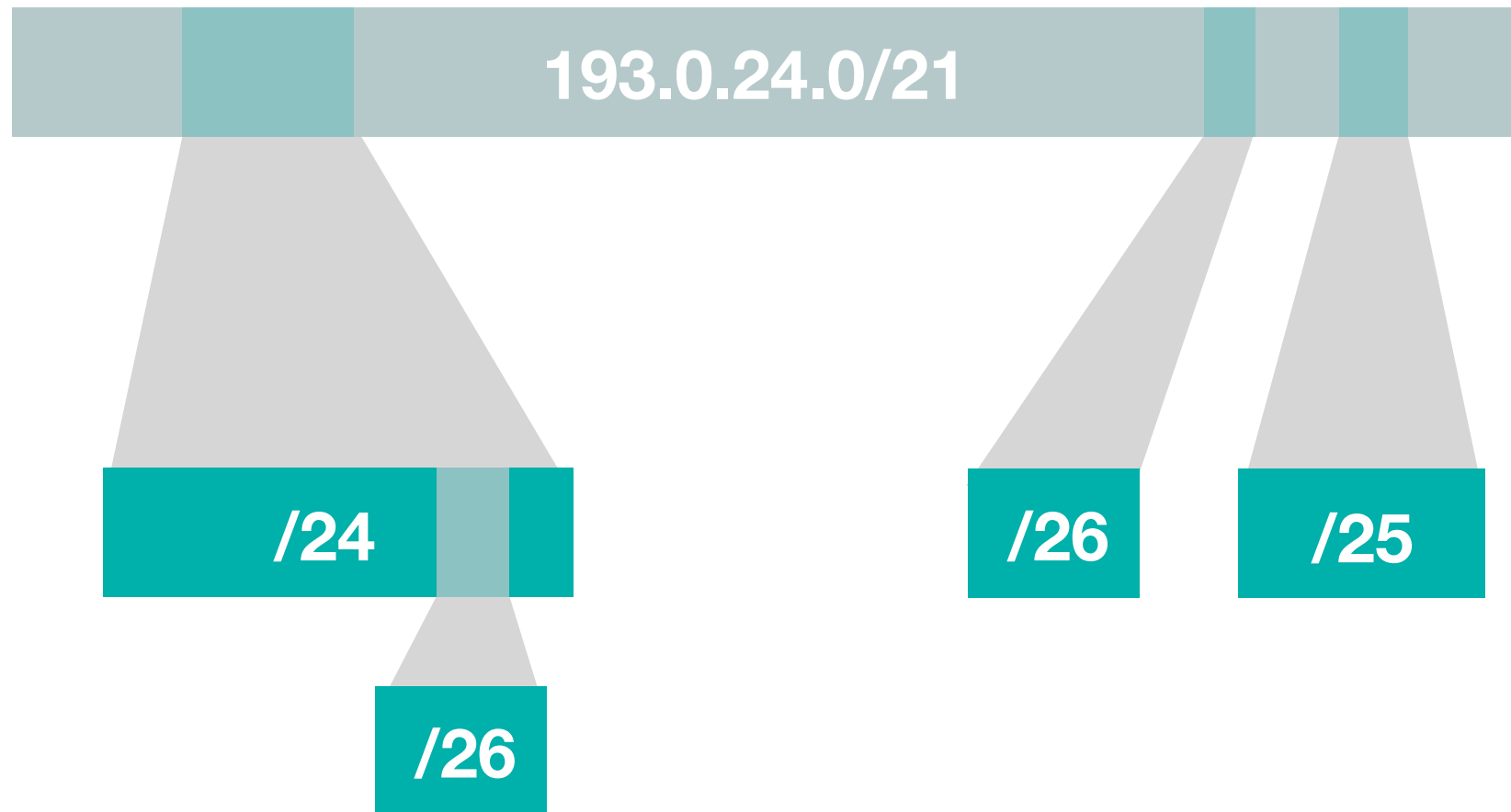
-m 193.0.24.0/21



More Specific inetnums: -M



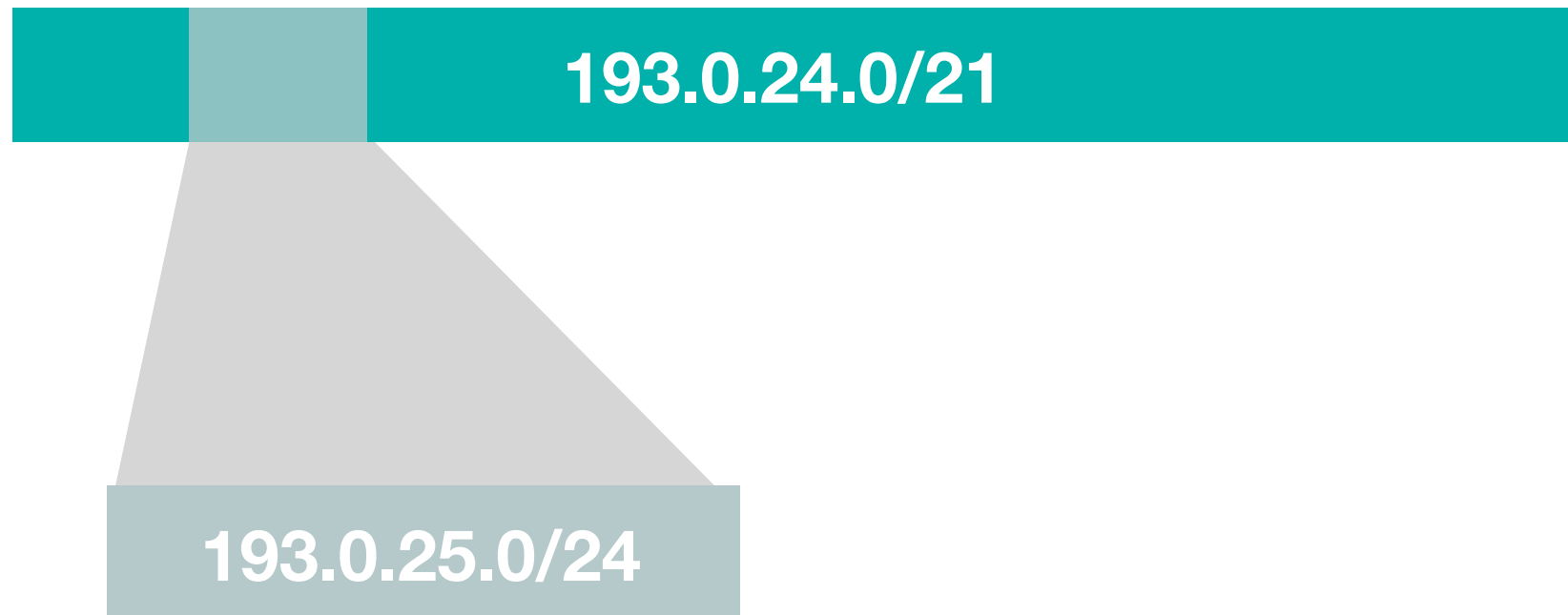
-M 193.0.24.0/21



Less Specific inetnums: -l



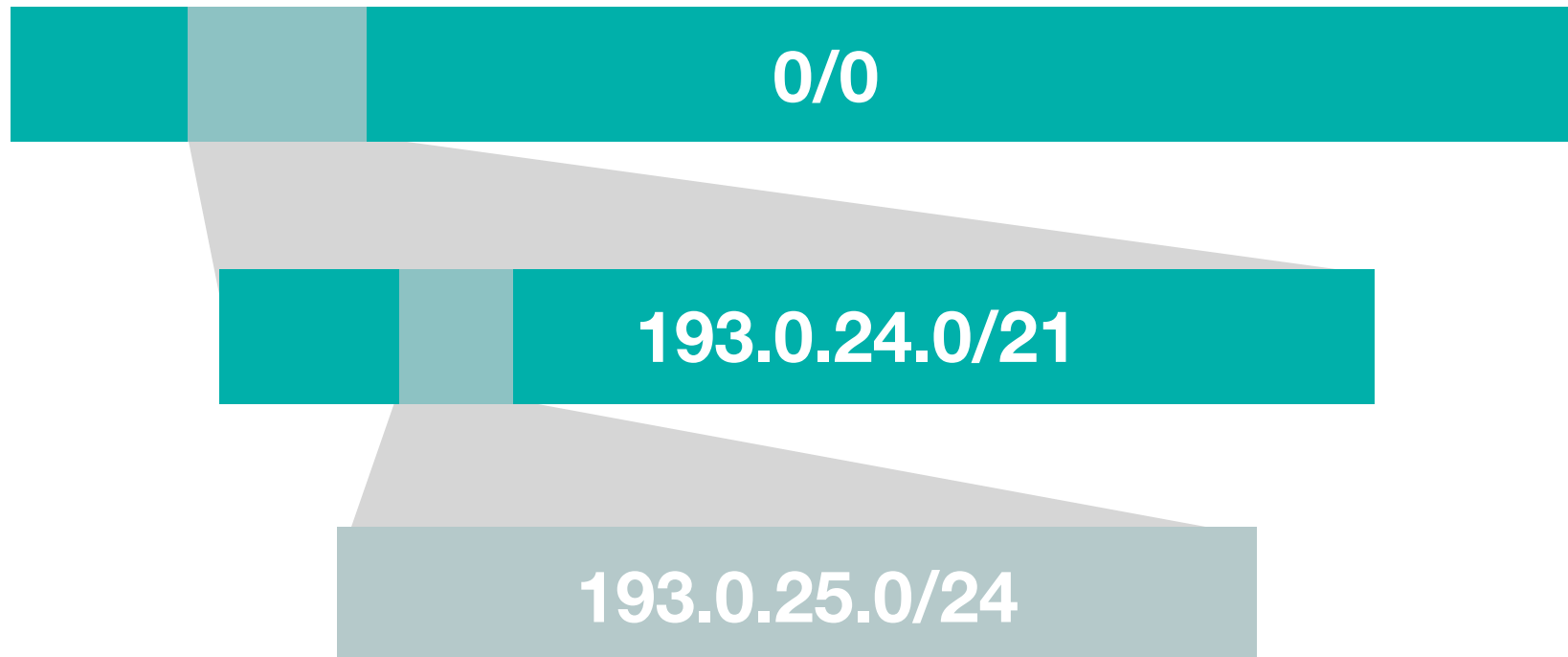
-l 193.0.25.0/24



Less Specific inetnums: -L



-L 193.0.25.0/24





Querying the RIPE Database

Activity 2

Activity: Querying the RIPE Database



- **Time**
 - 15 minutes
- **Goal**
 - Learn to use the web interface to find information in RIPE DB
- **Tasks**
 - Find contact information about an IP address
 - Look for the IP address space of an LIR



