RIPE NCC

RIPE NETWORK COORDINATION CENTRE

LIR and RIPE Database

Training Course

January 2017

Schedule

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
- Number on the list
- Experience with the RIPE NCC and RIPE DB
- Goals

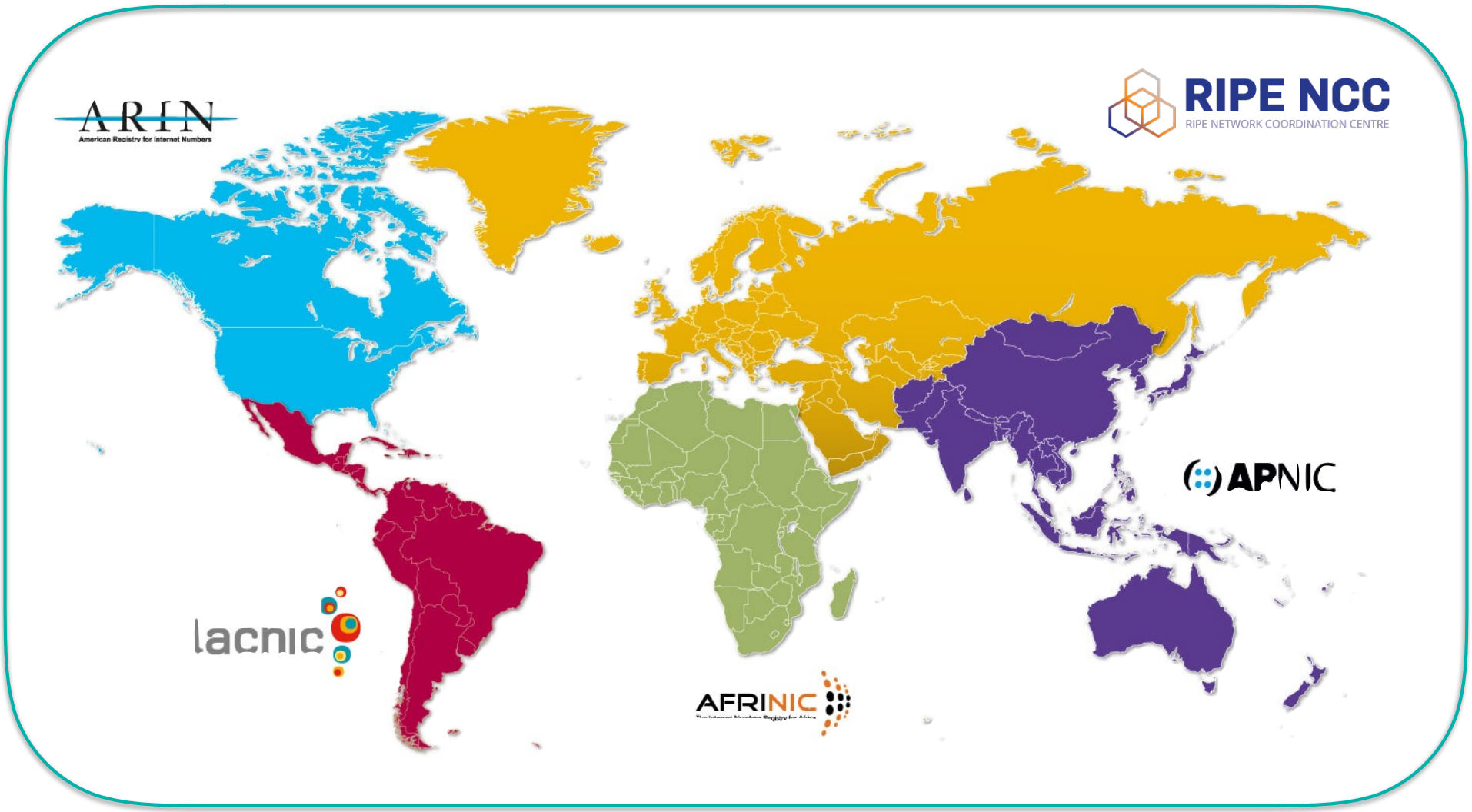
Overview

- The Internet Registry (IR) System
- Participating
- Being an LIR
  - Exercise: Being an LIR Contact
- The RIPE Database: Query, Update and Create
  - RIPE DB Exercises
- Getting Resources
- Transfers
- Distributing Resources
  - Exercises: Making/Registering Assignments
- Managing Resources
- Tips and Tools

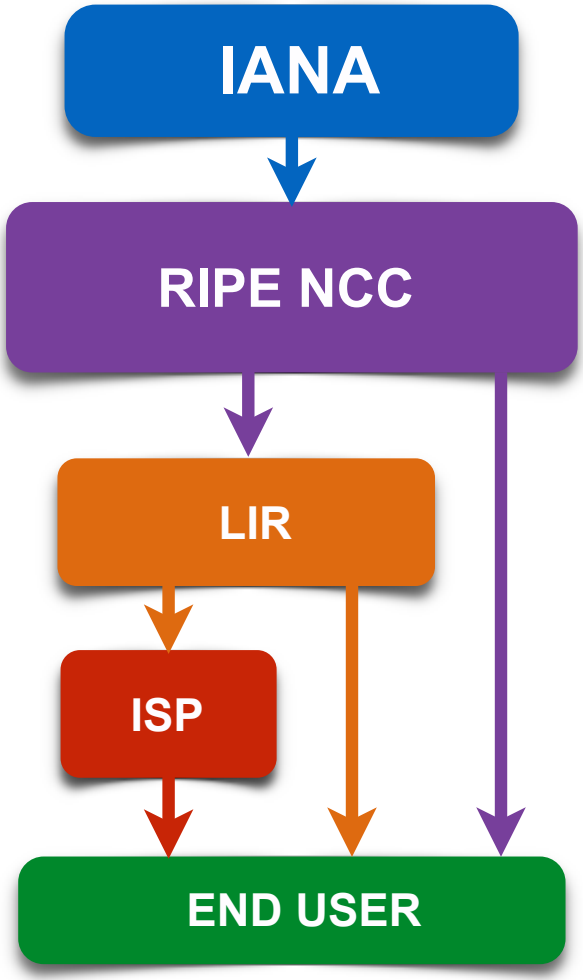
The Internet Registry System

Section 1

The Internet Registry System (1)



The Internet Registry System (2)



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

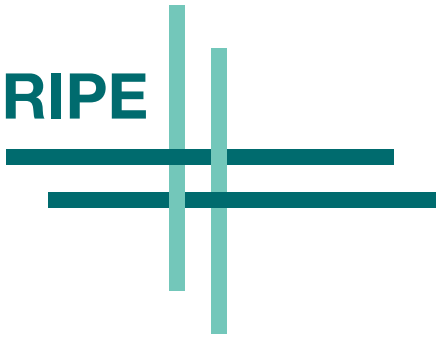
- **Why?**
  - IP addresses and AS Numbers are limited resources
  - These resources were not used efficiently in the past
- **How?**
  - Introduction of CIDR
  - Policies to ensure fair usage
- **Results:**
  - Growth in IP address space usage slowed down
  - Resources were distributed based on need

RIPE NCC

- Began operating in 1992
- Not-for-profit membership organisation
- 15,100+ members (Local Internet Registries)
- Neutral, Impartial, Open, Transparent
- Provides administrative support to RIPE

Réseaux IP Européens (RIPE) Community

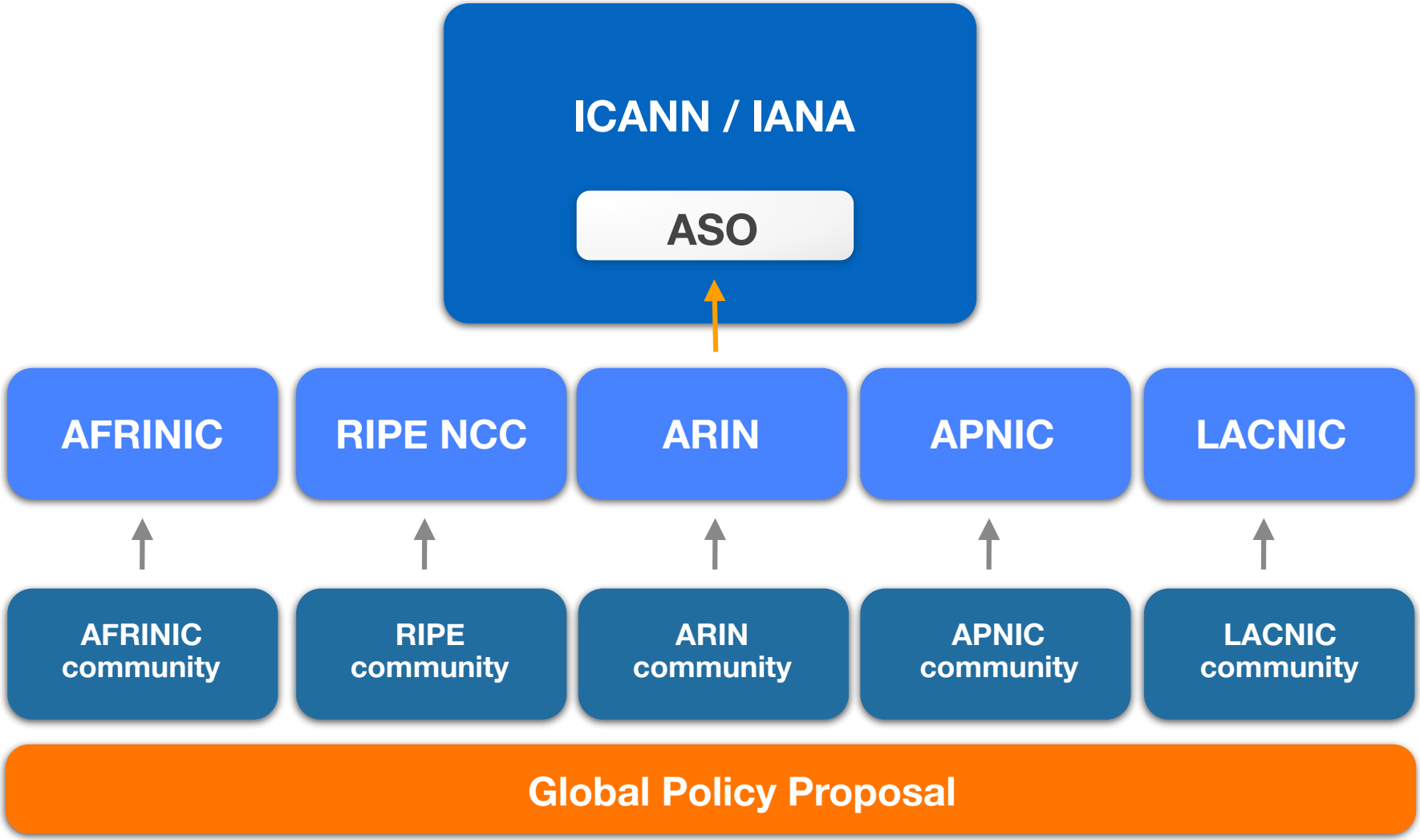
- Since 1989 discussion forum open to all parties interested
- Not a legal entity and no formal membership
- Develops policies
- Work done in Working Groups
- Activities are performed on a voluntary basis
- Decisions formed by consensus
- RIPE meetings twice a year



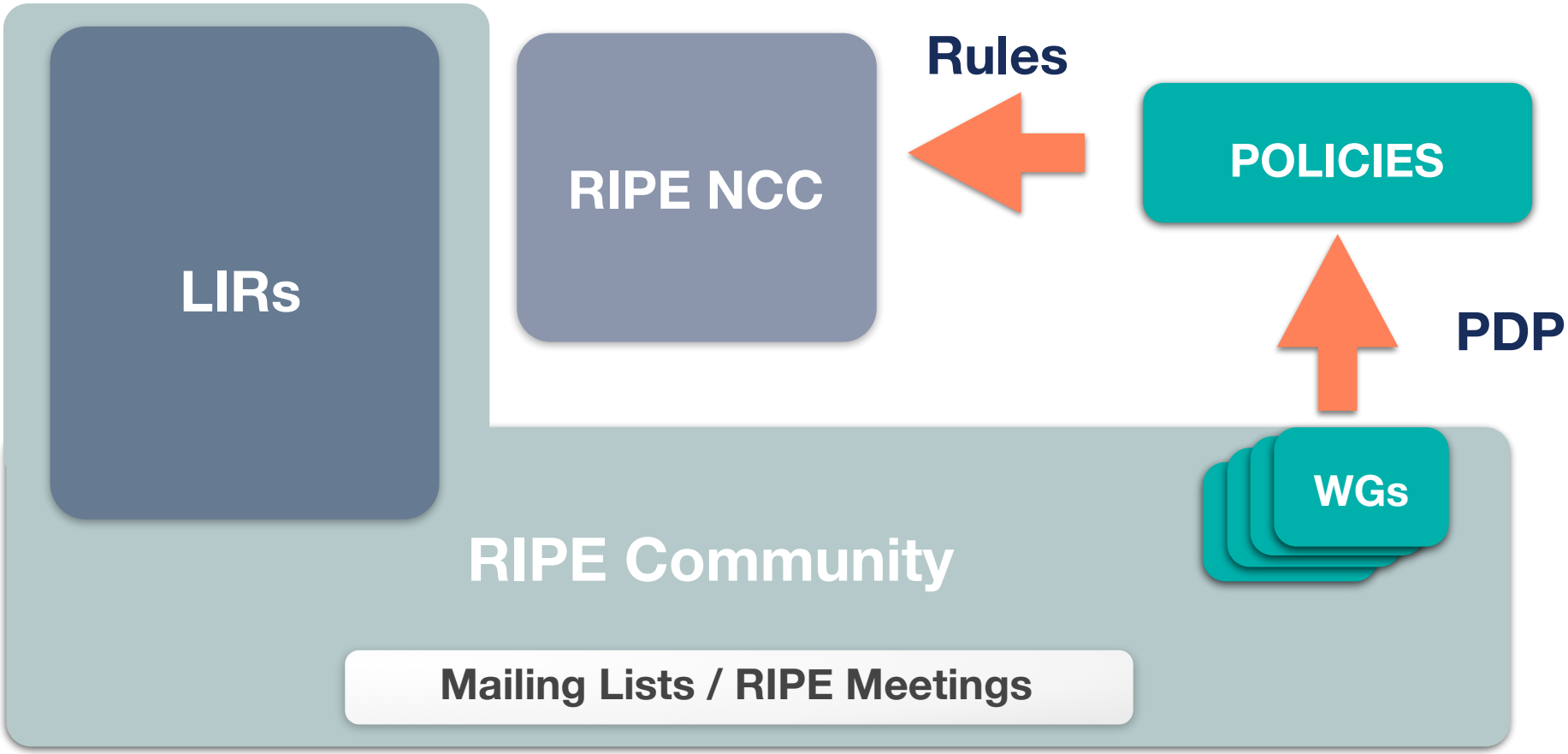
Participating

Section 2

Who Makes Policies ?



RIR Bottom-up Model



Working Groups

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

RIPE Forum: https://www.ripe.net/participate/mail/forum/

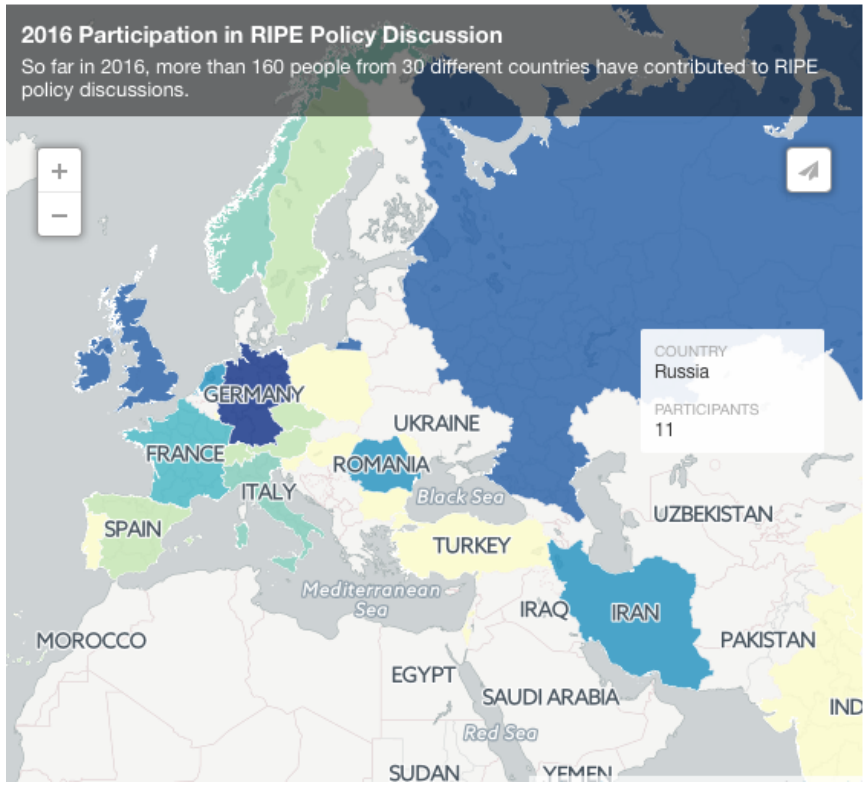
When to do a Policy Proposal?

- When something is missing, outdated or can be improved

- When not to do it?
  - Disagreement with RIPE NCCs request evaluation
    First: Arbitration Process
  - Changes to the RIPE NCC membership (charging, rules)
    Solution: RIPE NCC General Meeting

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



https://www.ripe.net/participate/policies/participation-ripe-pdp

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

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 ?