Updating the RIPE Database

Protecting Objects



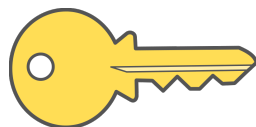
person: Jean Blue

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





Update after a Query Result

Responsible organisation: [Reseaux IP Europeens Network Coordination Centre \(RIPE NCC\)](#)

Abuse contact info: abuse@ripe.net

inetnum: 193.0.24.0 – 193.0.30.255
netname: RIPENCC-MEETING-PUBLIC
descr: Reseaux IP Europeens Network Coordination Centre (RIPE NCC)
remarks: RIPE NCC Training Services & RIPE Meetings
remarks: This space is used as public space during RIPE meetings
country: NL
admin-c: BRD-RIPE
tech-c: OPS4-RIPE
status: ASSIGNED PA
mnt-by: RIPE-NCC-MNT
mnt-routes: RIPE-NCC-MNT
mnt-domains: RIPE-NCC-MNT
created: 2013-10-09T14:42:14Z
last-modified: 2017-12-04T14:40:12Z
source: RIPE

Update object

RIPEstat

Modify "inetnum" object

Edit in text area

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

RIPE-NCC-MNT

inetnum

193.0.24.0 -193.0.30.255

netname

RIPENCC-MEETING-PUBLIC

descr

Reseaux IP Europeens Network Coordination Centre (RIPE NCC)

remarks

RIPE NCC Training Services & RIPE Meetings

remarks

This space is used as public space during RIPE meetings

country

NL

admin-c

BRD-RIPE

tech-c

OPS4-RIPE



Duplicate the attribute



Add a new attribute



Delete the attribute

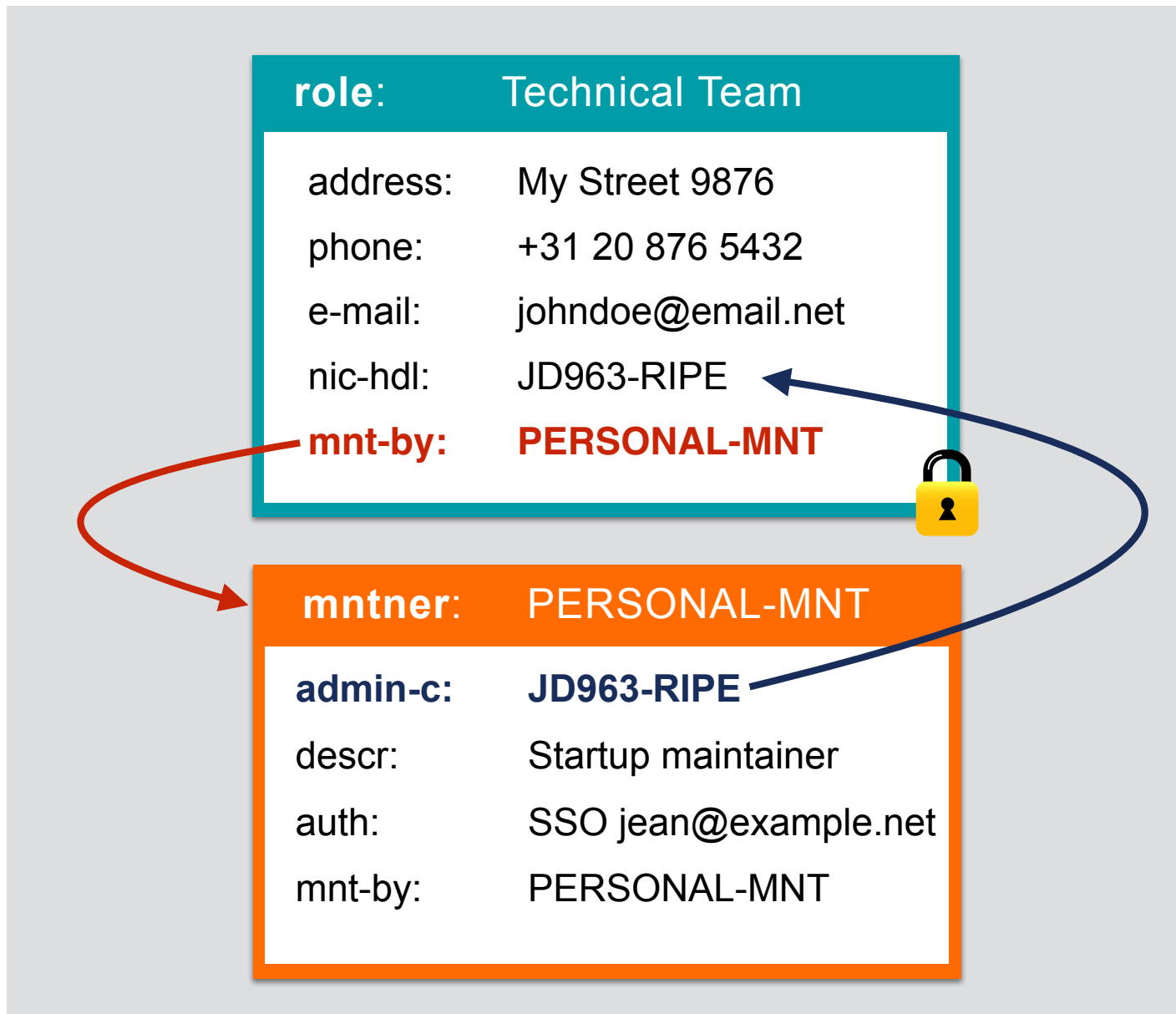


Info about the attribute



Creating Objects

Maintainer and Person/Role



Create role and maintainer pair (1)



Select object type you would like to create

Object type

role and maintainer pair

Create

Create role and maintainer pair (2)



Create role and maintainer pair

mntner	
<input type="text" value="AA320-MNT"/>	?
role	
<input type="text" value="ABC Admins"/>	? Switch to person
address	
<input type="text" value="Singel 258, 1016 AB Amsterdam"/>	?
e-mail	
<input type="text" value="abd-admins@abc-company-email.com"/>	?

By submitting this form you explicitly express your agreement with the [RIPE Database Terms and Conditions](#)

Cancel

Submit

- Instead of a **role**, you can create a **person** object



Create role and maintainer pair (3)

Your objects have been successfully created

role with primary key "AA3-TEST"

role:	ABC Admins
address:	Singel 258, 1016 AB, Amsterdam
e-mail:	abc-admins@abc-company-email.com
nic-hdl:	AA3-TEST
mnt-by:	AA320-MNT
created:	2019-10-16T11:52:09Z
last-modified:	2019-10-16T11:52:09Z
source:	TEST

mntner with primary key "AA320-MNT"

mntner:	AA320-MNT
admin-c:	AA3-TEST
upd-to:	john.smith@abc-company-email.com
auth:	SSO john.smith@abc-company-email.com
mnt-by:	AA320-MNT
created:	2019-10-16T11:52:09Z
last-modified:	2019-10-16T11:52:09Z
source:	TEST



Creating an object (1)

- Webupdates
- Email updates
- Syncupdates
- Restful API (XML/JSON)

You are editing Reseaux IP Europeens Network C...

Select object type you would like to create

Object type


- ✓ role and maintainer pair
- as-set
- aut-num
- domain
- filter-set
- inet-rtr
- inet6num
- inetnum
- irt
- key-cert
- mntner
- organisation
- peering-set
- person
- role
- route
- route-set
- route6
- rtr-set



Creating an object (2)

- Choose a **mntner** to protect the new object

Create "inetnum" object

 Create in text area

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



- Or choose a **person** object for admin-c (only mntners)

Create "mntner" object

Please select your administrative contact before creating the shared maintainer object



Don't have an administrative contact? [Create maintainer and person pair](#)



Creating an object (3)

Create "inetnum" object

Create in text area

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

EXAMPLE-LIR-MNT ★ ✕

inetnum

Specifies the range of IPv4 addresses in dash or CIDR notation.

netname

The name of the range of IP address space.

country

Identifies the country as a two-letter ISO 3166 code, e.g. NL

admin-c

Nic-handle of an administrative contact.

tech-c

Nic-handle of a technical contact.

status

Specifies the kind of resource.

source

RIPE

By submitting this form you explicitly express your agreement with the [RIPE Database Terms and Conditions](#)

Cancel

Submit

Creating an object (4)



Your object has been successfully created

inetnum with primary key "193.0.30.0 - 193.0.30.255"

```
inetnum:          193.0.30.0 - 193.0.30.255
netname:          CUSTOMER-NETWORK-001
descr:           The IPv4 network of customer 001
country:         NL
admin-c:         GV5919-RIPE
tech-c:          GV5919-RIPE
status:          ASSIGNED PA
mnt-by:          EXAMPLE-LIR-MNT
created:         2015-12-24T10:02:59Z
last-modified:   2015-12-24T10:02:59Z
source:          RIPE
```



Questions





Getting Resources

Section 5



Terminology

- **Allocation**

- Block of IP addresses reserved for future use

- **Assignment**

- A chunk of addresses from an allocation that is used:
 - in your own infrastructure
 - in an End User network

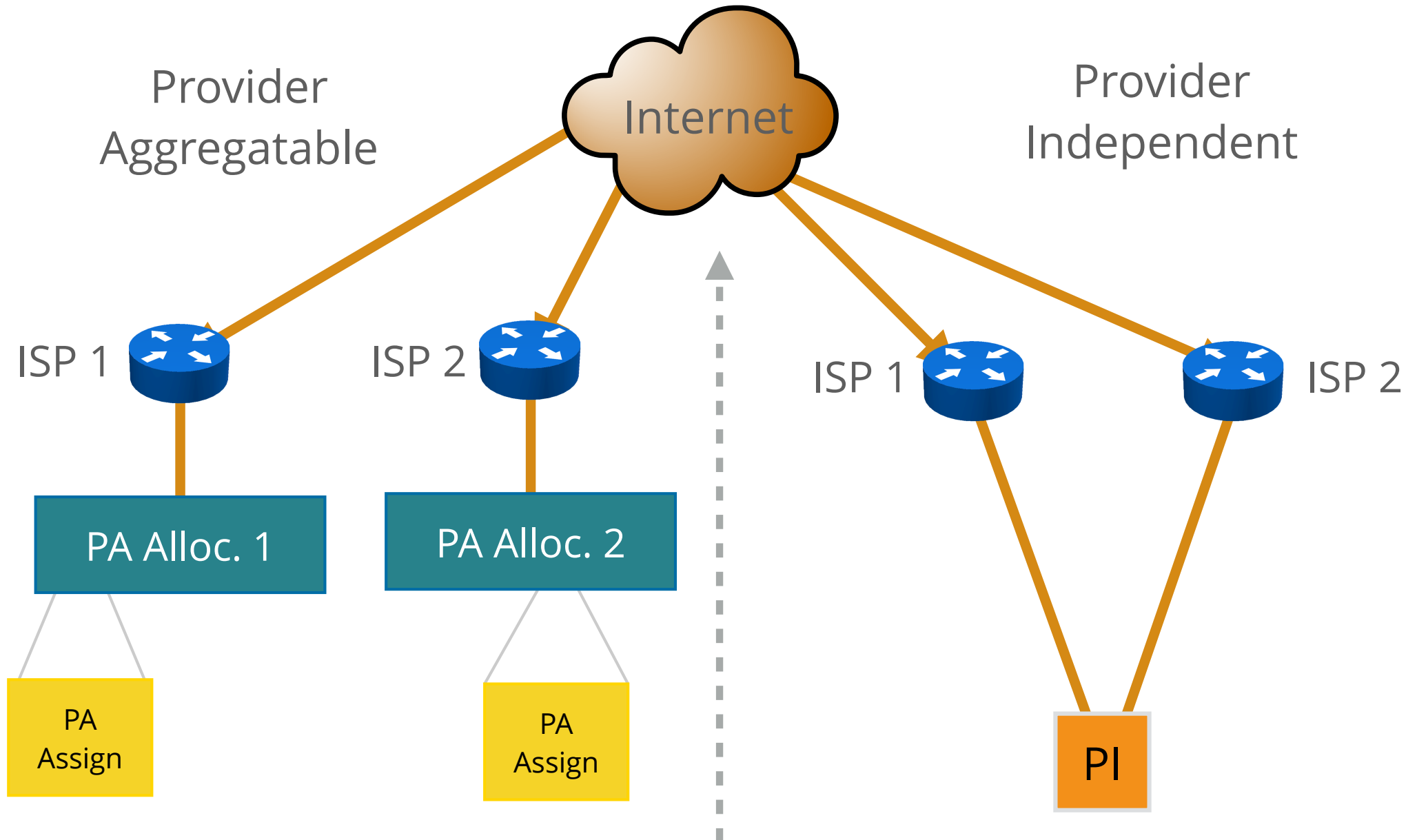


Types of Address Space

- **PA = Provider Aggregatable**
 - Blocks given to LIRs
 - Distributed further to other users
 - When customers change ISP, the IPs go back to LIR
- **PI = Provider Independent**
 - Blocks given directly to a user for their own network
 - User takes IPs with them if they change ISP