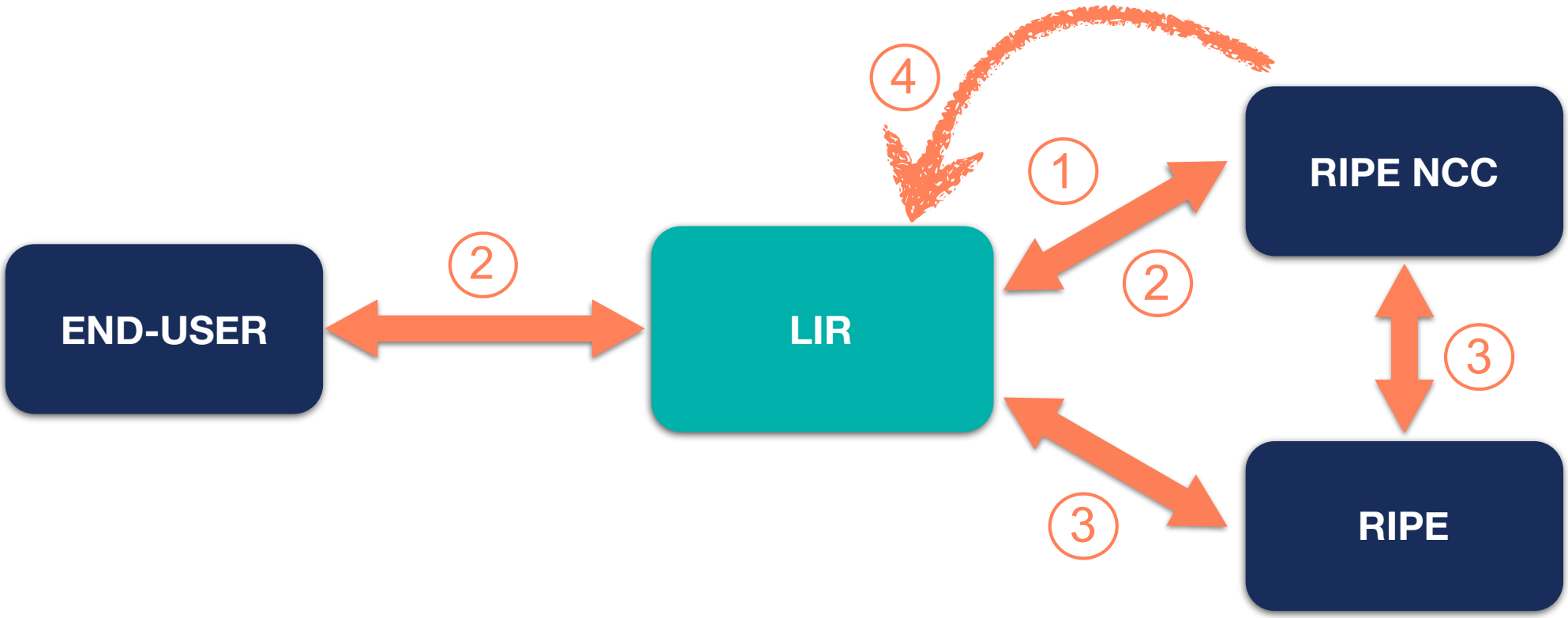
- **The RIPE community**
  - Creates & discuss proposals
  - Seeks consensus
- **Working Group (WG) chairs**
  - Accept proposals
  - Chair the discussions
  - Decide if consensus has been reached
- **The RIPE NCC**
  - Acts as the secretariat to support the process
  - Publishes policies documents and 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 RIPE NCC takes on responsibility for address space held by closing LIRs

RIPE NCC Access

- Our single sign-on system
- To RIPE NCC tools
- Non-LIRs can get an account too
- Use **Two-step Verification** for added security

http://access.ripe.net

Make an Access account

Activity

LIR Portal

RIPE NCC Access

LIR Portal

My LIR

- LIR Account Details
- Billing Details
- LIR Contacts
- GM Preferences
- User Accounts

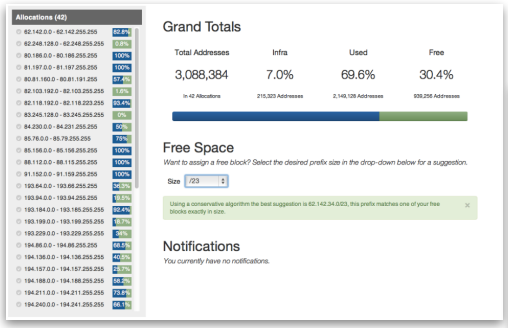
Resources

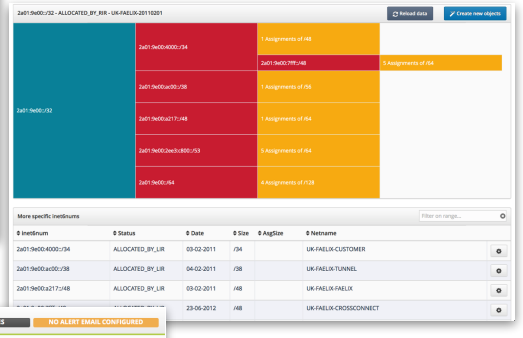
Resource Certification

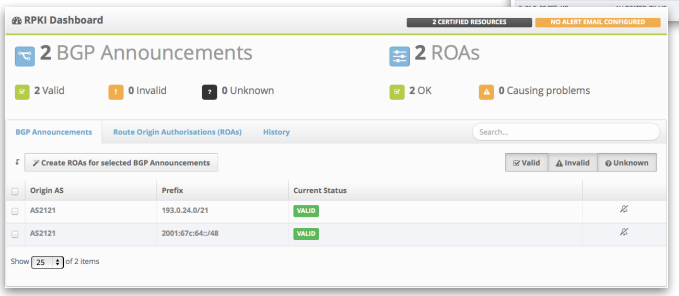
Tools

Resources

- IPv4 Analyser
- IPv6 Analyser
- IPv4
- IPv6
- ASN
- Request Resources
- Request Transfer
- Webupdates
- IPv4 Transfer Listing Service







And more…

LIR Portal

Demonstration

Being an LIR contact

Exercise 1

Exercise: Being an LIR Contact

- Time
  - 15 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?

The RIPE Database

Section 4

RIPE Database

- Goal: Registration

- Public Internet resource and routing registry database
  - Resources (IP addresses, AS Numbers)
  - Contact information for resources
  - Reverse DNS delegations
  - Routing policy

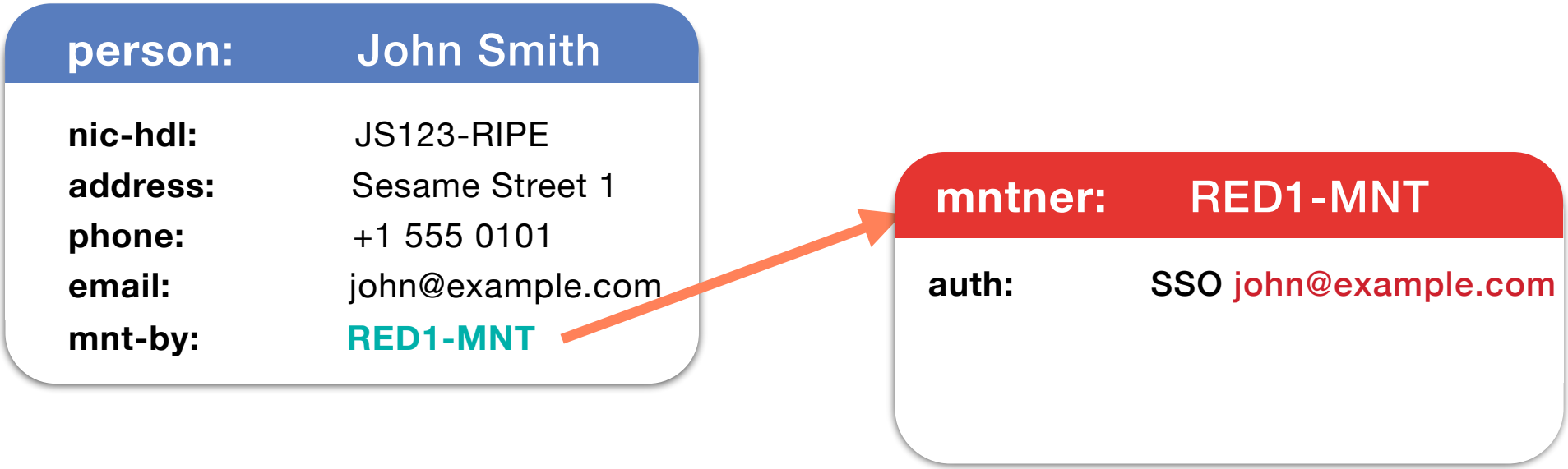
RIPE Database Objects

- IPs and ASNs
  - inetnum, inet6num, aut-num
- Contact
  - organisation, person, role
- Routing
  - route, route6
- Reverse DNS
  - domain
- Security
  - mntner

RIPE Database Attributes

- Information in Objects is stored in pairs:

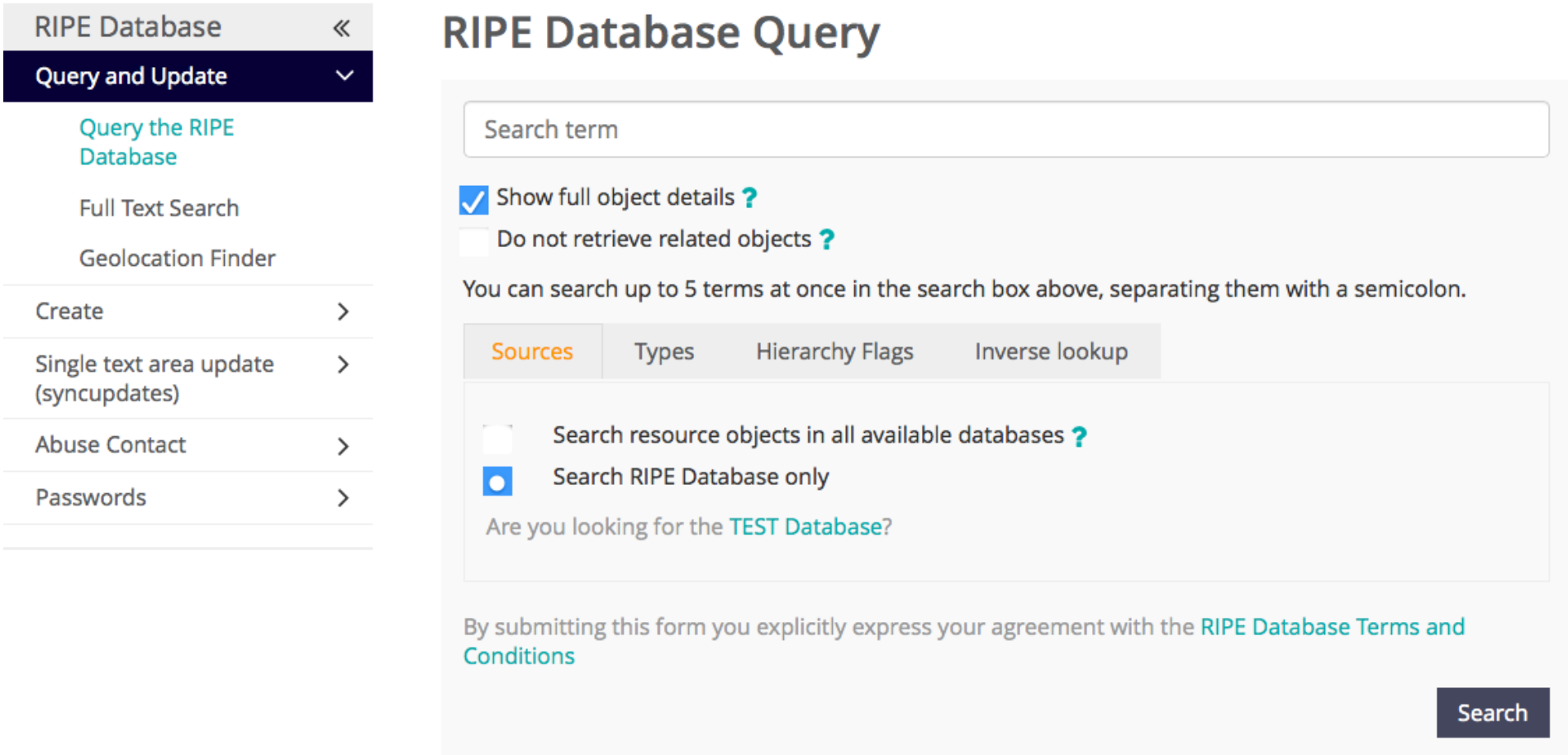
  Attribute-name : Attribute-value



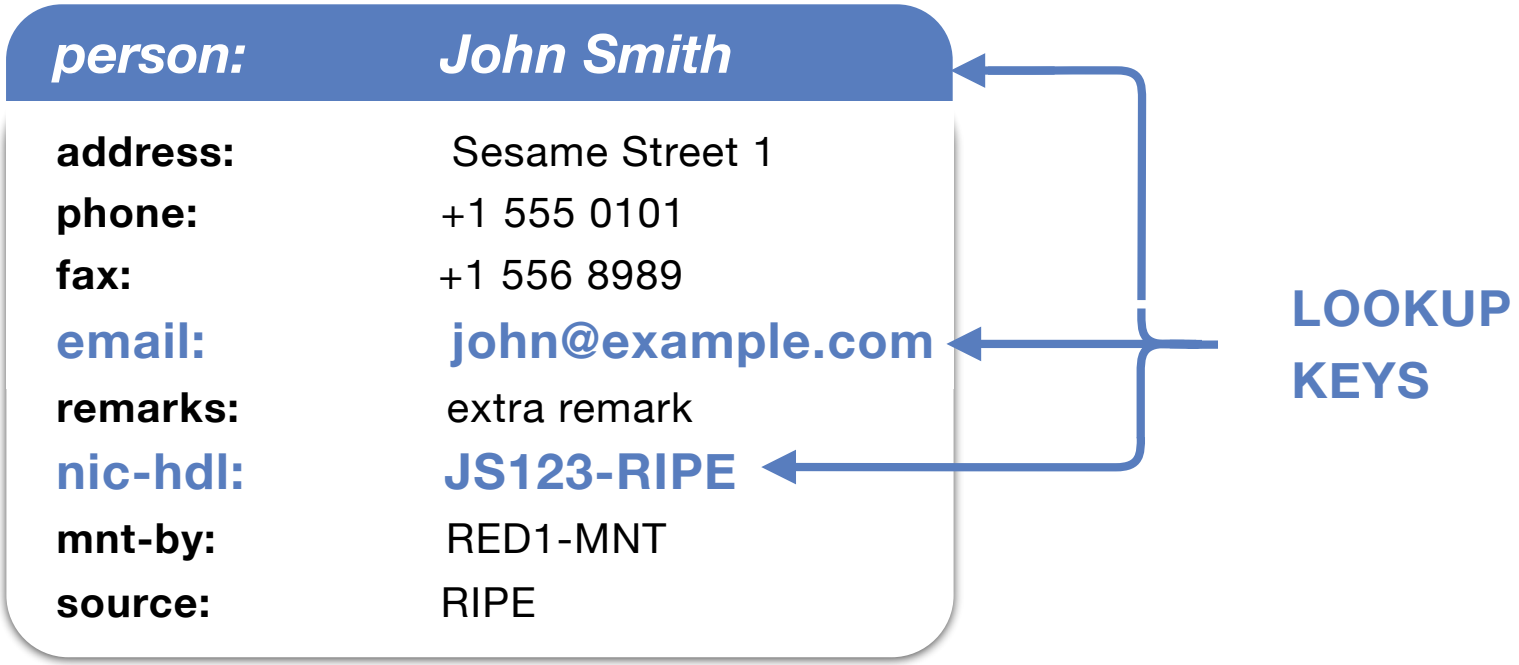
Querying the RIPE Database

Querying the RIPE Database

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



Lookup Keys


person: John Smith
address: Sesame Street 1
phone: +1 555 0101
fax: +1 556 8989
email: john@example.com
remarks: extra remark
nic-hdl: JS123-RIPE
mnt-by: RED1-MNT
source: RIPE
LOOKUP KEYS