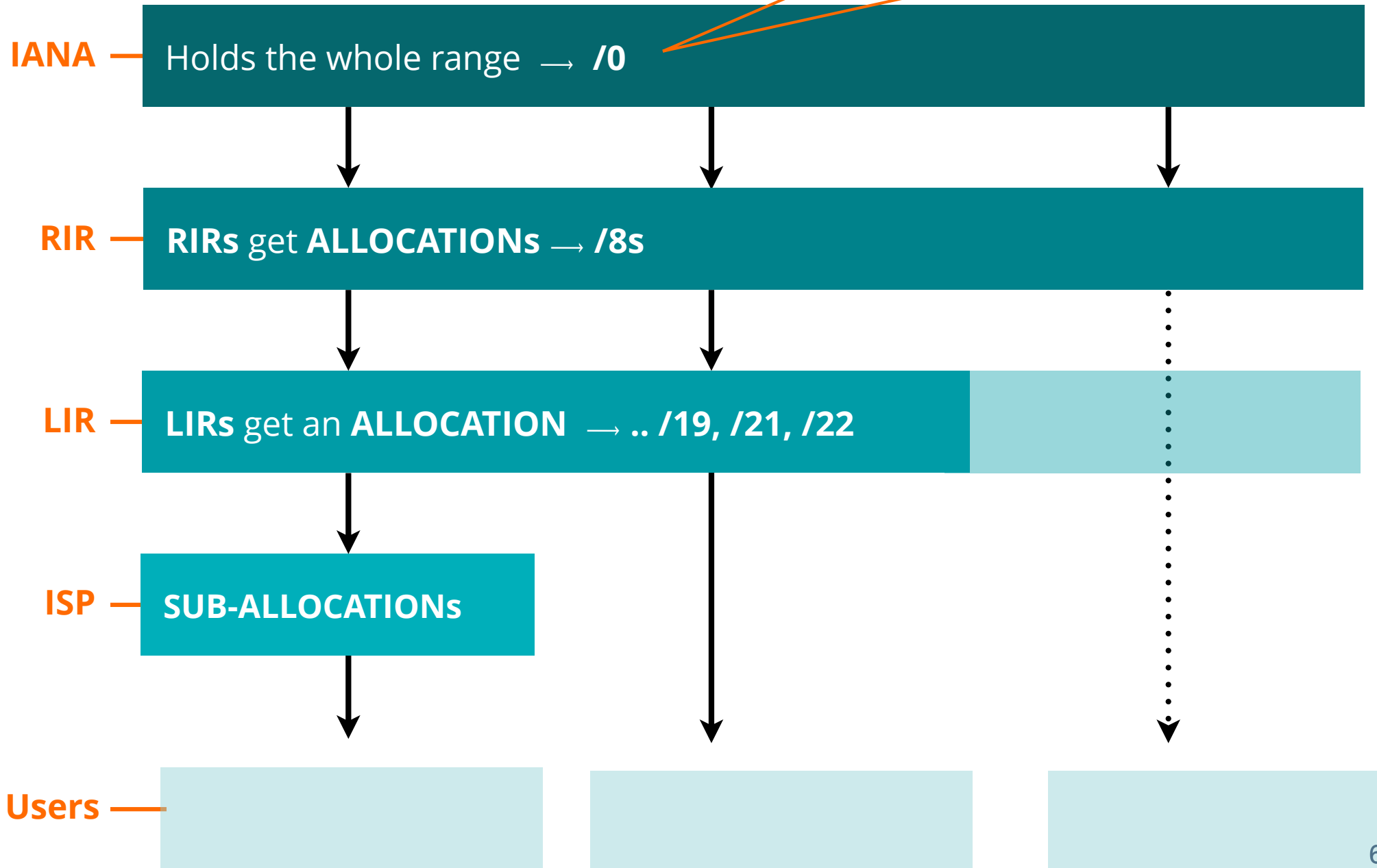


PA versus PI



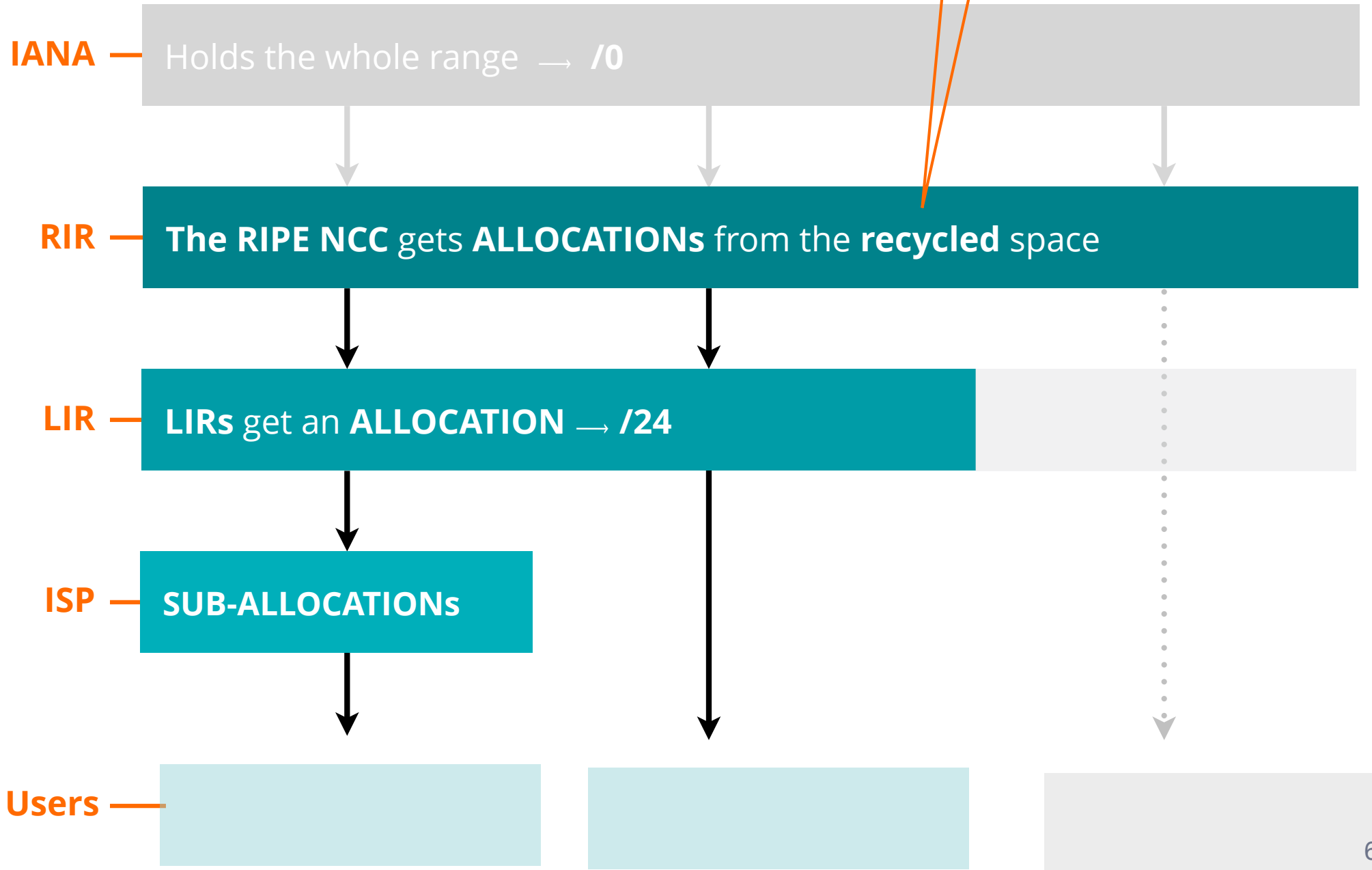
IPv4: How it used to be

/8 = 16,77 million IPv4 addresses
/16 = 65536 IPv4 addresses
/24 = 256 IPv4 addresses



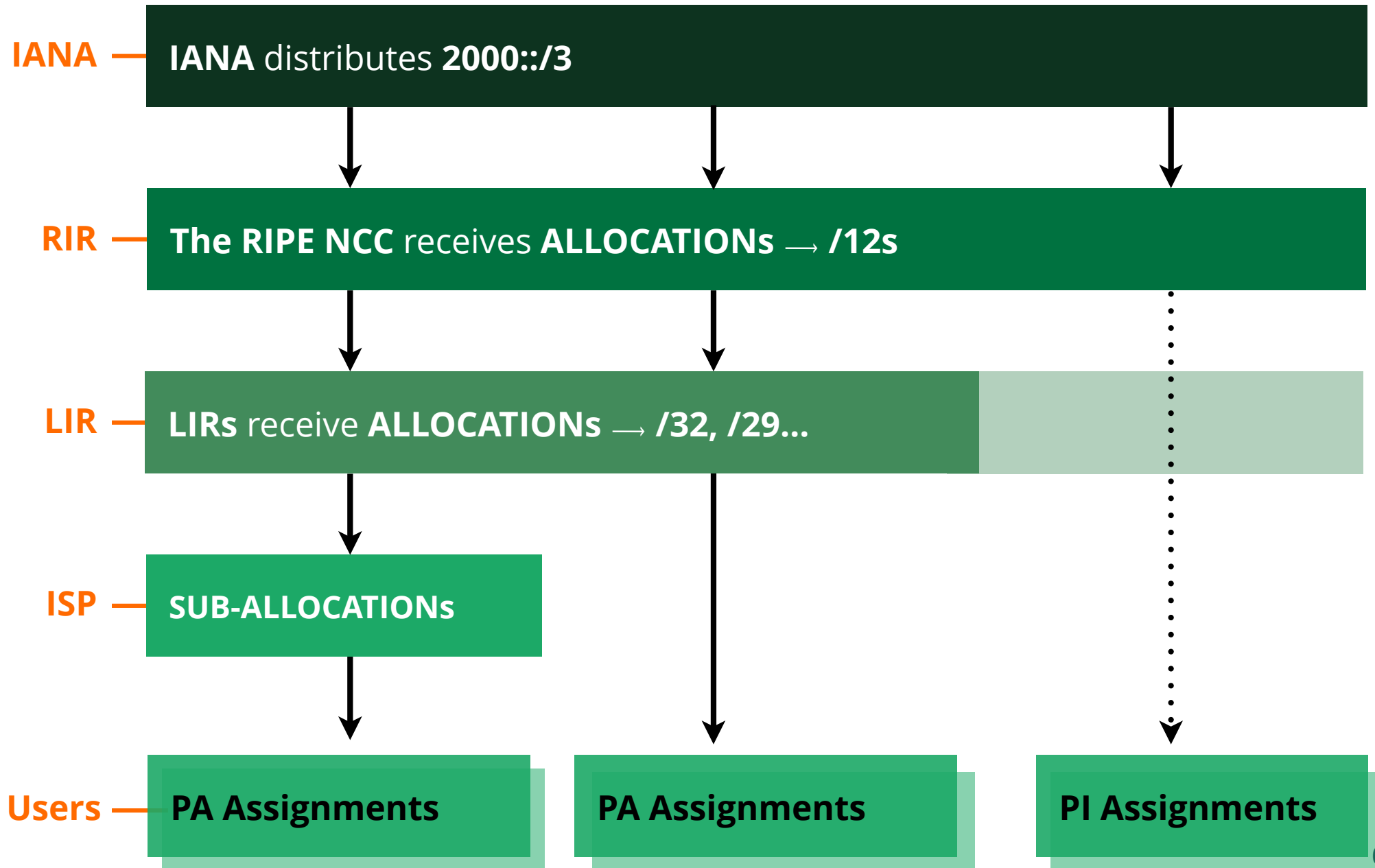


How it is for IPv4 now



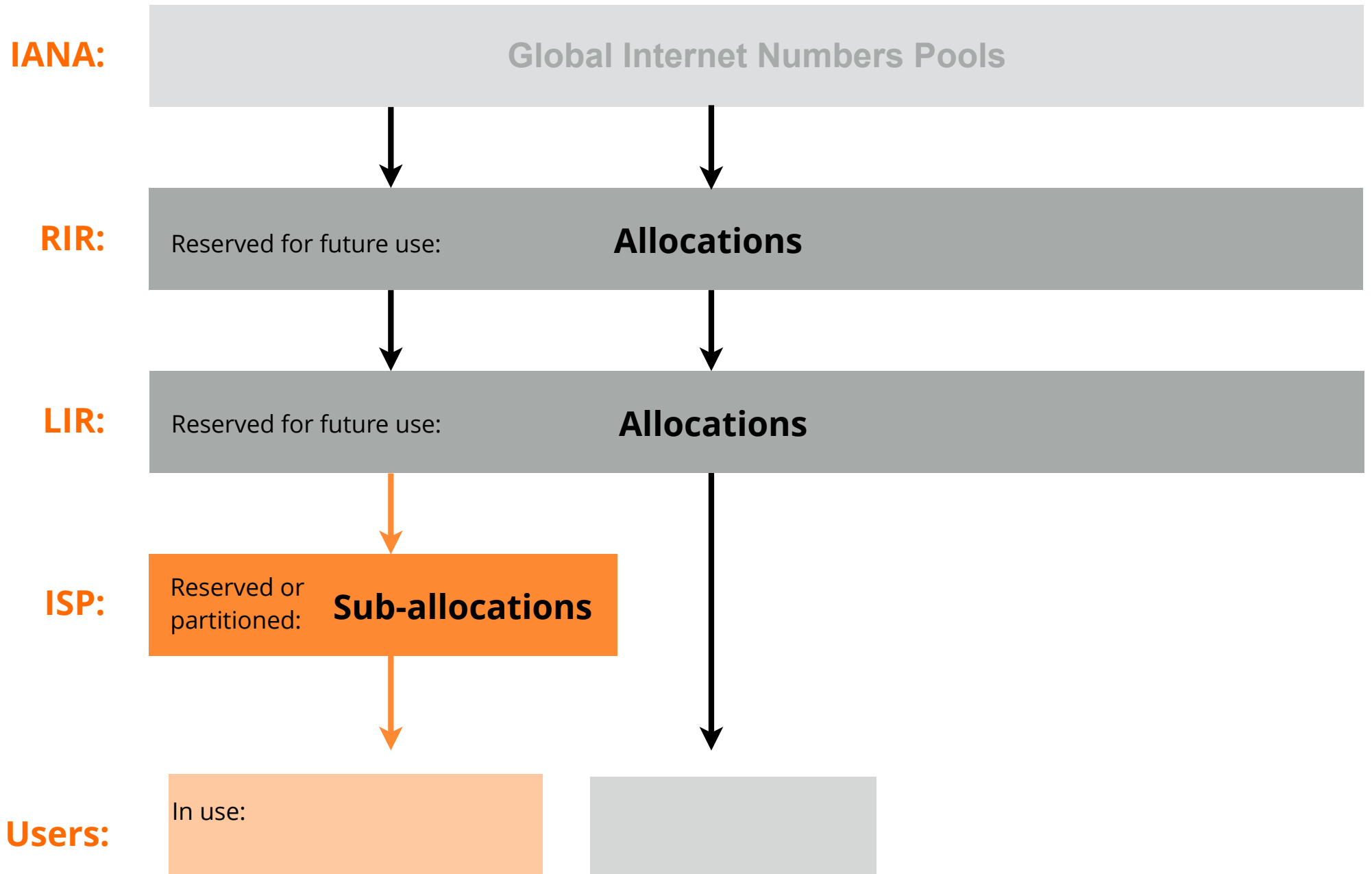


How it works for IPv6





Sub-allocations





First IPv6 Allocation

- Have **mntner**, **person** and **role** objects ready
- Submit the First IPv6 Allocation Request form
 - Have a plan for making assignments within two years
- Minimum allocation size is /32
 - Up to a /29 without additional justification
 - More if justified by customer numbers and the extent of the infrastructure
 - Additional bits based on hierarchical and geographical structure, planned longevity and security levels

Requesting an IPv6 PI Assignment



- PI Assignment for End-Users need a Sponsoring LIR
- Needs **organisation**, **person**, **role** and **mntner** objects
- Minimum size = /48
- You must provide:
 - PI Assignment Request Form
 - End User Assignment Agreement
 - Company registration document or picture ID (for a private individual)



IPv6 PI Assignments

- Cannot be further sub-assigned to other organisations
- Allowed to give separate addresses (not prefixes) to:
 - Visitors, server or appliance, point-to-point link to 3rd party

inet6num:	2001:db8:1234::/48
descr:	Some PI Assignment
status:	ASSIGNED PI
mnt-by:	RIPE-NCC-END-MNT
mnt-by:	ENDUSER-MNT
mnt-routes:	ENDUSER-MNT
mnt-domains:	ENDUSER-MNT

- Yearly charges for PI Assignments
 - See the RIPE NCC Charging Scheme



IPv4 Allocation: The Waiting List

- Submit the IPv4 Allocation Request form
 - Use the same **mntner**, **person/role** objects from the IPv6 allocation
- Each LIR is put on the first-come-first-served waiting list to get **one /24** block
 - = 256 IPv4 addresses
- Cannot be transferred for **24 months** after receiving it



IPv4 PI Assignments

- Since IPv4 exhaustion, **no new PI assignments**
- No sub-assigning allowed
- Yearly charges for PI Assignments
 - See the RIPE NCC Charging Scheme
- **Convert** LIR PI assignments into PA allocations



Autonomous System Numbers

- **Assignment requirements**
 - Address space
 - Multihoming
 - One AS Number per network
- For LIR itself
- For End User
 - Sponsoring LIR requests it for End User
- **32-bit is the default**



PI / ASN and Sponsoring LIR

- Options for End Users without sponsoring LIR holding PI / ASN:
 - Sign End User Agreement with an LIR
 - Become an LIR themselves
 - Return the resources
- Sponsoring LIR is published in the RIPE Database
 - “sponsoring-org:” attribute



Getting IPs and ASNs

Demonstration



Transfers

Section 6



Types of Transfers

PA allocations

between RIPE NCC members

Merger or Acquisition

PI assignments

between End Users

From Legacy Space

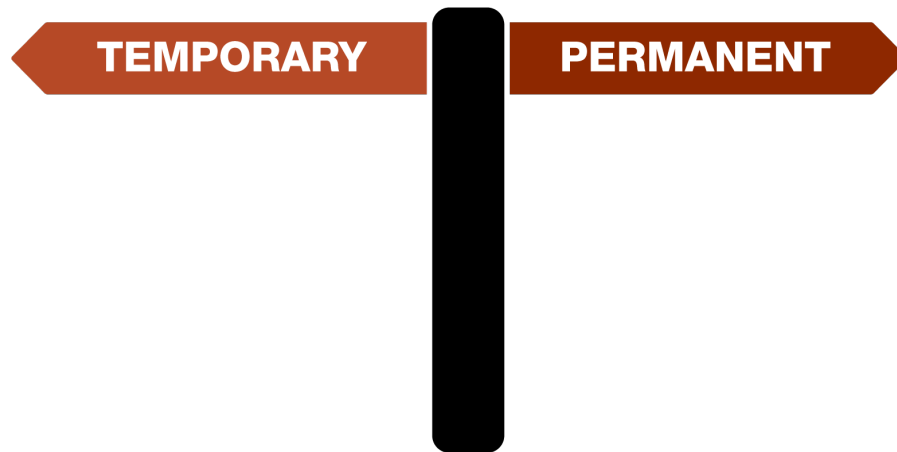
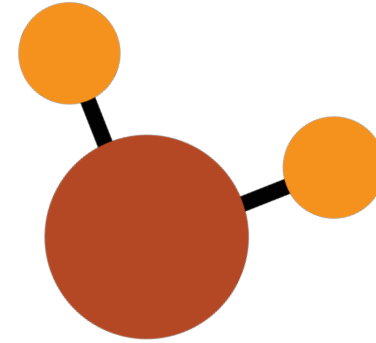
AS numbers