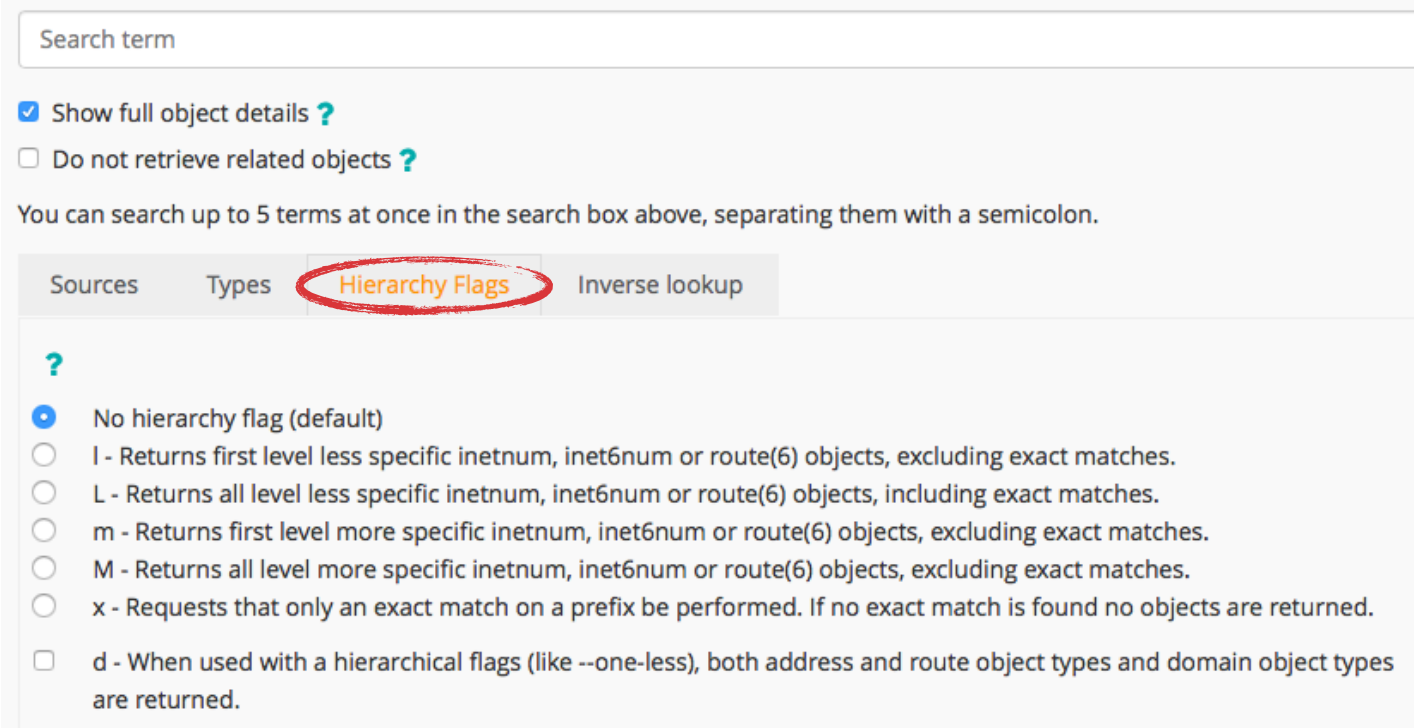
Querying with Flags

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

    -m 193.0.16.0/21

  - Or check appropriate box in a tab

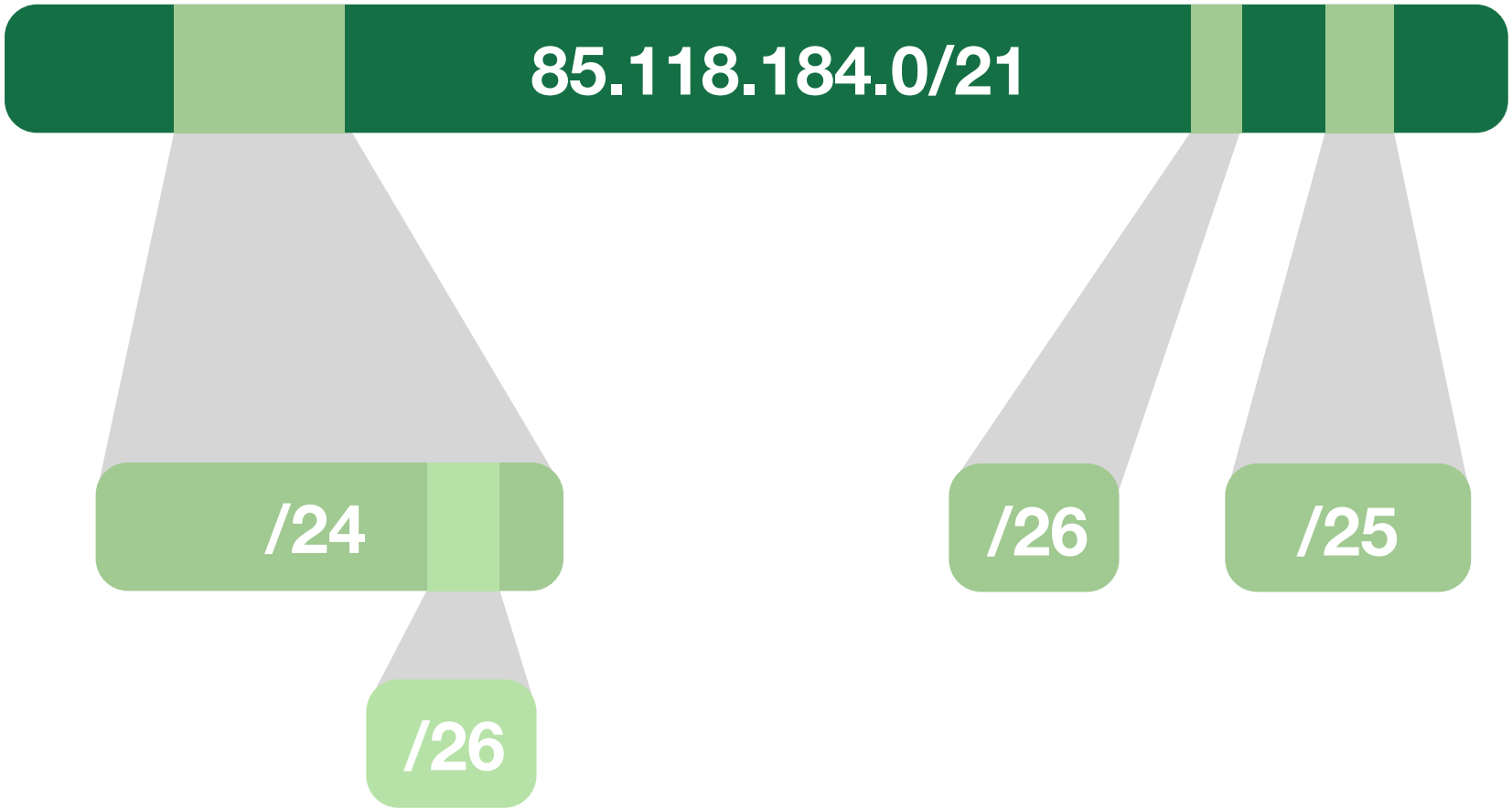
    Example, “Hierarchy Flags”:



More Specific inetnums

-m 85.118.184.0/21

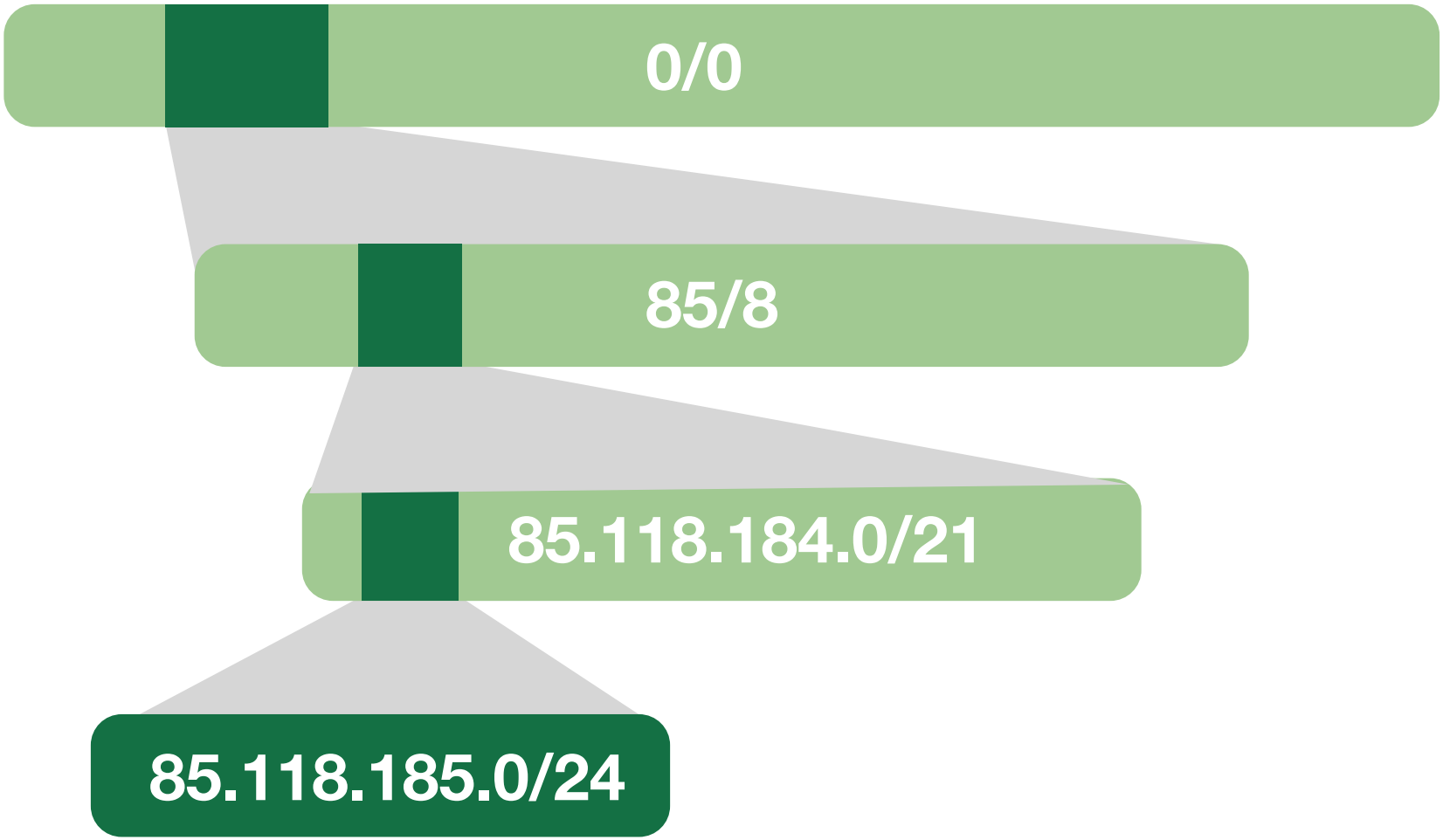
-M 85.118.184.0/21



Less Specific inetnums

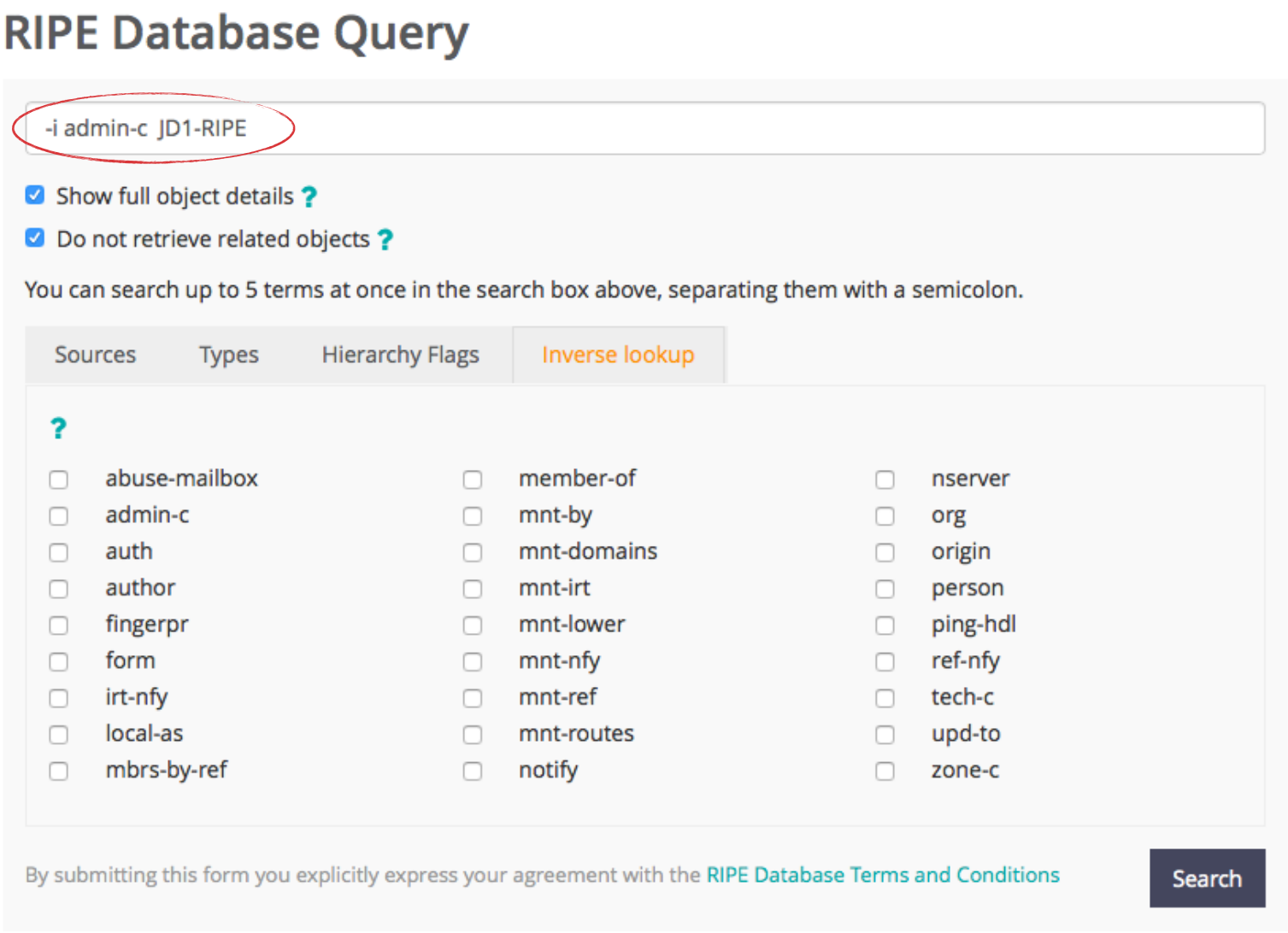
-l 85.118.185.0/24

-L 85.118.184.0/24



Inverse Lookup

- **Finding all objects in which your object is referenced**



Inverse Lookup

RIPE Database Query

JD1-RIPE

- [x] Show full object details ?
- [x] Do not retrieve related objects ?

You can search up to 5 terms at once in the search box above, separating them with a semicolon.

Sources | Types | Hierarchy Flags | Inverse lookup

?

☐ abuse-mailbox	☐ member-of	☐ nserver
☑ admin-c	☐ mnt-by	☐ org
☐ auth	☐ mnt-domains	☐ origin
☐ author	☐ mnt-irt	☐ person
☐ fingerpr	☐ mnt-lower	☐ ping-hdl
☐ form	☐ mnt-nfy	☐ ref-nfy
☐ irt-nfy	☐ mnt-ref	☐ tech-c
☐ local-as	☐ mnt-routes	☐ upd-to
☐ mbrs-by-ref	☐ notify	☐ zone-c

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

Search

Querying the RIPE Database

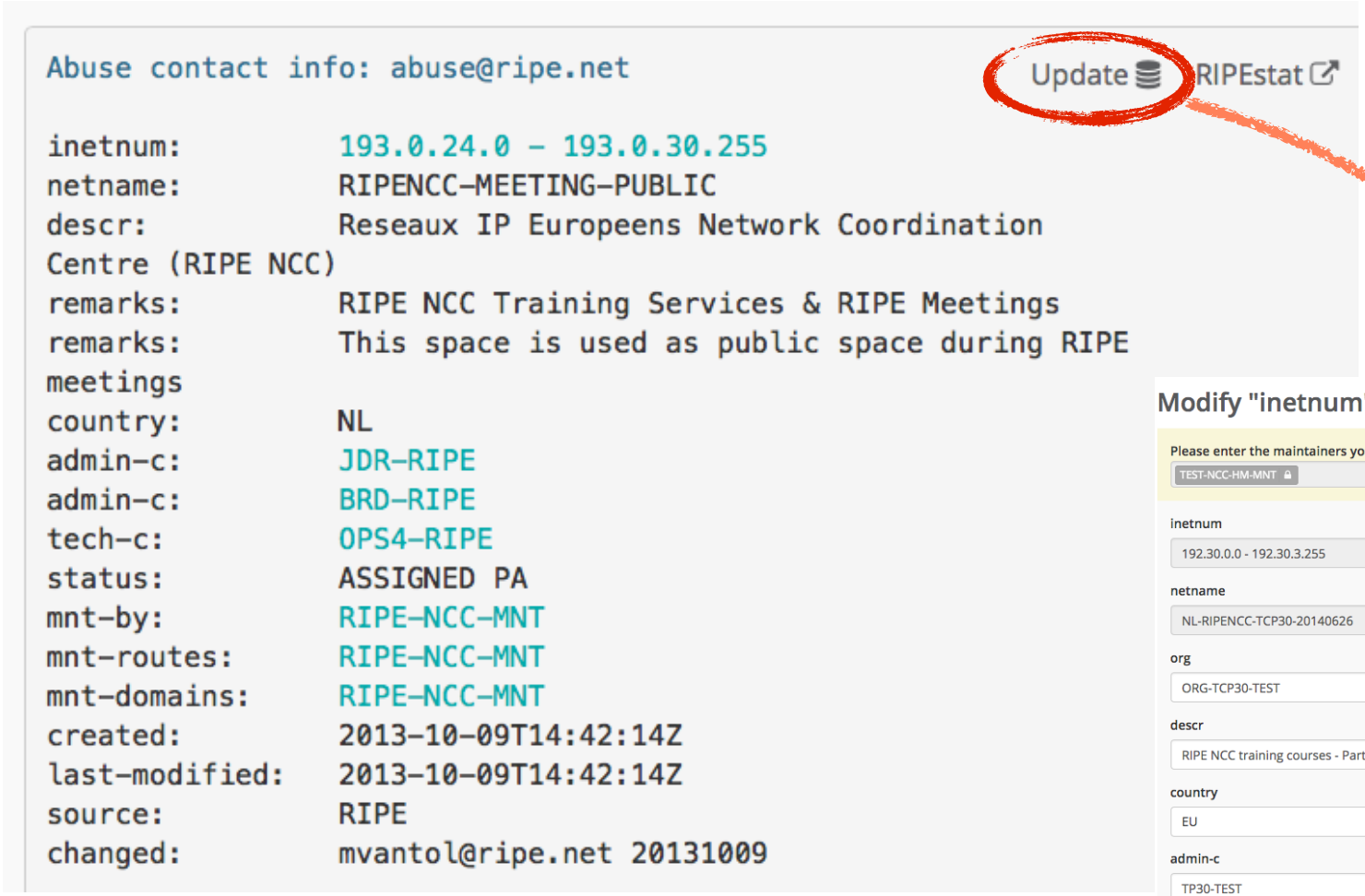
Exercise 2

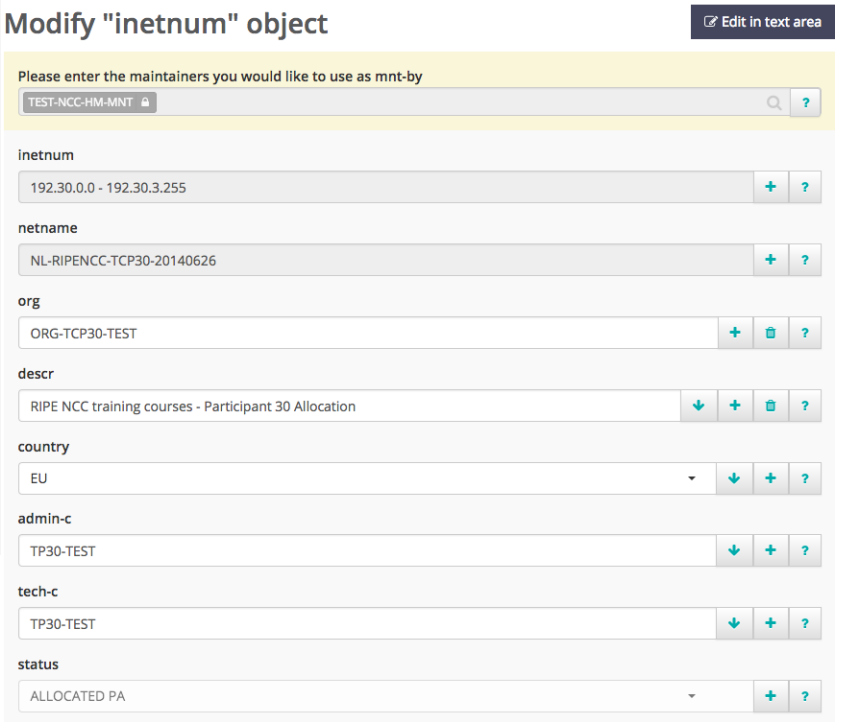
Exercise: Querying the RIPE Database

- 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

Update after a Query Result





Duplicate the attribute

Add a new attribute

Delete the attribute

Info about the attribute

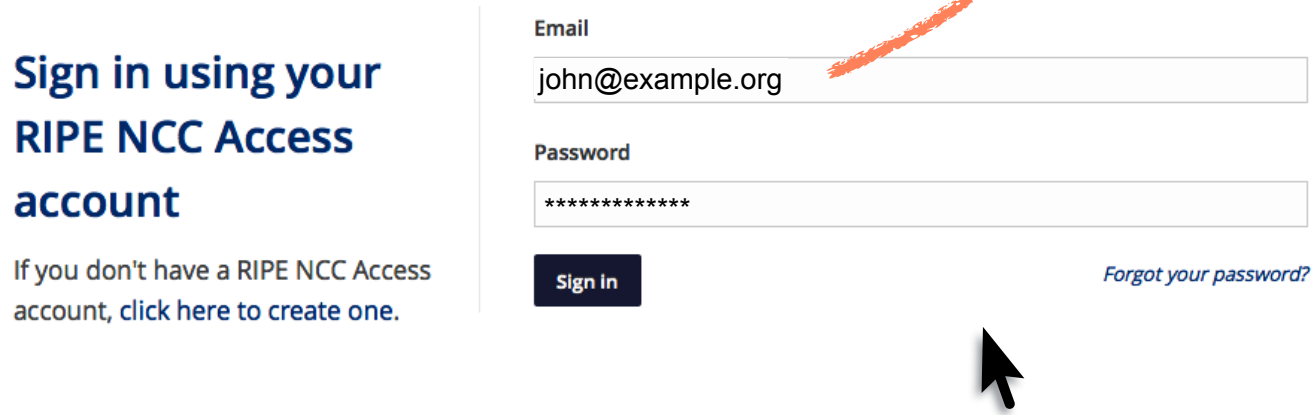
Protecting an Object

person:	John Smith
nic-hdl:	JS123-RIPE
address:	Sesame Street 1
phone:	+1 555 0101
email:	john@example.com
mnt-by:	RED1-MNT

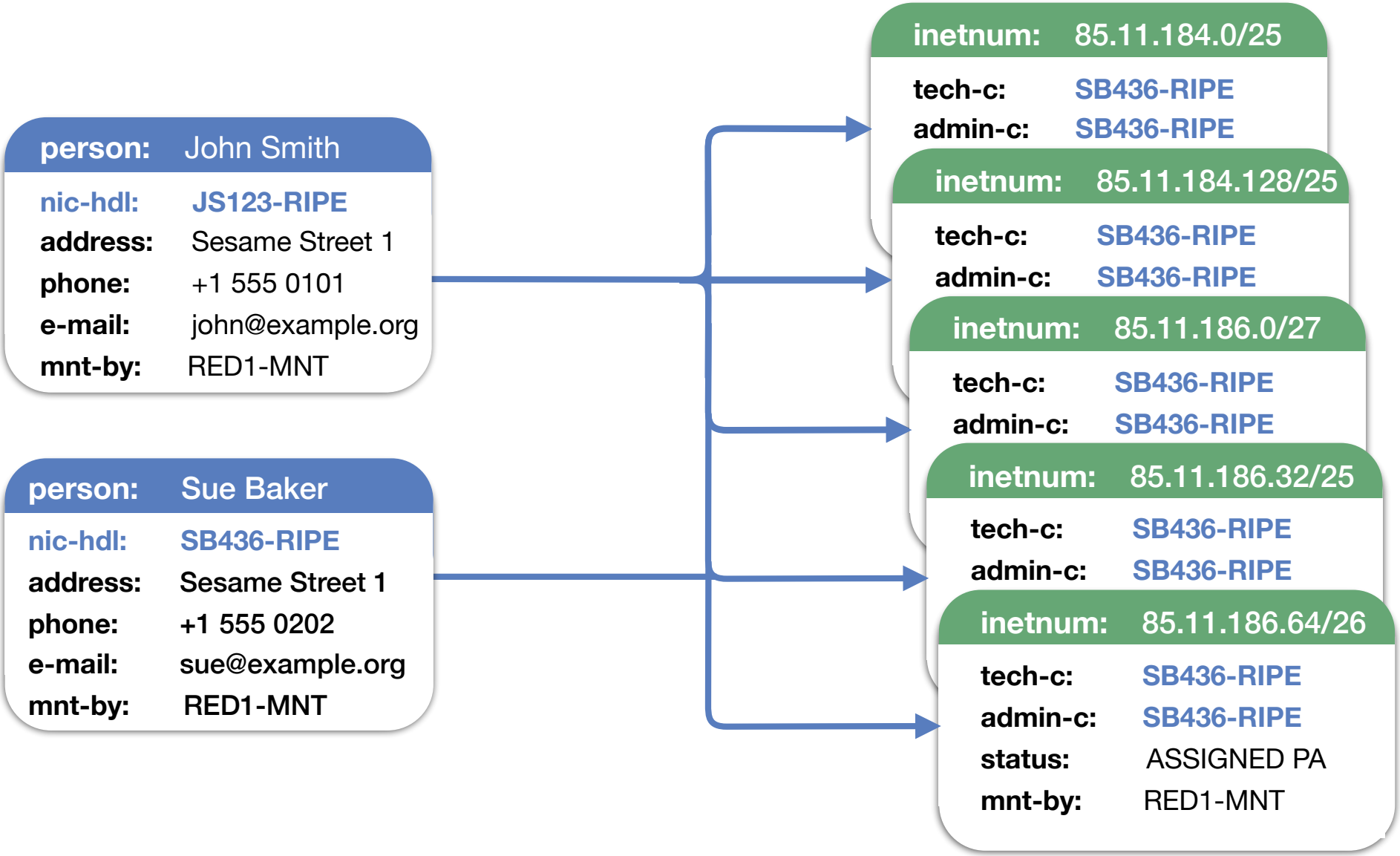
to update this object…

mntner:	RED1-MNT
auth:	SSO john@example.com
auth:	MD5-PW 1car0J
auth:	PGPKEY-34825

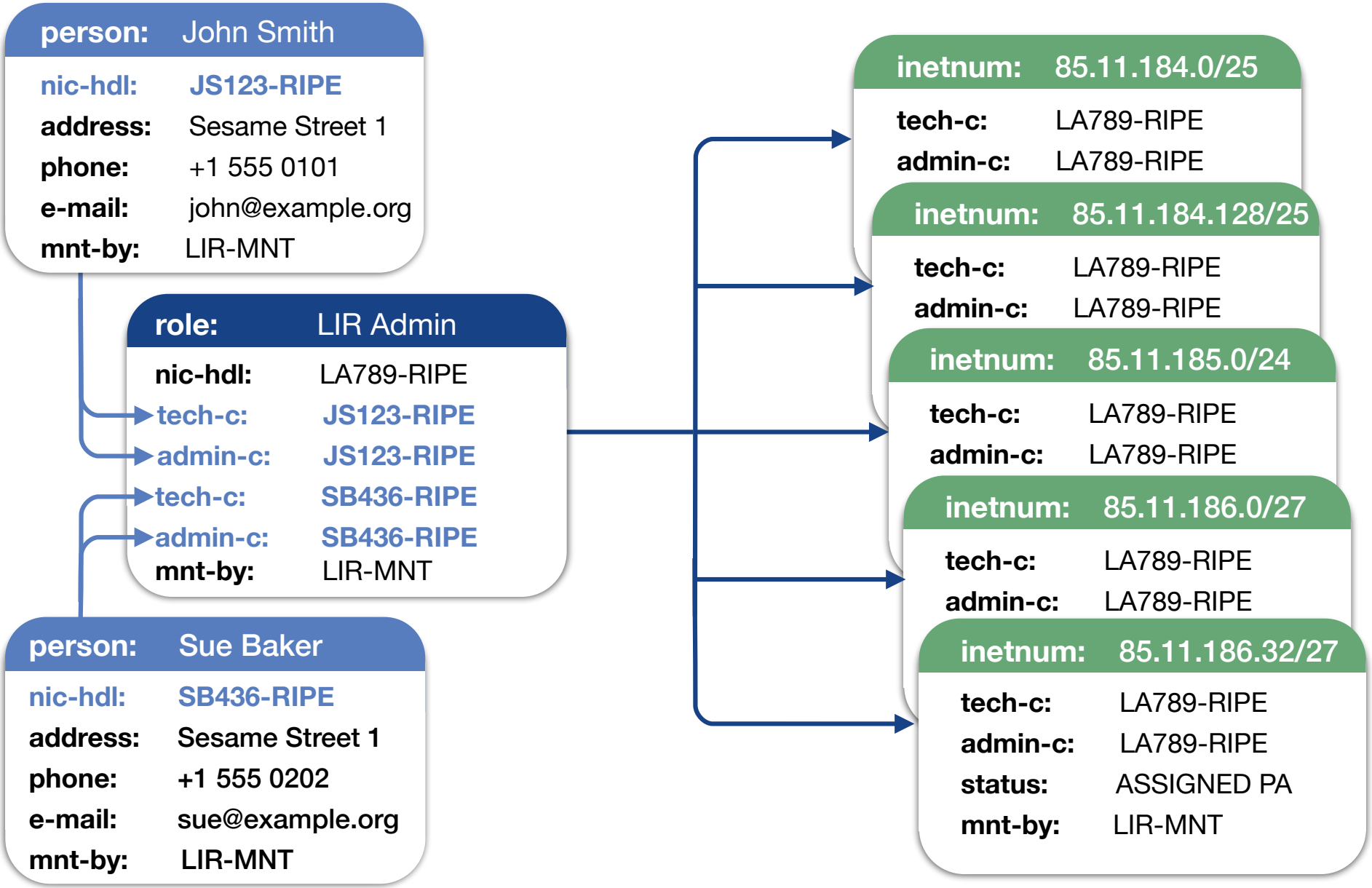
…you must pass one of the authentications



Updates: Not Using a role Object



Updates: Using a role Object

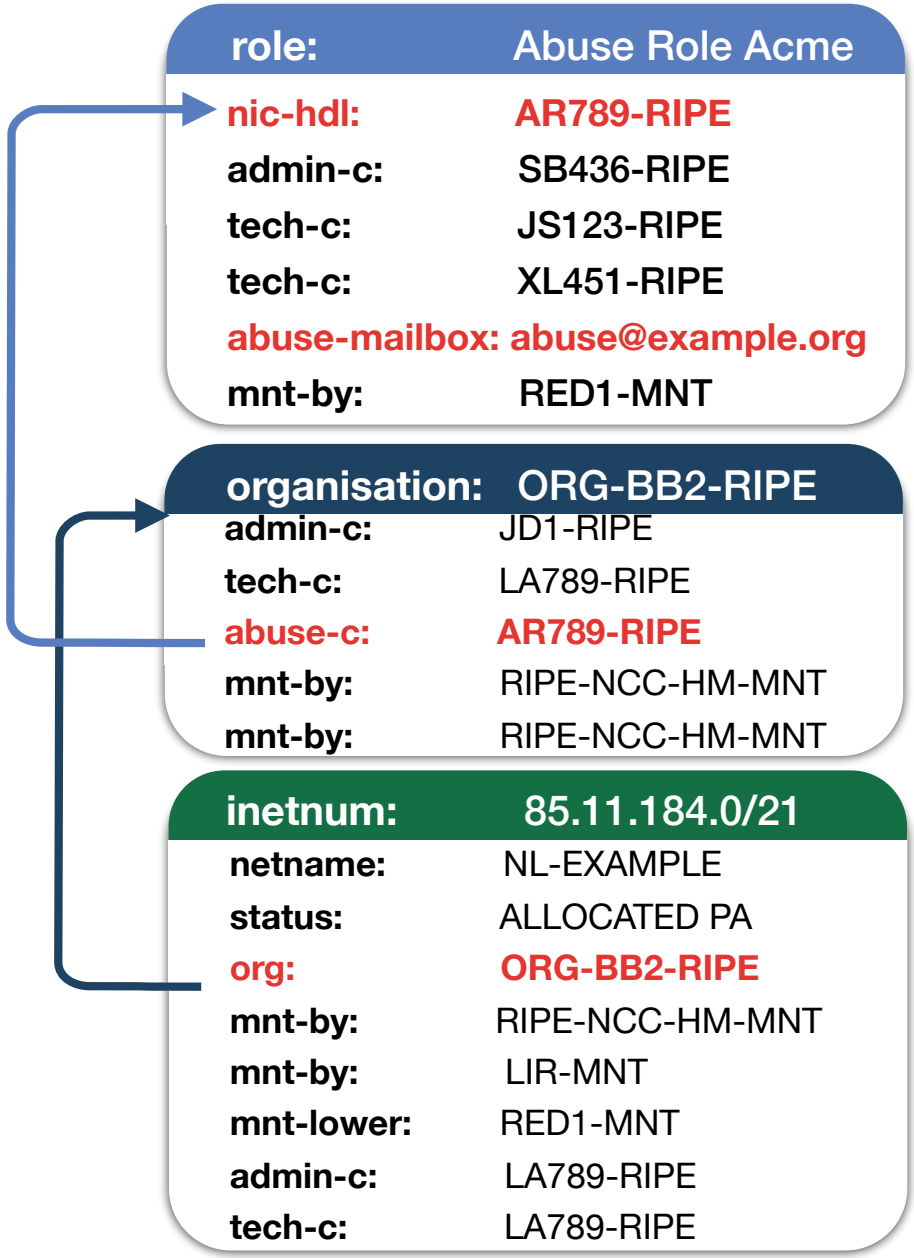


Add Abuse Contact for Your Allocation

Create “Abuse Role object” with “abuse mailbox”

Point the abuse-c in the org object to the “Abuse Role object”

The allocation points to your organisation object



Updating the RIPE Database

Exercise 3

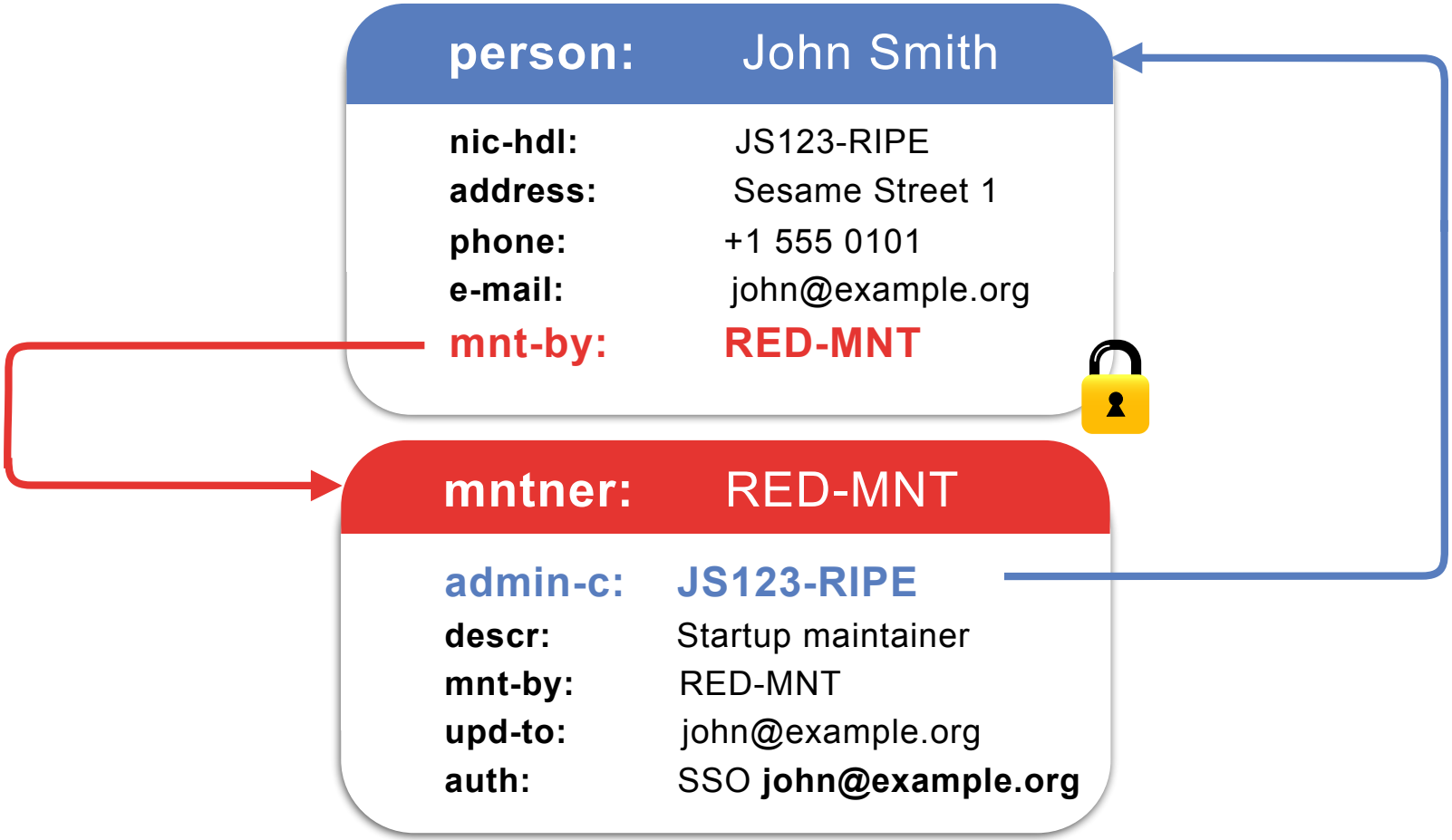
Exercise: Updating the RIPE Database

- Time
  - 10 minutes
- Goal
  - Learn how to update existing objects in the RIPE Database
- Tasks
  - Update a maintainer object adding an authentication attribute

Creating Objects in RIPE Database

Create maintainer and person pair (1)

- Creation of first **person** - **mntner** object pair



Create maintainer and person pair (2)

You are here: Home > Manage IPs and ASNs > RIPE Database > Webupdates

RIPE Database

Query and Update

Create

Create an object

Create maintainer and person pair

Passwords

Create maintainer and person pair

mntner

person

address

phone

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

Cancel Submit

Create maintainer and person pair (3)

Your objects have been successfully created

person with primary key "JS17696-RIPE"

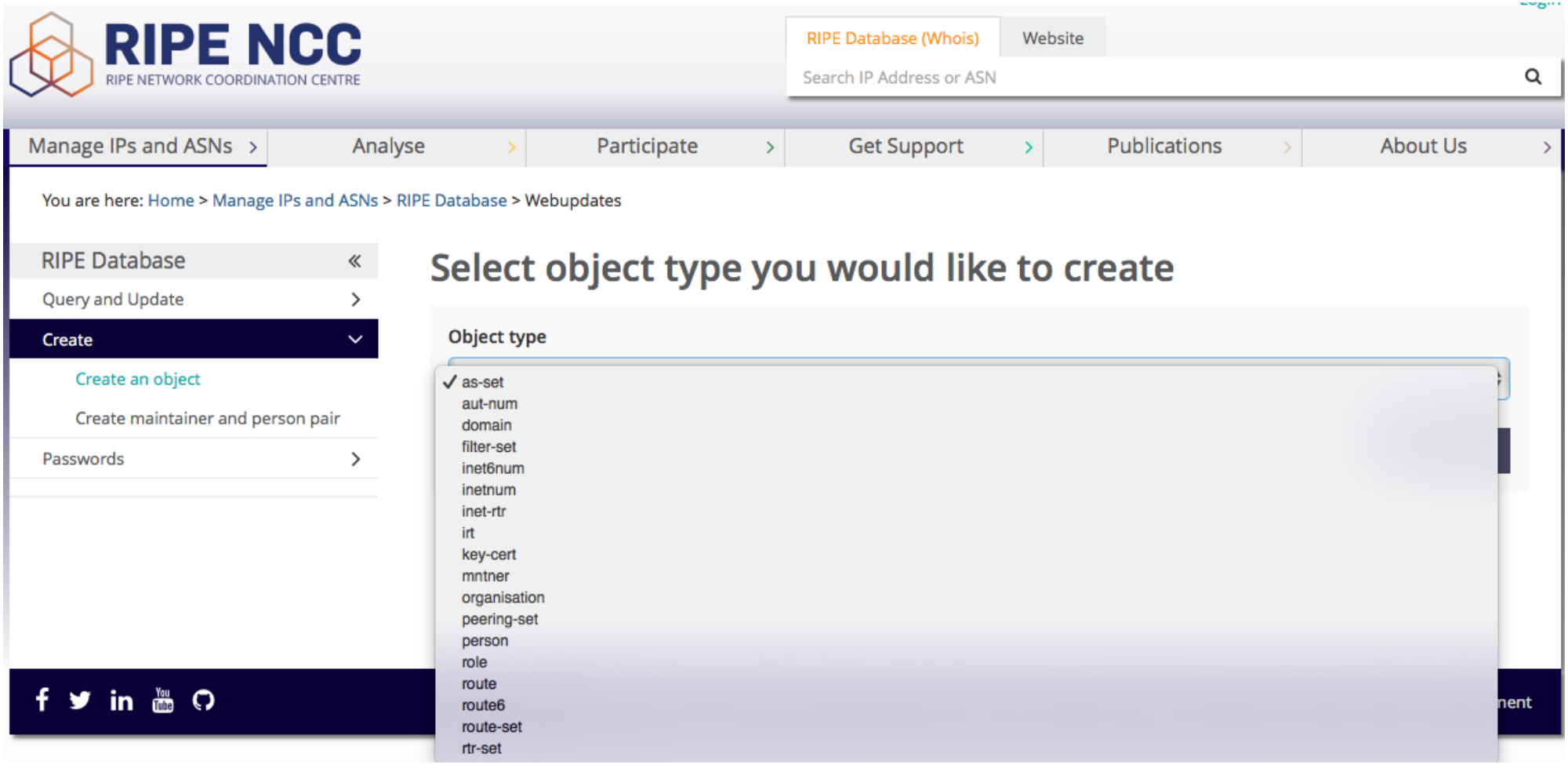
```
person:          John Smith
address:         Singel 258, 1016 AB Amsterdam
phone:           +31 20 535 4444
nic-hdl:         JS17696-RIPE
mnt-by:          RED1-MNT
created:         2016-01-06T14:55:48Z
last-modified:   2016-01-06T14:55:48Z
source:          RIPE
```

mntner with primary key "RED1-MNT"

```
mntner:          RED1-MNT
descr:           Startup maintainer
admin-c:         JS17696-RIPE
upd-to:          ferenc@ripe.net
auth:            SSO ferenc@ripe.net
mnt-by:          RED1-MNT
created:         2016-01-06T14:55:48Z
last-modified:   2016-01-06T14:55:48Z
source:          RIPE
```