between End Users

Inter-RIR



AS Number Transfers

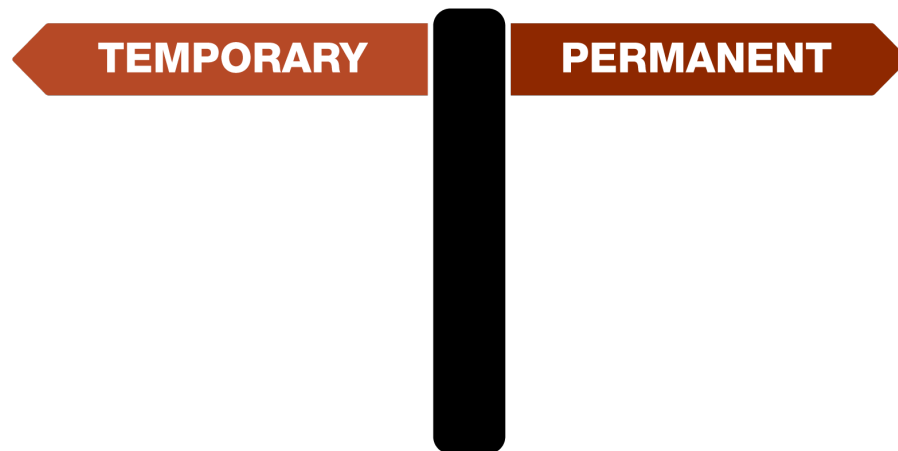


SPONSORED BY
YOUR LIR

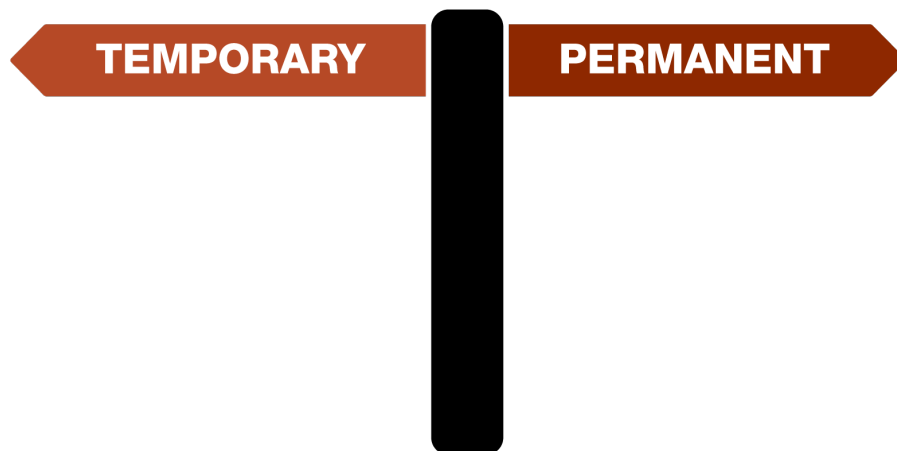
IPv4 Allocation Transfers



LIR → **LIR**



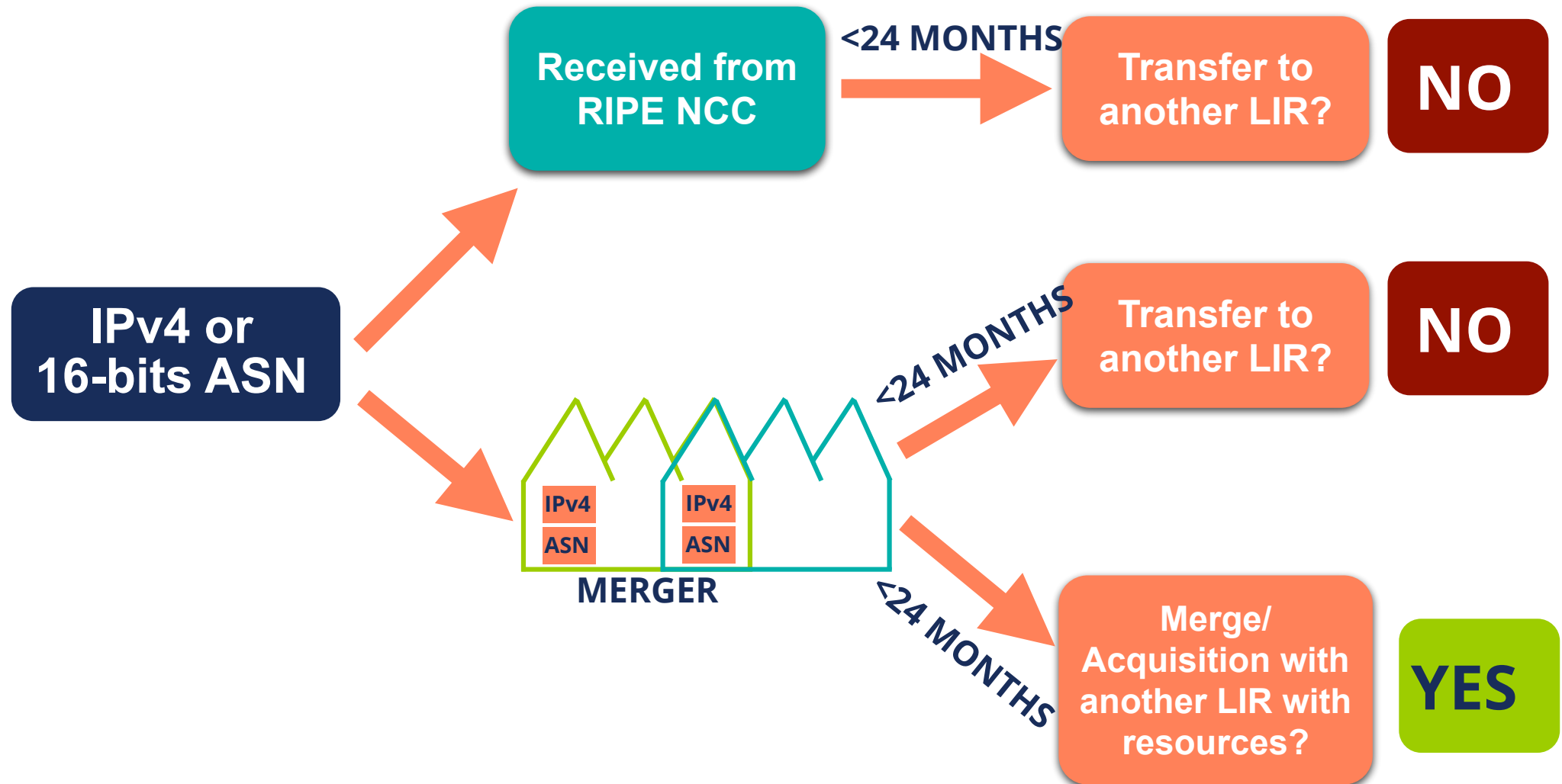
IPv4 PI Assignment Transfers



SPONSORED BY
YOUR LIR



Transfers Restrictions

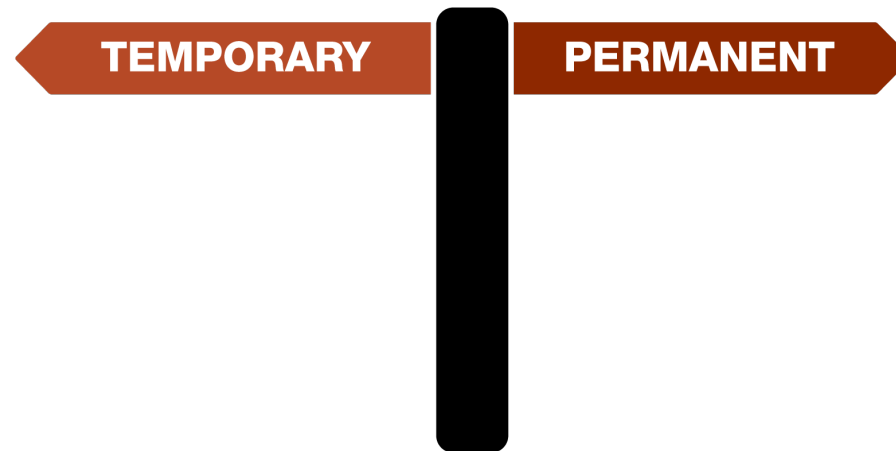




IPv6 Allocation Transfers

LIR → **LIR**

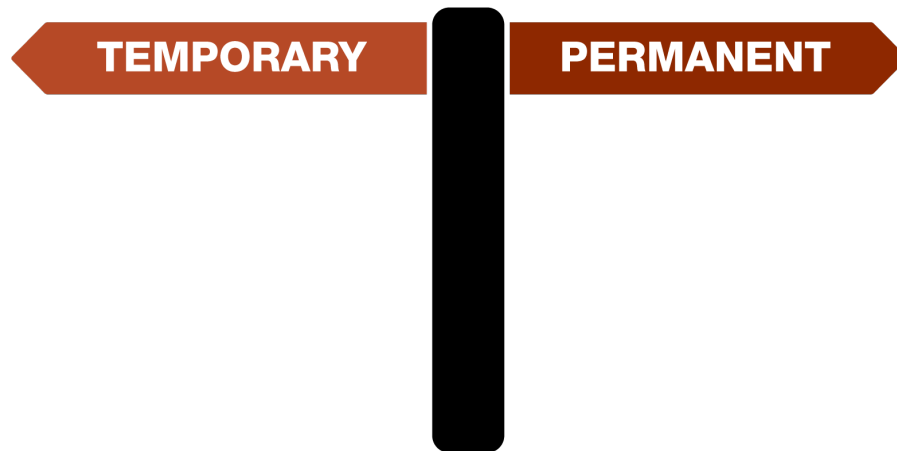
MIN
SIZE
/32



IPv6 PI Assignment Transfers



MIN
SIZE
/48



SPONSORED BY
YOUR LIR

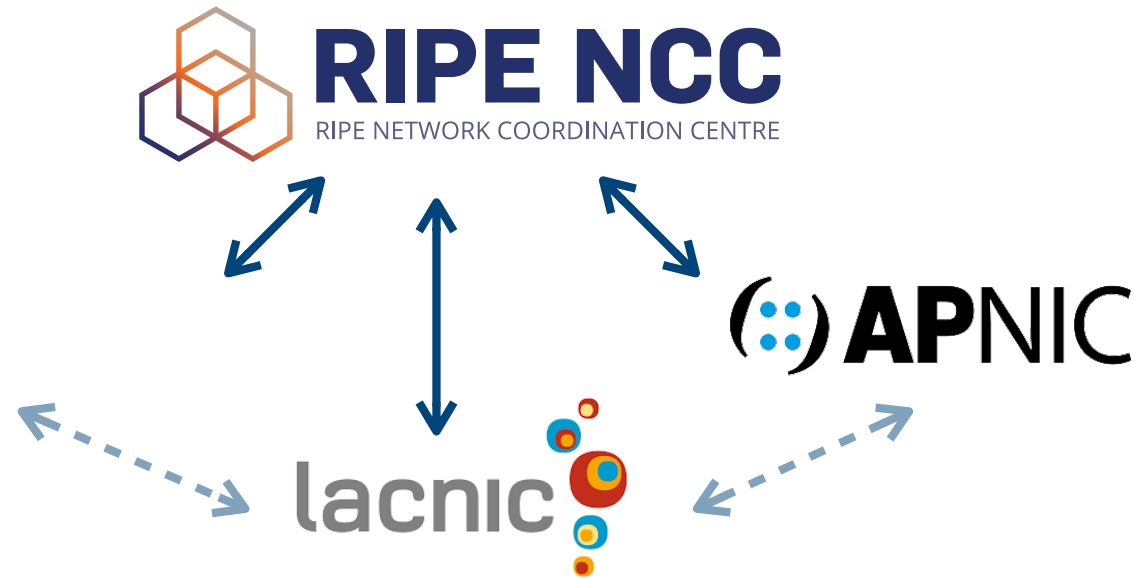


Transfers: How to Request

- Use the “**Request Transfer**” wizard
- Include the following information & documents:
 - IPv4 / IPv6 / ASN being transferred
 - company names and contact details
 - company registration papers
 - Transfer Agreement
 - information why it needs to be transferred
- **For PI transfers, sponsoring LIR agreement is needed too**



Inter-RIR Transfers



- Between RIRs with compatible policies (ARIN, APNIC, LACNIC)
- IPv4 addresses and AS Numbers (including legacy)
- Send your request to inter-rir@ripe.net