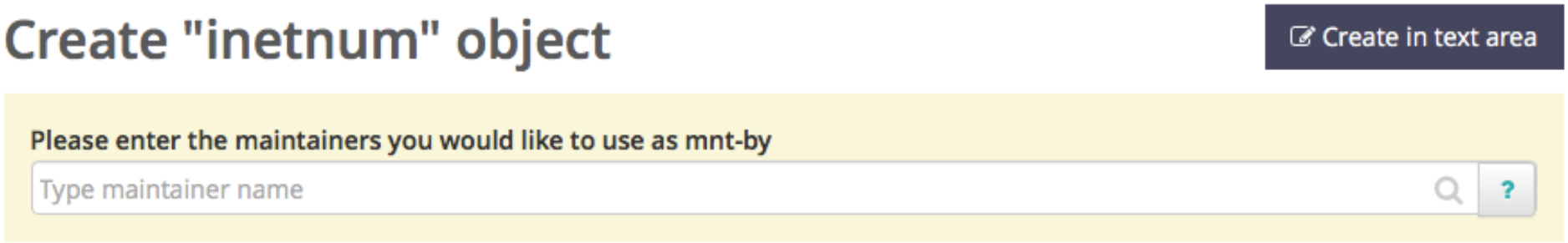
Creating an object (1)

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



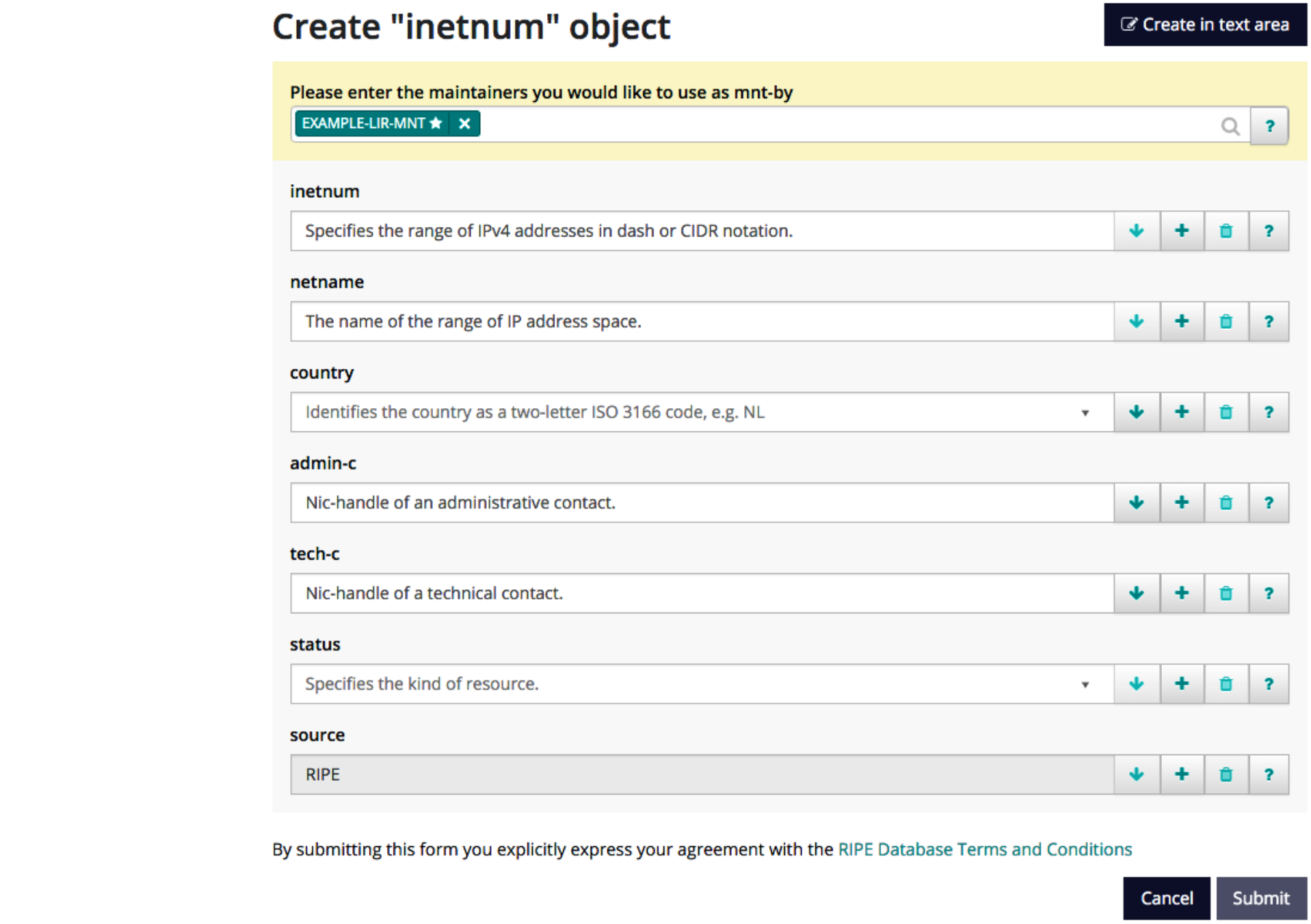
Creating an object (2)

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



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

Creating an object (3)



Creating an inetnum object - IPv4

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
```

Hierarchical Authorisation (1)

- **Giving someone else some rights to create new objects for you**
- **But not too many rights; you don't want them to delete or edit your objects**

  - mnt-lower - create inetnum or inet6num objects
  - mnt-routes - create route or route6 objects
  - mnt-domains - create (reverse) domain objects

Hierarchical Authorisation (2)

- **mntner in mnt-by has two functions:**
  1. Protects the object
  2. Guards the address range

inetnum:	85.118.184.0/23
mnt-by:	RED1-MNT

Hierarchical Authorisation (3)

- **If your SSO account is associated with…**
  - associated with **RED1-MNT**
  - not associated with **GOLD-MNT**
- **…can you create a more specific object?**

inetnum:	85.118.184.0/23
mnt-by:	RED1-MNT
mnt-lower:	GOLD-MNT

- **NO!**

Hierarchical Authorisation (4)

inetnum:	85.118.184.0/23
mnt-by:	RED1-MNT
mnt-lower:	GOLD-MNT
mnt-lower:	RED1-MNT

- Who can update this object?

John

- Who can create more specific inetnums now?

Abe

John

Hierarchical Authorisation (5)

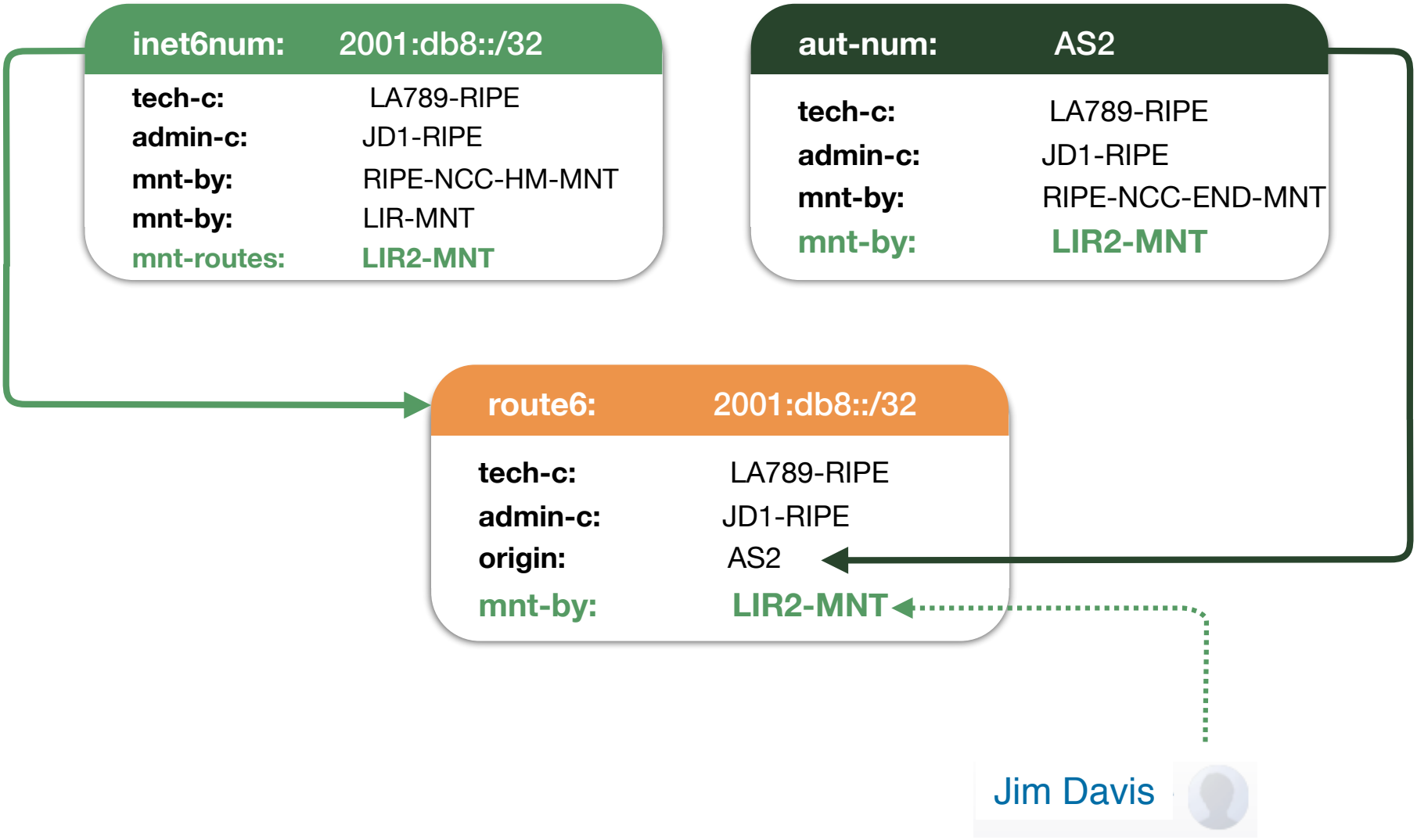
- Route and Domain objects

inetnum:	85.118.184.0/21
descr:	My Allocation
status:	ALLOCATED PA
org:	ORG-BB2-RIPE
admin-c:	LA789-RIPE
tech-c:	LA789-RIPE
mnt-by:	RIPE-NCC-HM-MNT
mnt-by:	LIR-MNT
mnt-lower:	**LIR2-MNT**
mnt-routes:	**LIR2-MNT**
mnt-domains:	**LIR2-MNT**

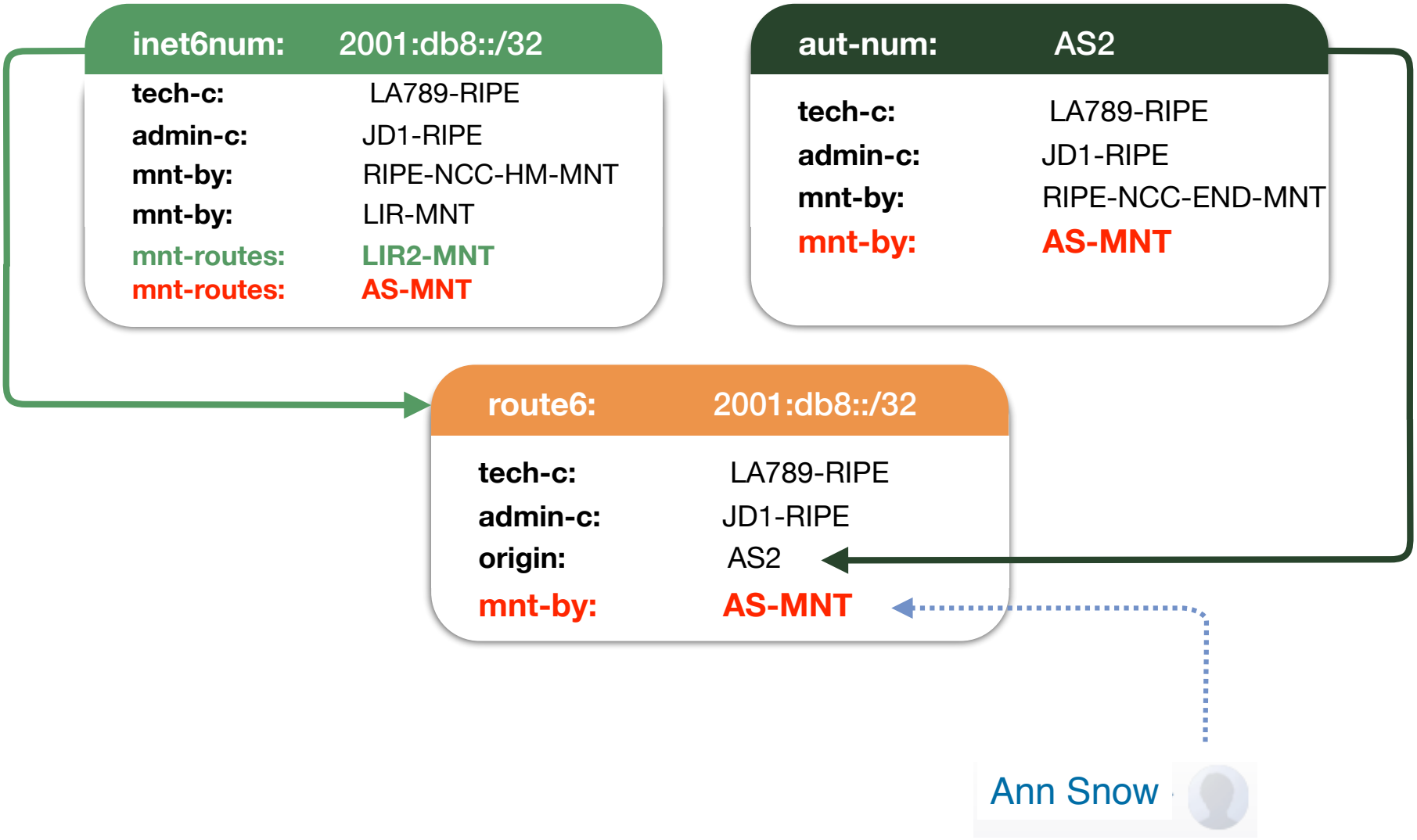
domain:	184.11.85.in-addr.arpa
mnt-by:	STRANGE-MNT
mnt-by:	END-USER-MNT
nserver:	ns1.example.com
nserver:	ns2.example.com

route:	85.11.184.0/21
origin:	AS2
tech-c:	LA789-RIPE
admin-c:	JD1-RIPE
mnt-by:	SOME-MNT

route and route6 Object (1st Scenario)



route and route6 Object (2nd Scenario)



Domain Objects

- **Domain object creation = request for reverse delegation**
  - Asking RIPE NCC to enter NS records pointing to your name servers in RIPE NCC's parent zone
- **Valid for IPv4 and IPv6**
- **Robot checks before successful creation**
  - Authentication check
  - RIPE Database syntax check
  - Zone delegation check

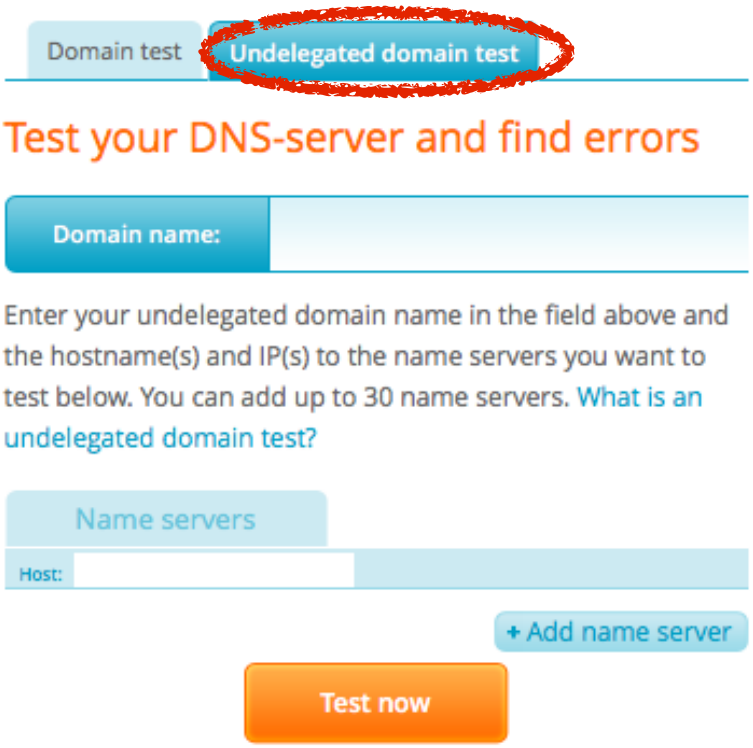
Setting up Reverse Delegation: Preparation

- **Modify the covering inetnum or inet6num**
  - add ”mnt-domains: your_mntner”
- **Reverse delegation needs specific prefix lengths**
  - /24 or /16 chunks for IPv4
  - multiples of 4 bit chunks (/32, /36, /48, etc.) for IPv6
- **Domain names:**
  - c.b.a.in-addr.arpa. (for IPv4 a.b.c.0/24)
  - 8.b.d.0.1.0.0.2.ip6.arpa. (for IPv6 2001:db8::/32)

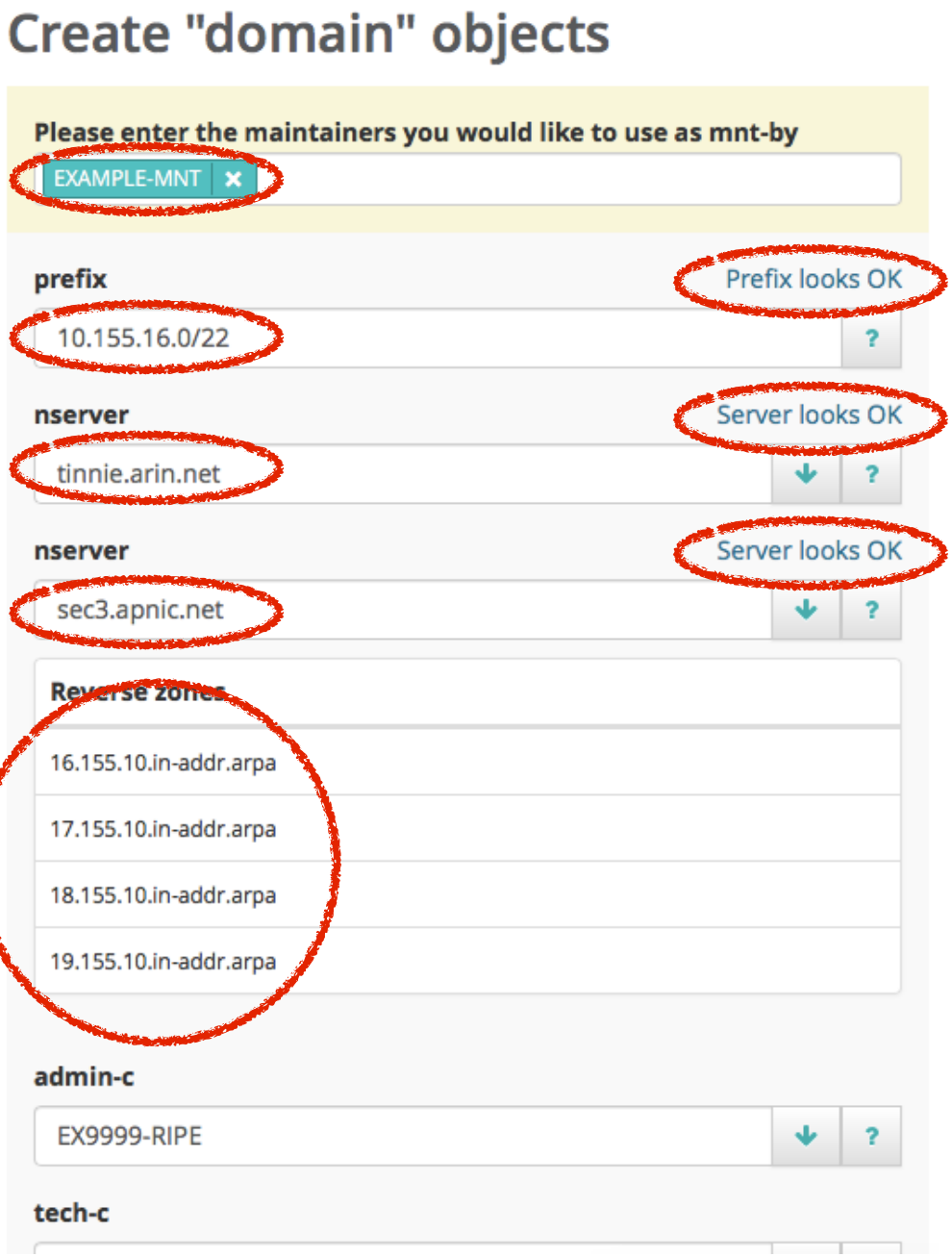
Setting up Reverse Delegation: Setup

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

- **Delegation checker**
  - http://dnscheck.ripe.net



Setting up Reverse Delegation: domain Object



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

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

Creating Objects in RIPE Database

Exercise 4

Exercise: Creating Objects in the RIPE Database

- Time
  - 15 minutes
- Goal
  - Learn how to create new objects in the RIPE Database
- Tasks