Questions





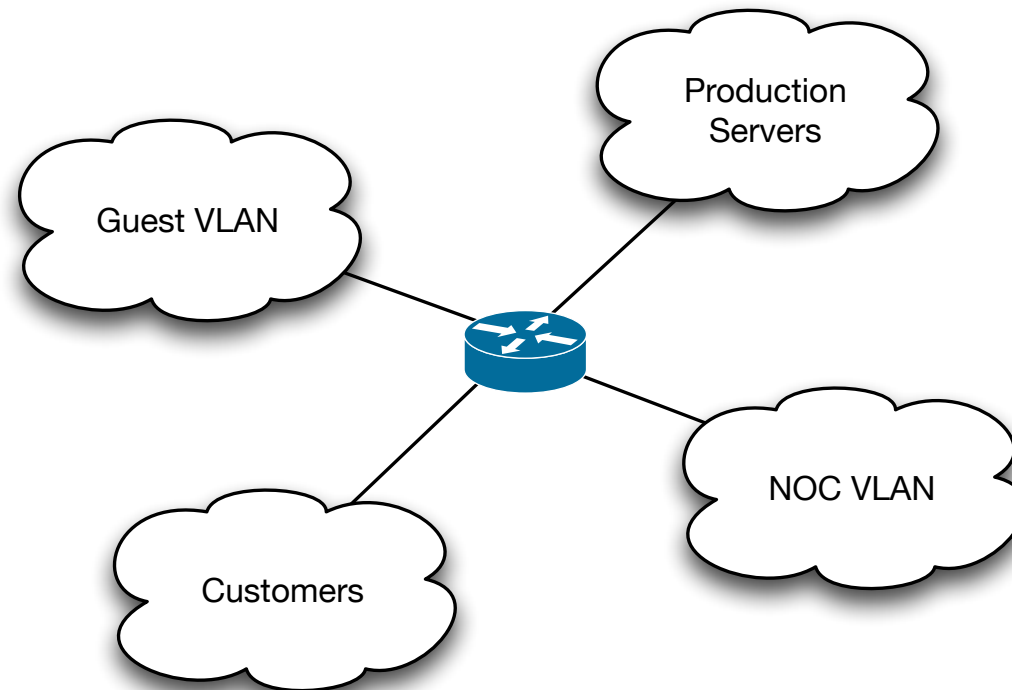
Distributing Resources

Section 7



How Much Address Space?

- Think about how the network will be split up
- Subnets are used to group hosts



- Calculate how much address space you will need!



IPv4 Subnets



- 3 IPs required for each subnet
 - network
 - broadcast
 - gateway
- Usable IPs = [subnet size] - 3 IPs
 - /24 = 256 IPs = 256 - 3 = 253 usable IPs



IPv6 Subnets

/64 = 1 subnet = 18,446,744,073,709,551,616 IPs

...

/60 = 16 subnets

...

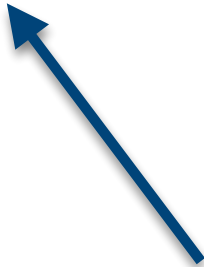
/56 = 256 subnets

...

/52 = 4096 subnets

...

/48 = 65536 subnets



*In IPv6,
amount of hosts
in a subnet is
irrelevant!*



IPv6 Assignments

- Default IPv6 subnet = **/64**
- Every “end site” can be assigned between /64 and larger without prior approval of the RIPE NCC
 - Keep assignment documentation in case of audit!
- Assignments for your own infrastructure
 - /48 per Point of Presence
 - Additional /48 for the core network



Making Assignments

Activity 3



Activity: Making assignments

- **Time**
 - 30 minutes
- **Goal**
 - Understand and practice the Assignment Process
- **Task**
 - Ask the End User for more information, if needed
 - Decide the assignment sizes
 - How would you document the assignments?



Making assignments - Solution

- IPv4

Service	Now	1 Year	2 Years	IPv4 Prefix
Shared Webhosting	$(150/10) + 3 = 18$ IPs	$(300/10) + 3 = 33$ IPs	$(600 / 10) + 3 = 63$ IPs	/26
SSL Webhosting	$7 + 3 = 10$ IPs	$14 + 3 = 17$ IPs	$28 + 3 = 31$ IPs	/27
Infrastructure	$10 + 3 = 13$ IPs			/28

- IPv6

- A prefix with at least 3 /64s. Make it easy, use a **/48**

IPv6 Registration in the Database



- All assignments and sub-allocations must be registered to make them valid!

Assignment

inet6num: 2001:db8:aaaa::/48

descr: Customer 321
country: EU
admin-c: LA789-RIPE
tech-c: LA789-RIPE
status: **ASSIGNED**
mnt-by: LIR-MNT

Sub-allocation

inet6num: 2001:db8:f000::/36

descr: Branch office #1
country: EU
admin-c: LA789-RIPE
tech-c: LA789-RIPE
status: **ALLOCATED-BY-LIR**
mnt-by: LIR-MNT

Grouping Customer Assignments



inet6num:	2001:db8::/36
descr:	DSL customers
admin-c:	LA789-RIPE
tech-c:	LA789-RIPE
status:	AGGREGATED-BY-LIR
assignment-size:	48
mnt-by:	LIR-MNT



inet6num:	2001:db8:103::/48
inet6num:	2001:db8:102::/48
inet6num:	2001:db8:101::/48
inet6num:	2001:db8:100::/48
descr:	Customer 321
country:	EU
admin-c:	LA789-RIPE
tech-c:	LA789-RIPE
status:	ASSIGNED
mnt-by:	LIR-MNT



IPv4 Resources

- LIRs are allocated only one /24
 - More IPv4 space through transfers
 - Assignment size is limited to total of IPv4 space an LIR holds
- All assignments must be registered correctly in the RIPE Database

<http://www.ripe.net/ripe/docs/ipv4-policies.html>

IPv4 Registration in the Database



- All assignments and sub-allocations must be registered to make them valid!

Assignment

inetnum: 10.0.3.0 - 10.0.3.255

descr: Customer 321
country: EU
admin-c: LA789-RIPE
tech-c: LA789-RIPE
status: **ASSIGNED PA**
mnt-by: LIR-MNT

Sub-allocation

inetnum: 10.0.1.0 - 10.0.2.255

descr: Branch office #1
country: EU
admin-c: LA789-RIPE
tech-c: LA789-RIPE
status: **SUB-ALLOCATED PA**
mnt-by: LIR-MNT

Grouping Customer Assignments



inetnum:	10.5.0.0 - 10.5.7.255
descr:	DSL customers
admin-c:	LA789-RIPE
tech-c:	LA789-RIPE
status:	AGGREGATED-BY-LIR
assignment-size:	29
mnt-by:	LIR-MNT



inetnum:	10.5.0.24 - 10.5.0.31
inetnum:	10.5.0.16 - 10.5.0.23
inetnum:	10.5.0.8 - 10.5.0.15
inetnum:	10.5.0.0 - 10.5.0.7
descr:	Customer 1
country:	EU
admin-c:	LA789-RIPE
tech-c:	LA789-RIPE
status:	ASSIGNED
mnt-by:	LIR-MNT



Infrastructure vs. End User

Infrastructure

Blocks for connections to End Users:

- Point of Presence
- Point-to-Point
- Broadband address pools

(Also LIRs own network)

End User

Their equipment, their location

- End User networks
- Offices
- Co-located subnets



Infrastructure vs. End User

Infrastructure

Blocks for connections to End Users:

- Point of Presence
- Point-to-Point
- Broadband address pools

(Also LIRs own network)

Grey Area

Co-location
Server housing
Web hosting
Application Services

End User

Their equipment,
their location

- End User networks
- Offices
- Co-located subnets

When the End User has
a few addresses out of a
larger address block

If the End User has
a separate subnet



Registering the Assignments

Activity 4

Activity: Registering an Assignment



- **Time**
 - 25 minutes
- **Goal**
 - Practice how to register an assignment
- **Task**
 - Use the assignment from the previous activity
 - Choose the range(s) from your allocation
 - Create the inetnum and inet6num objects in the TEST RIPE Database



Managing Resources

Section 8



Managing IPv6 Address Space

- **Consider your mental health**
 - Use assignments on 4-bit boundary
- **Don't be too conservative**
 - Business customers often get a /48
 - /56 is a popular size for residential customers
- **Use "AGGREGATED-BY-LIR"**
 - to group assignments of the same size



Managing IPv4 Address Space

- LIRs can join the waiting list, and at some point get one /24 allocation (can be done only once)
 - Make **classless** assignments
 - **inetnum** does not have to be CIDR
 - Do not fragment your allocation
- **Need** is not a criteria for obtaining more IPv4 address space
- Keep the **RIPE Database** up to date

ARC



- Assisted Registry Check





ARC Goals

- Keep registry clean and up to date
- Make you aware of any inconsistencies with the registry data
- Support you with your registration tasks
- Increase LIR account security
- Keep in touch with you!

RPKI Digital Resource Certificates



- Issue digital certificates along with the registration of Internet number resources
- Two main purposes:
 - Make the registry more robust
 - Making Internet routing more secure
- Added value comes with validation
 - The possibility to perform BGP Origin Validation



Using Certificates

- Certification is a free, opt-in service for LIRs
- Your choice to request a certificate
 - Linked to your membership
 - Renewed every 12 months
 - Available in LIR Portal
- Certificate does not list any identity information
 - That information is in the RIPE Database
- Digital proof you are the holder of a resource
 - and you're authorised to announce it



Being an LIR contact

Activity 5



Activity: Being an LIR Contact

- **Time**
 - 25 minutes
- **Goal**
 - Understand the tasks of an LIR contact
- **Scenario**
 - It is your first day as an LIR contact. In which order would you complete these tasks?

Solution: Tasks to be arranged



ID	Groups of Tasks
1)	Get access / rights to the RIPE Database information related with your LIR
2)	Check / Update your registration information (LIR Portal)
3)	Revise / Update your LIR's objects in the RIPE Database
4)	Manage the resources for your LIR (IPs and ASNs)
5)	Get Access to the Management Web Interface

ID	TASKS
a)	Check / update LIR Certificate and certified authorisation for announced prefixes (RPKI Dashboard)
b)	Correct invalid and unused assignments in the RIPE Database
c)	Compare the resources assigned to your LIR with the RIPE Database
d)	Ask the RIPE NCC to update any out-dated LIR information you can't update yourself
e)	Add the object representing you in the DB (person object) to the object representing the LIR in the DB (role object)
f)	Create a RIPE NCC Access account, if you don't have one
g)	Request resources if needed (and possible)
h)	Check the LIR account information
i)	Create an object representing you in the RIPE Database, if you don't have one (person object)
j)	Check the User Accounts list in the LIR Portal (they have access to your LIR Portal)
k)	Make it possible for you to update LIR's objects created in the RIPE Database (Default LIR maintainer password or get your Access account associated with it)
l)	Correct any out-dated LIR information in the LIR Portal (User accounts, LIR Contact Info., etc.)
m)	Get access to the LIR portal (add your Access Account to User Accounts in LIR Portal)
n)	Check what resources your LIR has

Solution



Task Related With...	Group of Tasks	Tasks
LIR Portal, containing registration information of the LIR (Private Information Kept by RIPE NCC)	5) Get Access to the Management Web Interface	f) Create RIPE NCC Access account m) Get access to the LIR Portal
	2) Check / Update your registration information (LIR Portal)	j) Check the User Accounts list in Portal h) Check the LIR account information n) Check what resources your LIR has l) Correct out-dated LIR info in Portal d) Ask NCC to update out-dated LIR info
	4) Manage the resources for your LIR (IPs and ASNs)	g) Request resources if needed a) Update LIR Certificate (RPKI)
RIPE Database, containing information about numeric resources of the LIR and related contact information (Public information)	1) Get access / rights to the RIPE Database information related with your LIR)	k) Make it possible to update RIPE DB i) Create your person object in RIPE DB
	3) Revise / Update your LIR's objects in the RIPE Database	e) Add your person object to LIR role c) Compare LIR resources with RIPE DB b) Correct invalid assignm'ts in RIPE DB

Solution



Task Related With...	Group of Tasks	Tasks
LIR Portal, containing registration information of the LIR (Private Information Kept by RIPE NCC)	5) Get Access to the Management Web Interface	f) Create RIPE NCC Access account
		m) Get access to the LIR Portal
	2) Check / Update your registration information (LIR Portal)	j) Check the User Accounts list in Portal
		h) Check the LIR account information
		n) Check what resources your LIR has
		l) Correct out-dated LIR info in Portal
		d) Ask NCC to update out-dated LIR info
	4) Manage the resources for your LIR (IPs and ASNs)	g) Request resources if needed
		a) Update LIR Certificate (RPKI)
RIPE Database, containing information about numeric resources of the LIR and related contact information (Public information)	1) Get access / rights to the RIPE Database information related with your LIR)	k) Make it possible to update RIPE DB
		i) Create your person object in RIPE DB
	3) Revise / Update your LIR's objects in the RIPE Database	e) Add your person object to LIR role
		c) Compare LIR resources with RIPE DB
		b) Correct invalid assignm'ts in RIPE DB



Tips and Tools

Section 9



Lost Maintainer Password

- Go to <https://apps.db.ripe.net/db-web-ui/fmp>
- **Automated process**
 - Recovery link sent to “**upd-to:**” email address
- **Manual process**
 - Send statement & registration papers to us
 - After verification, we will send you an email with the recovery link
 - We will add your Access account to the maintainer



Protect Your Resources

- Maintain your contact info in the RIPE database
- Keep your User Accounts in the LIR Portal up to date
- Know the policies and procedures
- In case of questions, contact
Registration Services

lir-help@ripe.net

RIPE NCC Resource Quality Assistance



- Address distribution - no claims about routability
 - Assistance in case of filtering issues:
 - Help to establish a direct communication
 - Provide available contact details
 - Provide information about tools
- To reduce routability problems, the RIPE NCC:
 - Announces pilot prefixes of every newly allocated IP address block
 - Quarantines returned IP address space



RIPEstat

- One-stop-shop for viewing all IP-resource related data from the RIPE NCC
- Registry data, routing, reverse DNS, measurements & 3rd-party data
- Main interface: web-based widgets
 - also available as: CLI, data API & mobile
 - personalised via RIPE NCC Access

<http://stat.ripe.net>

RIPE Atlas: Active Measurements



- Next generation Internet measurement network
 - Gives a big picture about Internet traffic
- Currently 10,000+ active probes worldwide
- User Defined Measurements available for LIRs
 - ping, traceroute, DNS, SSL
- Set up IPv6 reachability test

<http://atlas.ripe.net>



RIPE Labs

- A place to showcase new and interesting Internet related developments
- Anyone can:
 - Present research
 - Showcase prototype tools
 - Share operational experience
 - Exchange ideas

<http://labs.ripe.net>



Questions



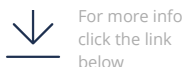
What's Next in Internet Registry



Webinars

Attend another webinar live wherever you are.

- ❖ LIRs and the Internet Ecosystem (2 hrs)
- ❖ LIRs: Managing IP Addresses and ASNs (2 hrs)
- ❖ Internet Governance (1 hr)
- ❖ Policy Development Process (1 hr)
- ❖ Webinar for New LIRs (1 hr)



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Face-to-face

Meet us at a location near you for a training session delivered in person.

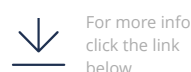
- ❖ LIR (8.5 hrs)
- ❖ RIPE Database (8.5 hrs)



E-learning

Learn at your own pace at our online Academy.

- ❖ Internet Governance (3 hrs)
- ❖ RIPE Database (16 hrs)



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Examinations

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- ❖ RIPE Database Associate



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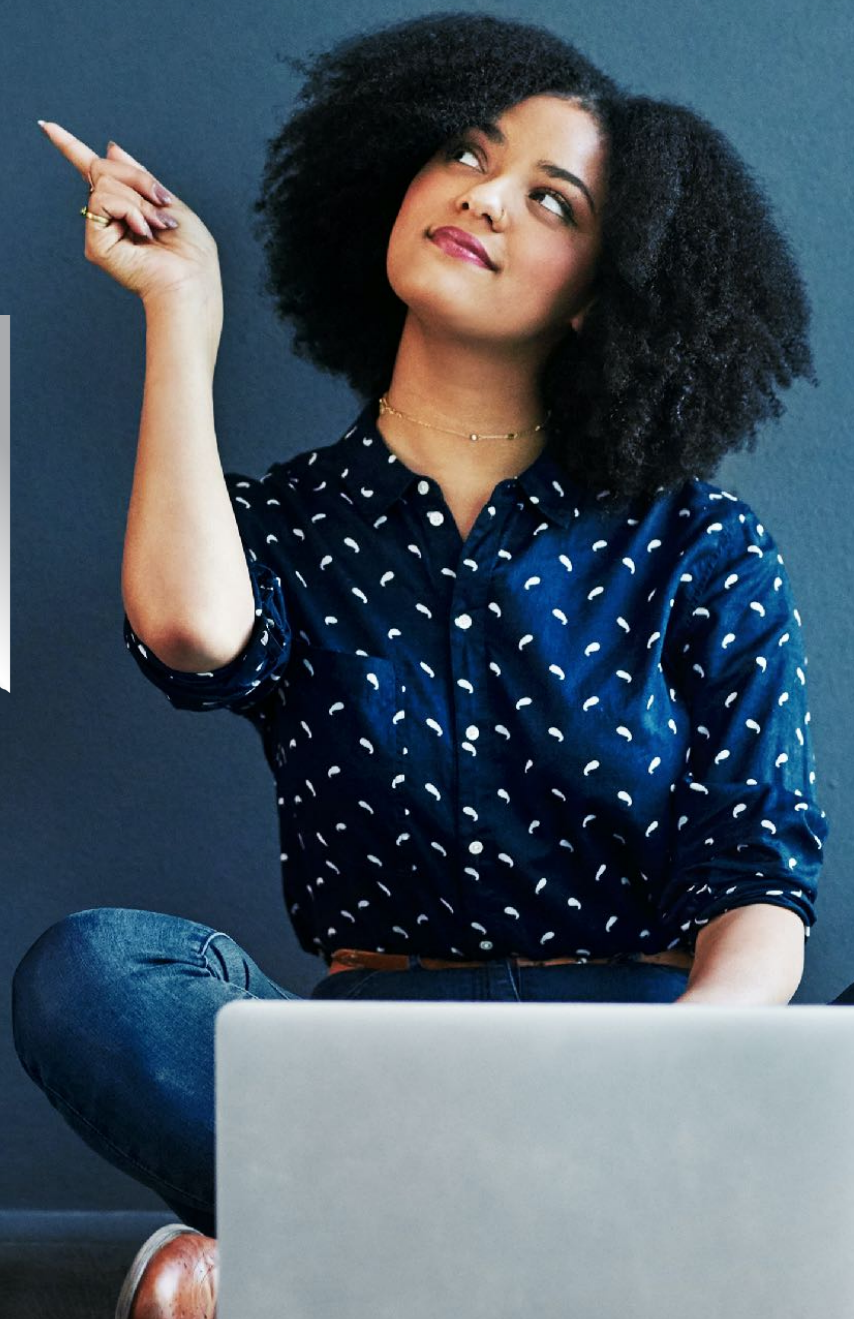




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<https://getcertified.ripe.net/>



Have more questions? Ask us!

academy@ripe.net



We want your feedback!



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<https://www.ripe.net/feedback/lir/>



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