  - Create a person and a maintainer object pair
  - Create a role object

Questions

Getting Resources

Section 5

Terminology

- **Allocation**
  - Block of IP addresses reserved for future use

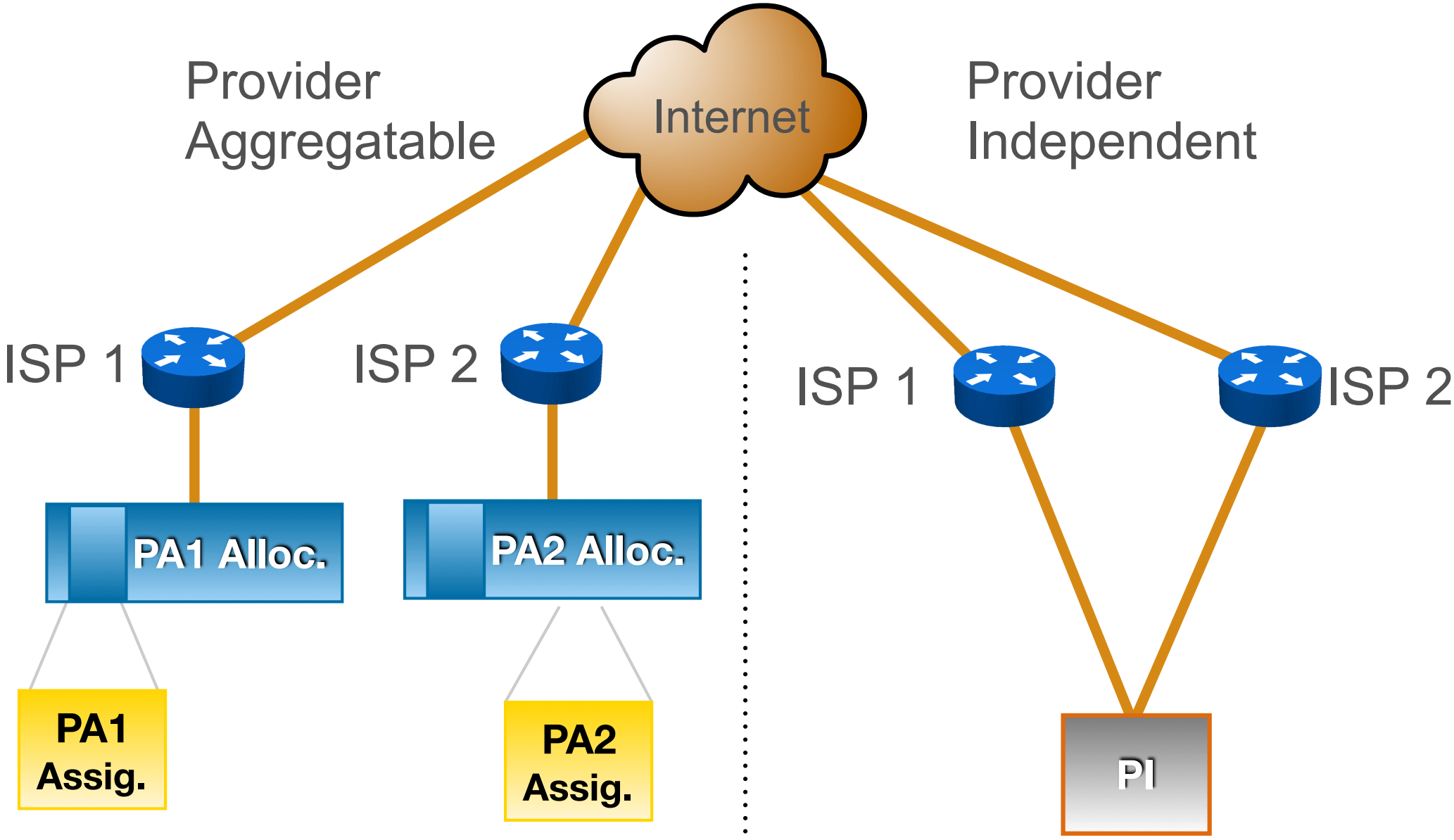
- **Assignment**
  - A chunk of addresses from an allocation that is used:
    - in your own infrastructure
    - in an End User network

Types of Address Space

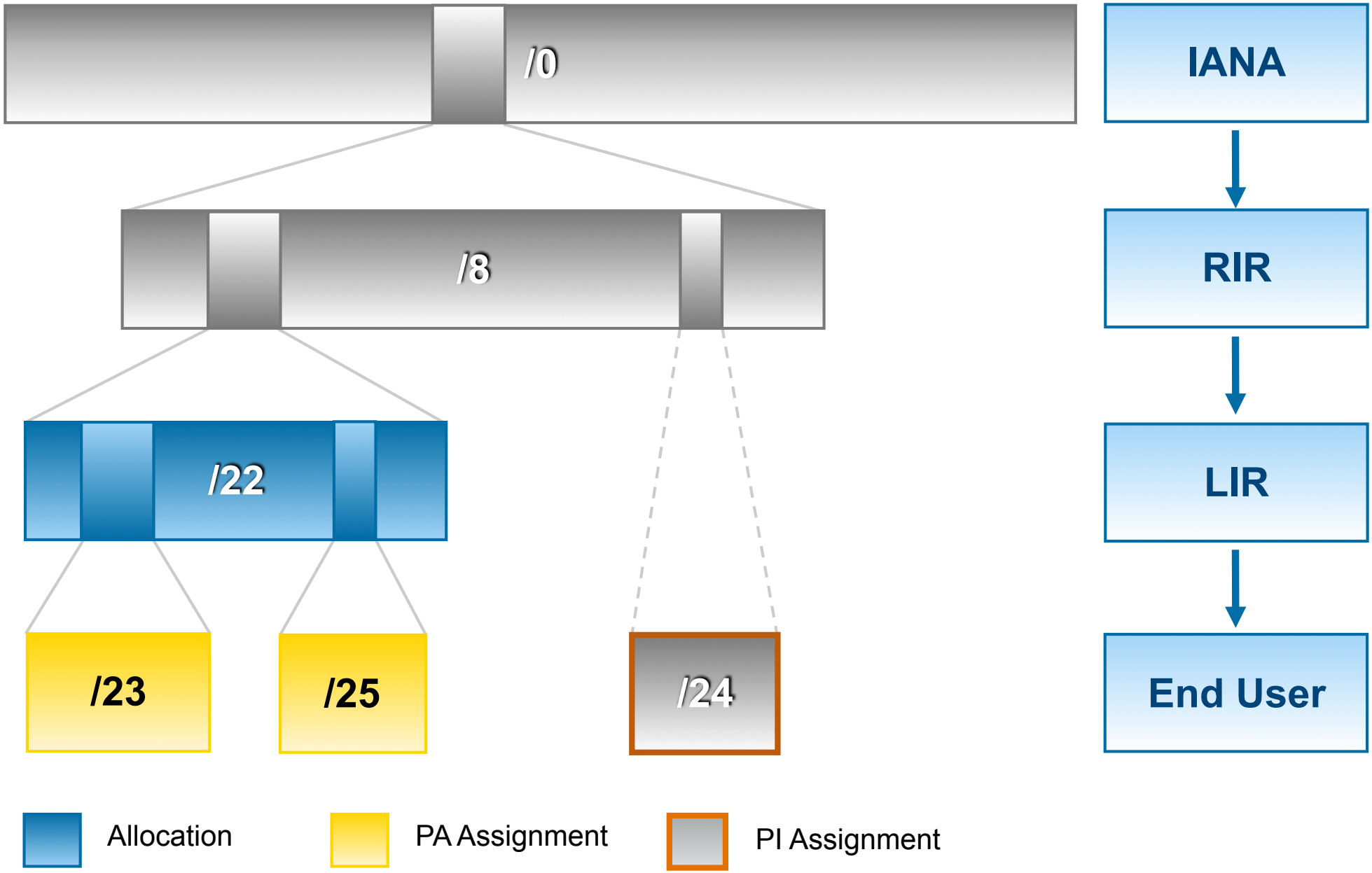
- **PA = Provider Aggregatable**
  - Blocks given to LIRs
  - Distributed further to other users
  - When customers change ISP, the IPs go back to LIR

- **PI = Provider Independent**
  - Blocks given directly to a user for their own network
  - User takes IPs with them if they change ISP

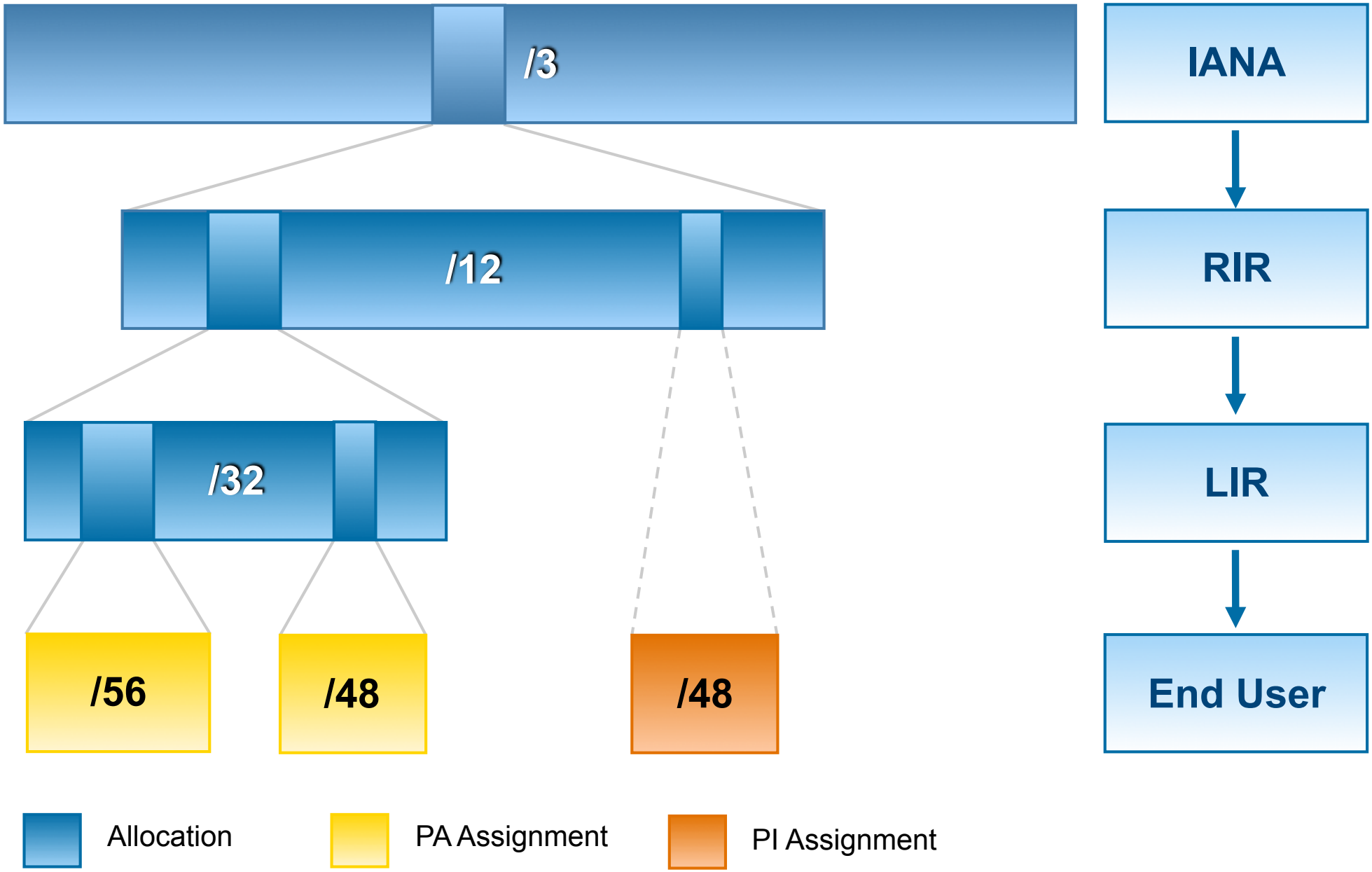
PA versus PI


Provider
Aggregatable
Internet
Provider
Independent
ISP 1
ISP 2
ISP 1
ISP 2
PA1 Alloc.
PA2 Alloc.
PA1
Assig.
PA2
Assig.
PI

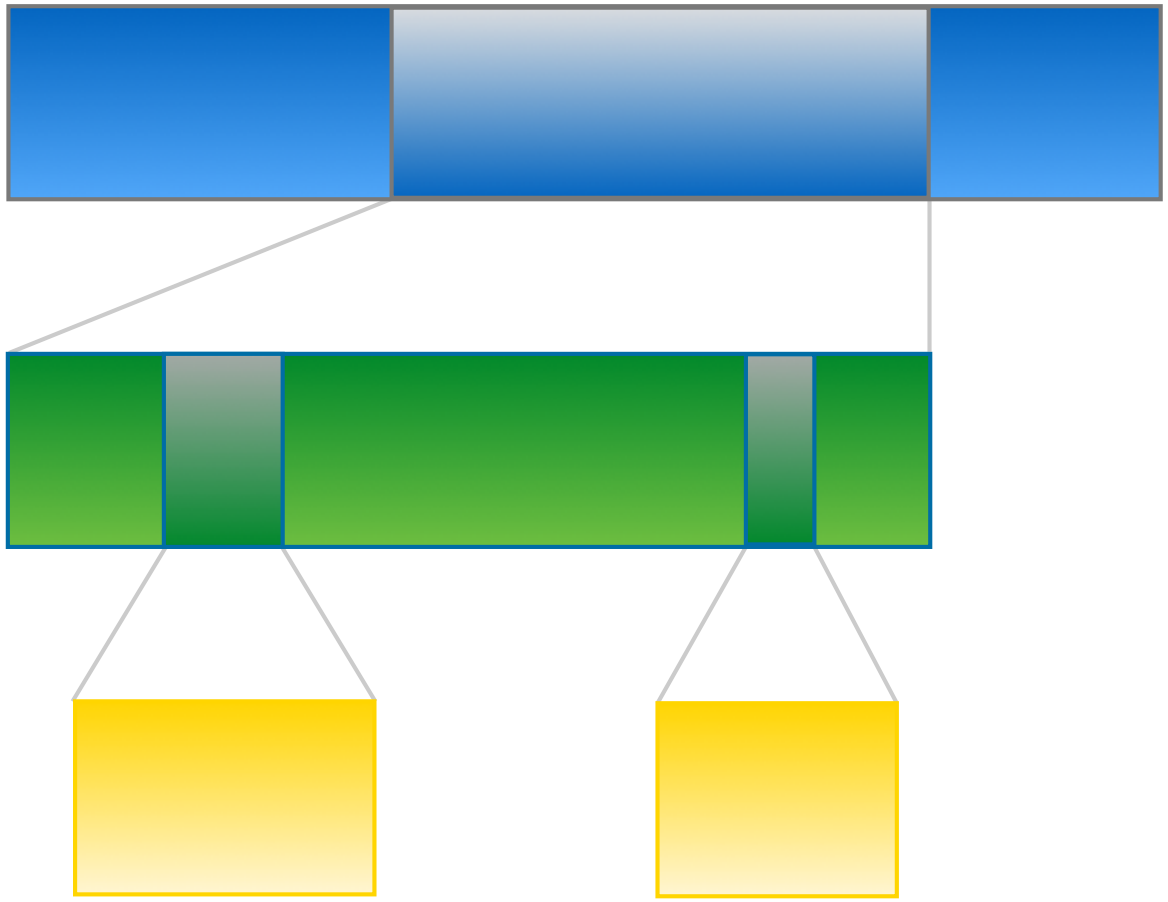
IPv4 Address Distribution - Current

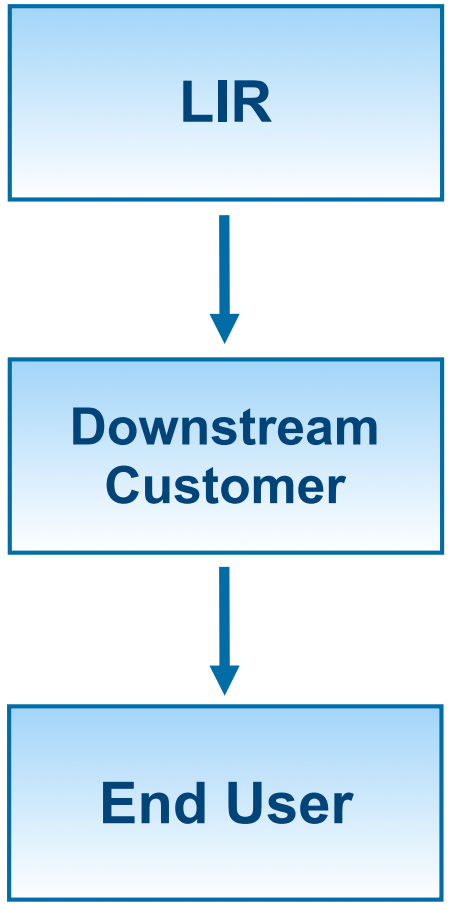


IPv6 Address Distribution



Sub-allocations





PA Allocation

PA Sub-allocation

PA Assignment

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

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

IPv6 PI Assignments

- PI space cannot be used for sub-assignments!
  - Not even a single address for the connection
  - If you have customers, you cannot use PI for them

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 from the Last /8

- Submit the IPv4 Allocation Request form
  - Use the same **mntner**, **person** and **role** objects from the IPv6 allocation
- Each LIR can get **one /22** block
  - = 1024 IPv4 addresses
- Cannot be transferred within 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
  - 16-bit available on request

PI / ASN and Sponsoring LIR

- Options for End Users 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

PI assignments
between End Users

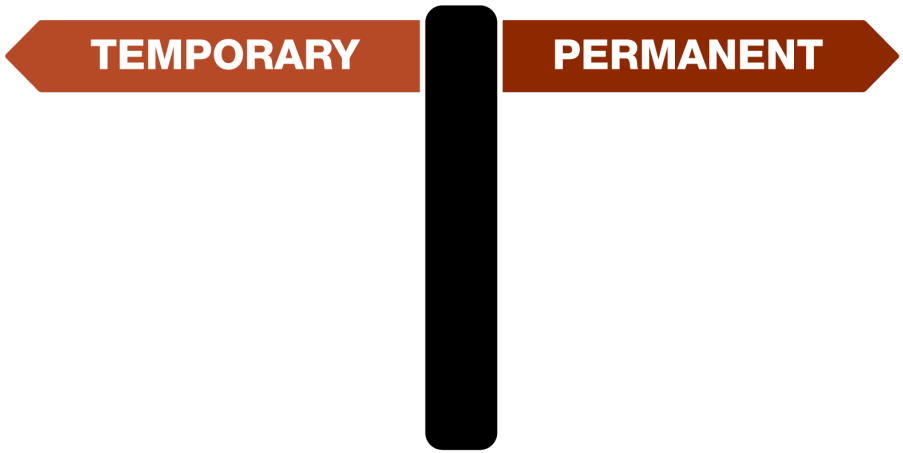
AS numbers
between End Users

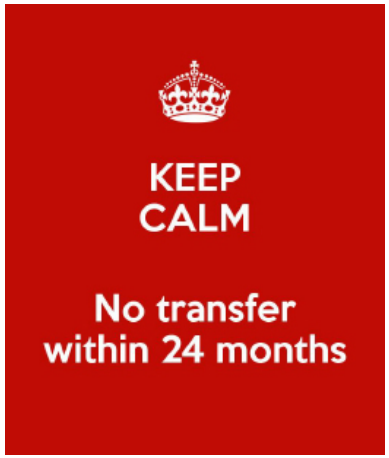
Merger or Acquisition

From Legacy Space

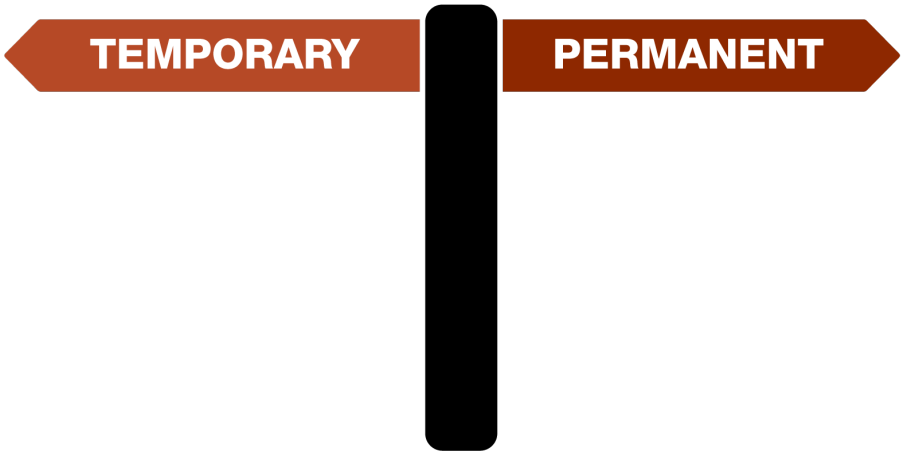
Inter-RIR

IPv4 Allocation Transfers





IPv4 PI Assignment Transfers



SPONSORED BY

YOUR LIR

IPv4 Transfers: Where to Look

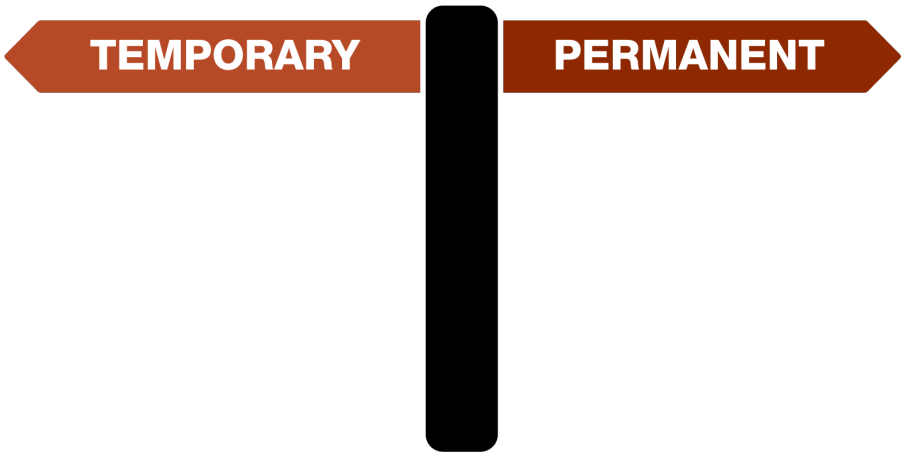
- IPv4 Listing Service
  - Accessible from LIR Portal account

- Brokers
  - Listed on RIPE NCC website
  - **NOT** endorsed by RIPE NCC
  - Signed an agreement to conform to RIPE Policies

IPv6 Allocation Transfers

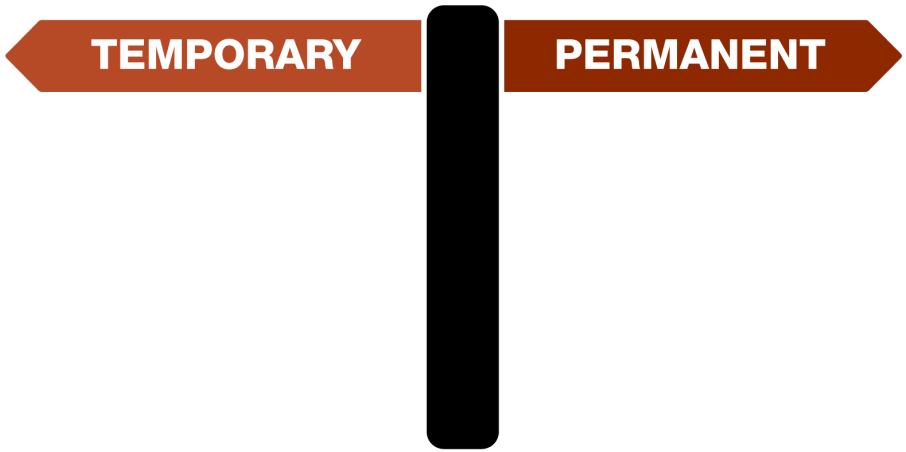
LIR → **LIR**

MIN
SIZE
/32



IPv6 PI Assignment Transfers

MIN
SIZE
/48



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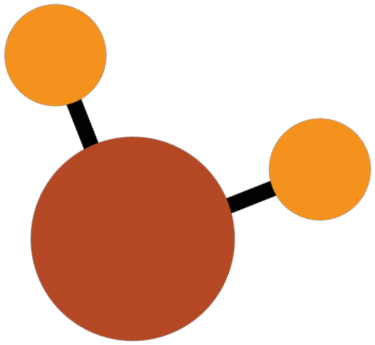
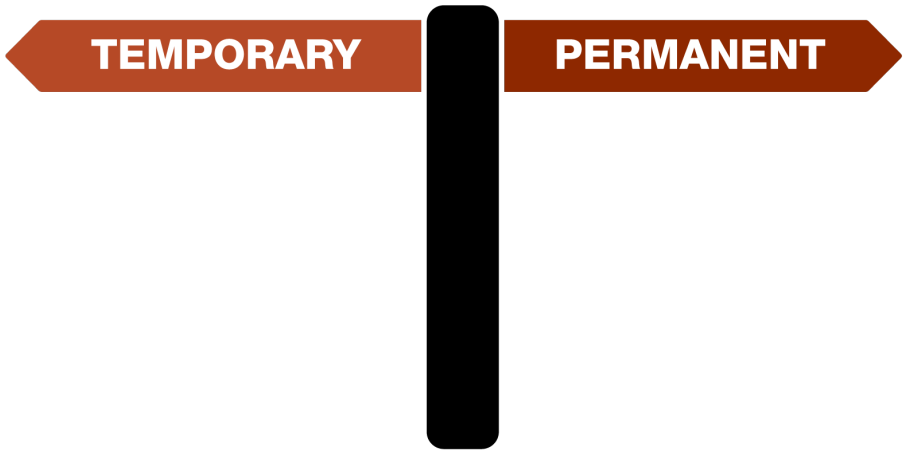
YOUR LIR

AS Number Transfers





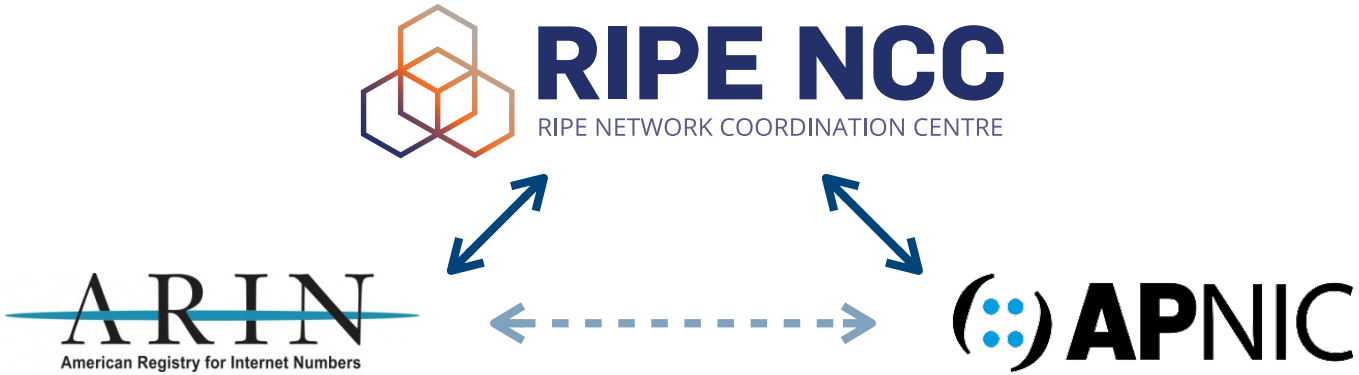
SPONSORED BY

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
  - For PI transfers, sponsoring LIR agreement is needed too

Inter-RIR Transfers



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

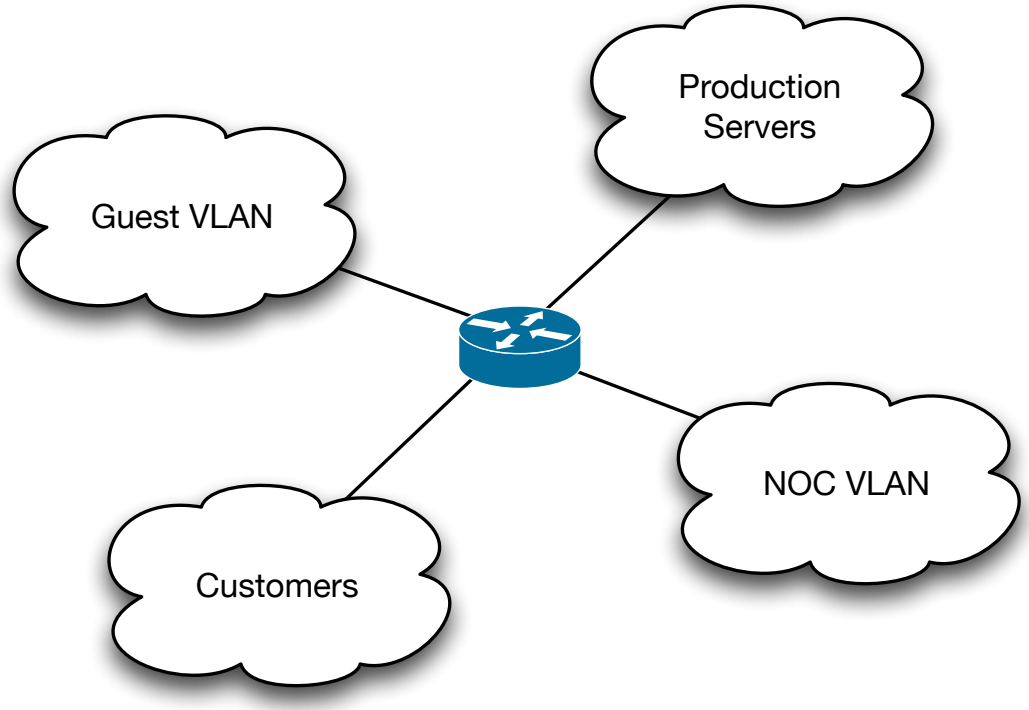
Questions

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 the amount of hosts in a subnet is irrelevant!

IPv6 Assignments

- Default IPv6 subnet = /64
- Every “end site” can be assigned between /64 and /48 without prior approval of the RIPE NCC
  - For larger assignments, send in request form
- Assignments for your own infrastructure
  - /48 per Point of Presence
  - Additional /48 for the core network

Making Assignments

Exercise 5

Exercise: 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?

IPv6 Registration in the Database

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

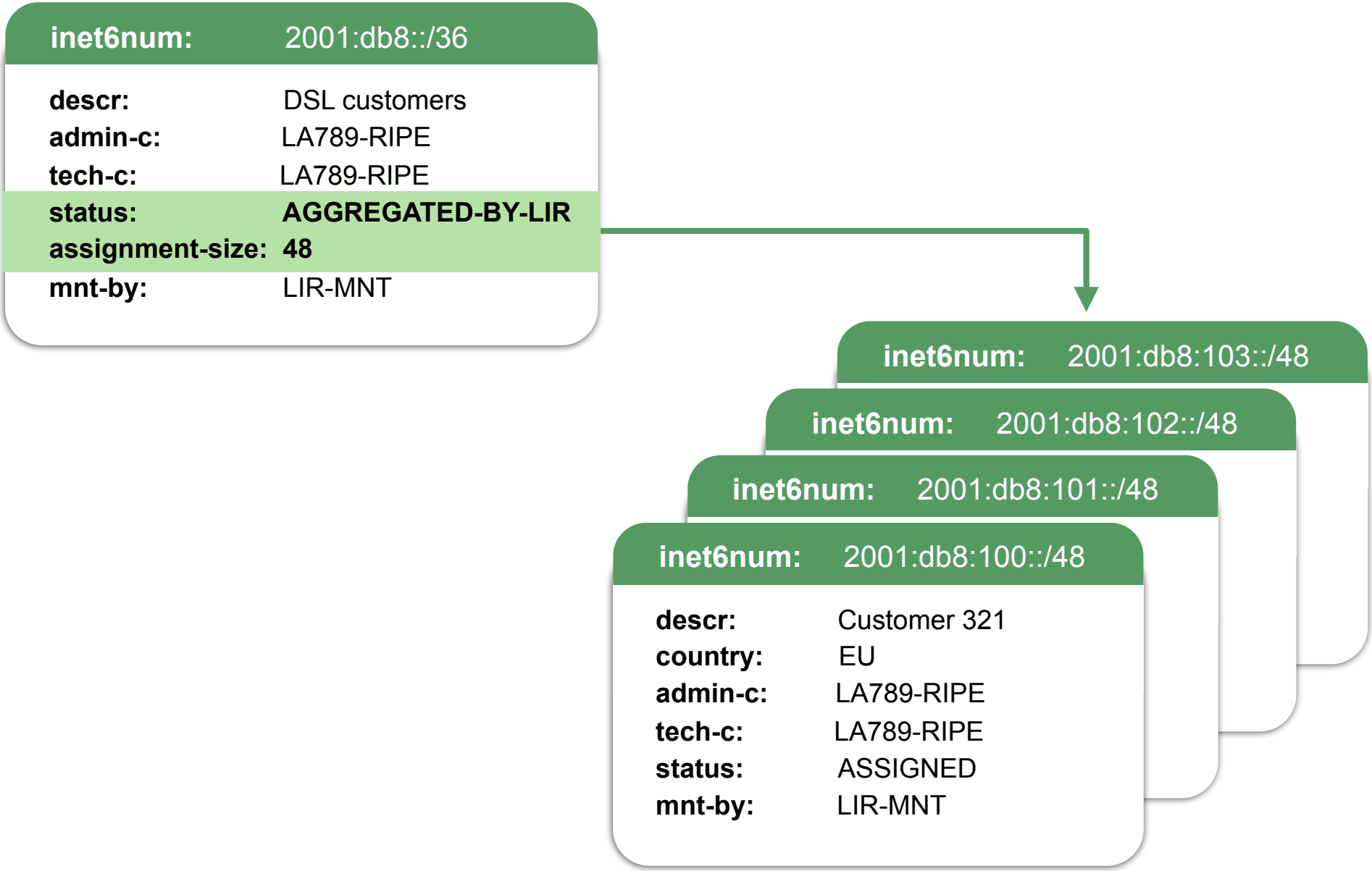
Assignment

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



IPv4 Resources

- LIRs are allocated only one /22
  - 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

Infrastructure vs. End User

Infrastructure

Blocks for connections to End Users:

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

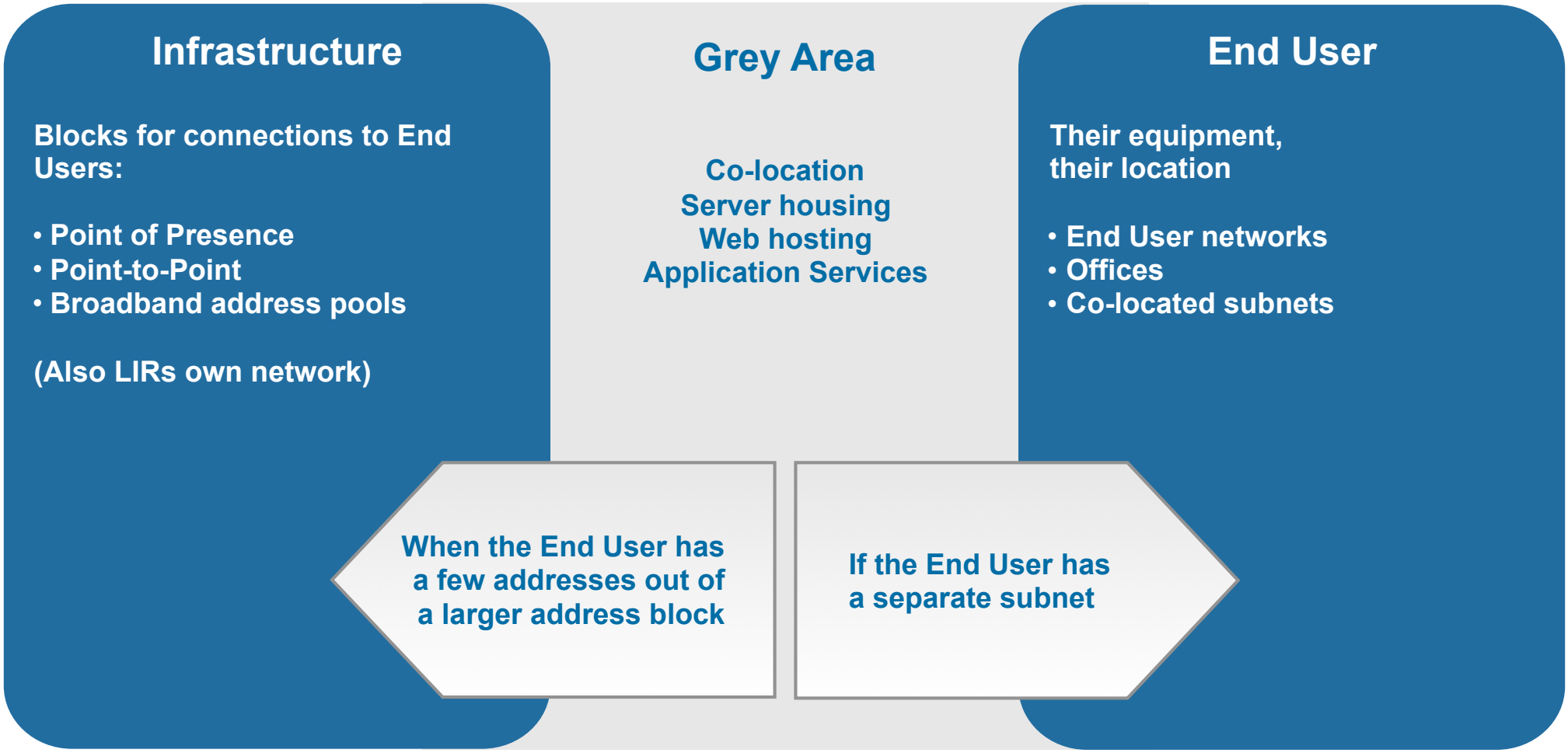
(Also LIRs own network)

End User

Their equipment, their location

- End User networks
- Offices
- Co-located subnets

Infrastructure vs. End User



Registering the Assignments

Exercise 6

Exercise: Registering an Assignment

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

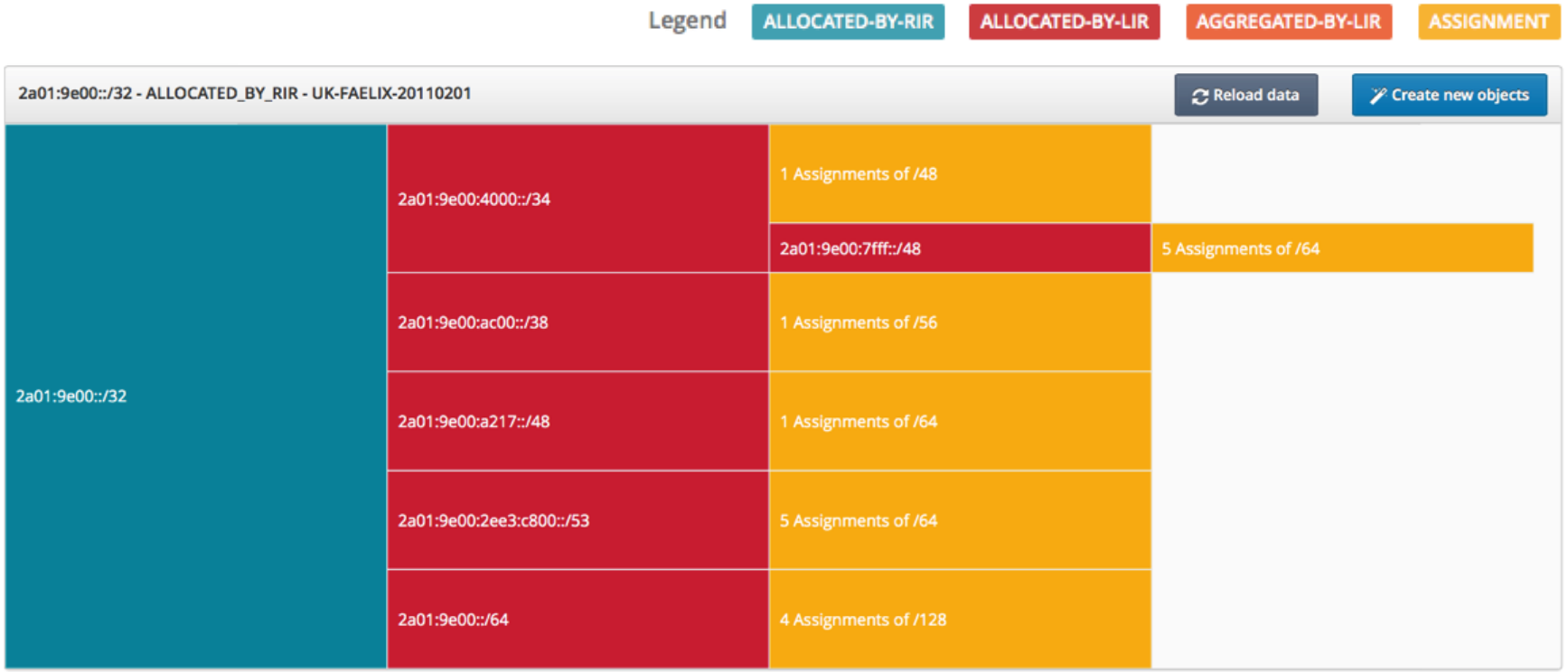
Managing Resources

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

IPv6 Analyser



More specific inet6nums

Filter on range...

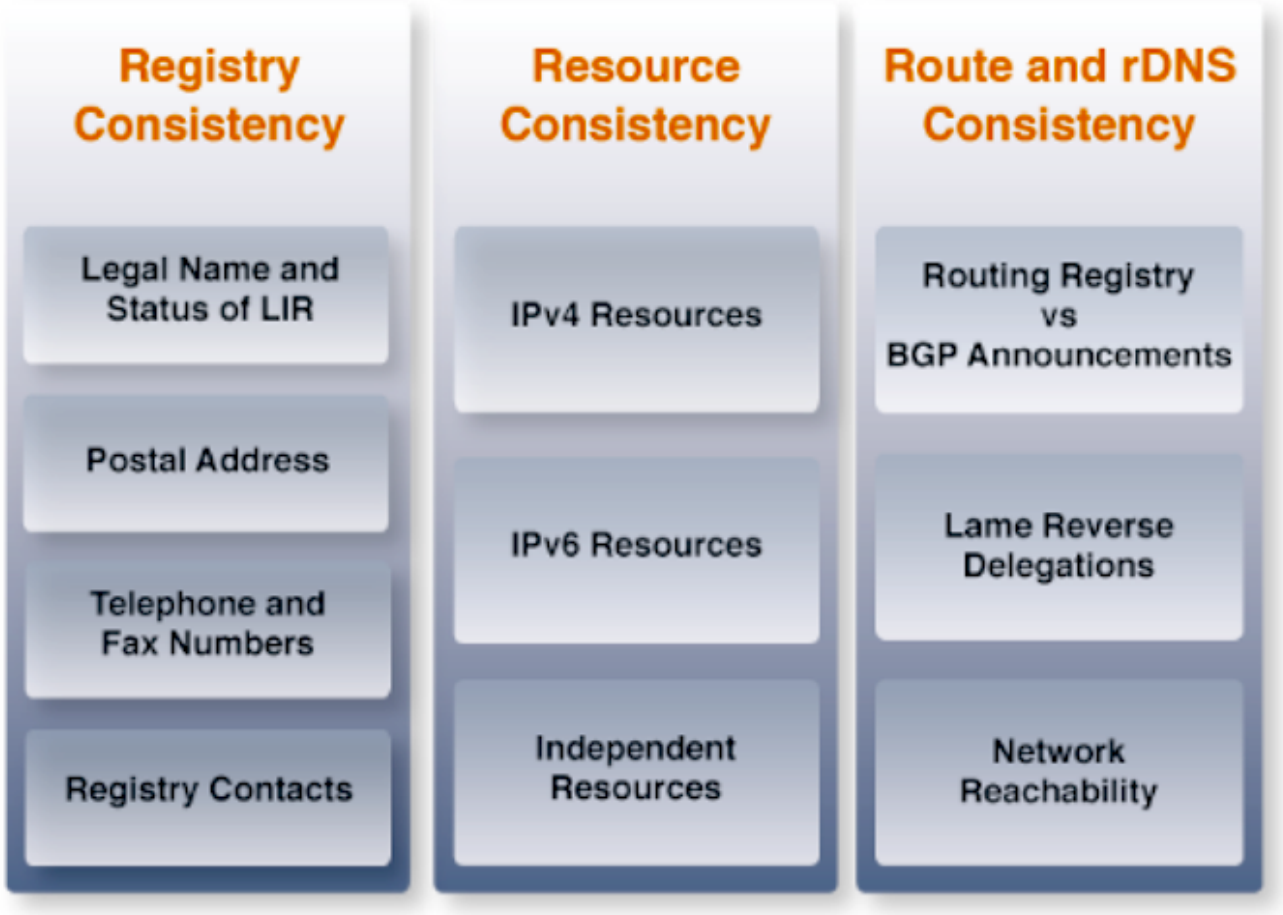
inet6num	Status	Date	Size	AsgSize	Netname
2a01:9e00:4000::/34	ALLOCATED_BY_LIR	03-02-2011	/34		UK-FAELIX-CUSTOMER
2a01:9e00:ac00::/38	ALLOCATED_BY_LIR	04-02-2011	/38		UK-FAELIX-TUNNEL
2a01:9e00:a217::/48	ALLOCATED_BY_LIR	03-02-2011	/48		UK-FAELIX-FAELIX
2a01:9e00:7fff::/48	ALLOCATED_BY_LIR	23-06-2012	/48		UK-FAELIX-CROSSCONNECT

Managing IPv4 Address Space

- LIRs get only one last /22 allocation
  - 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
- 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
  - 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

Questions

Tips and Tools

Section 9

Lost Maintainer Password

- Go to https://apps.db.ripe.net/change-auth/
- 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 9,200+ 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

RIPE NCC Academy

RIPE NCC
Academy

Graduate to the next level!

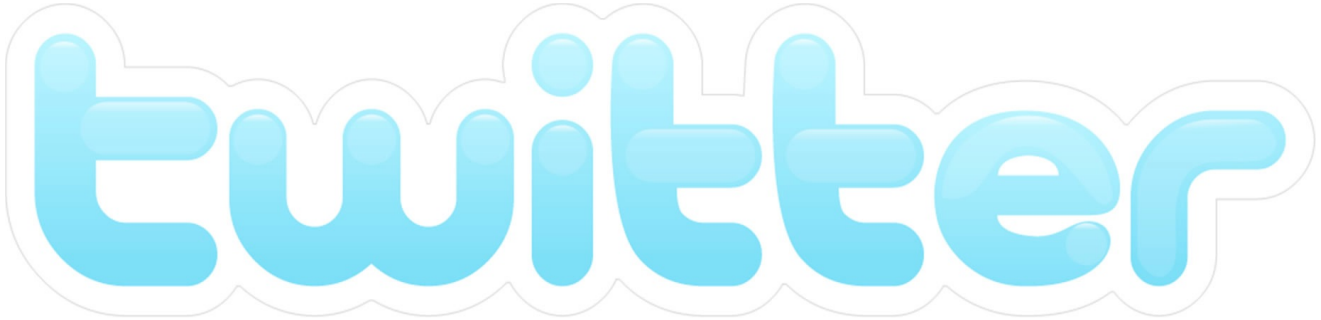
http://academy.ripe.net

Questions

Feedback!

https://www.ripe.net/training/lir/survey

Follow us!



@TrainingRIPENCC

The End!

Край

Y Diwedd

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Соңы

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Finvezh

Кінець

Konec

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Lõpp

Beigas

Vége

Son

An Críoch

Endir

Fine

Sfârşit

Fin

Τέλος

Einde

Конец

Slut

Slutt

Pabaiga

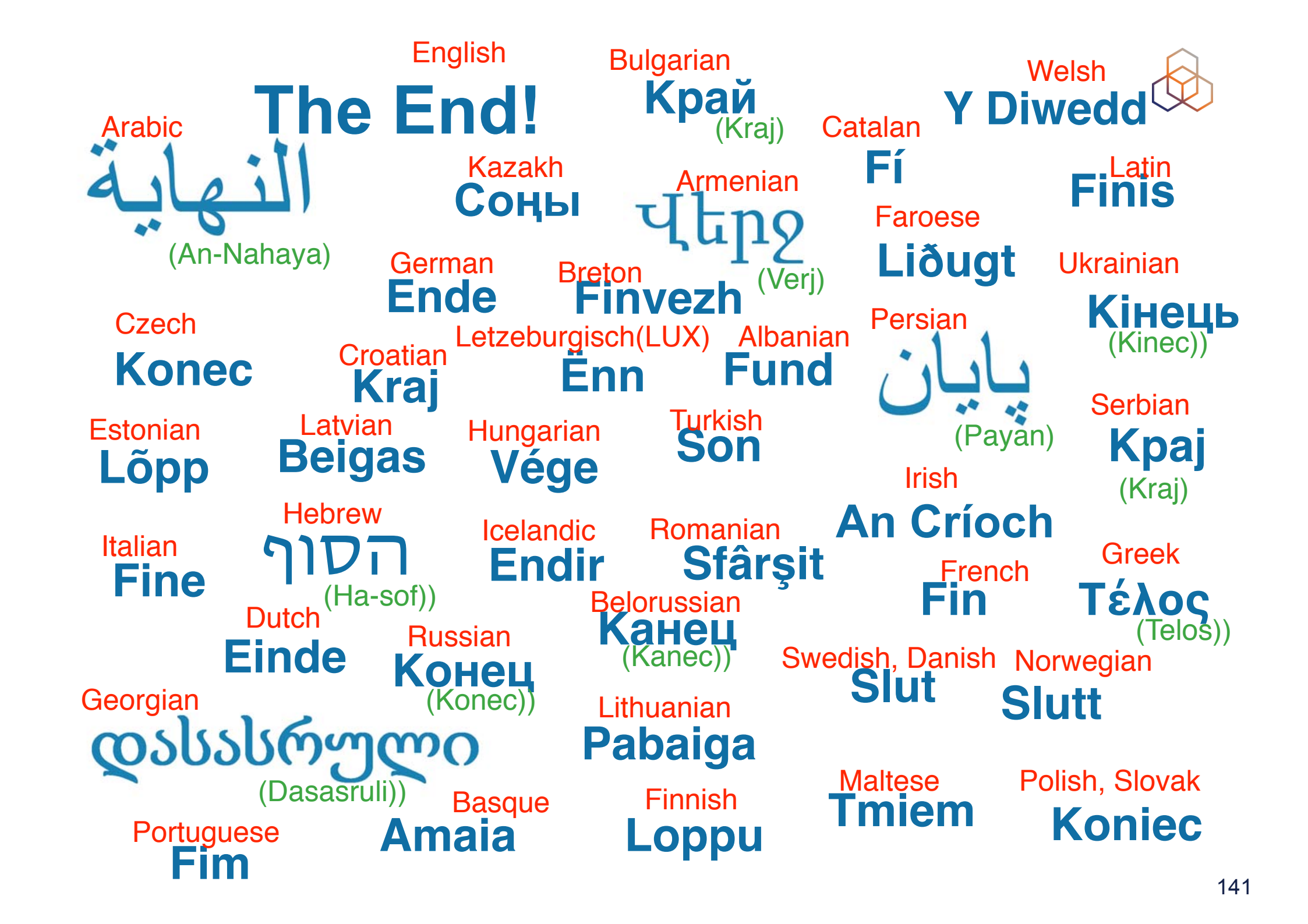
Tmiem

Koniec

Fim

Amaia

Loppu


English
The End!
Bulgarian
Край
(Kraj)
Welsh
Y Diwedd
Arabic
النهاية
(An-Nahaya)
Kazakh
Соңы
Armenian
վերջ
(Verj)
Catalan
Fí
Latin
Finis
Faroese
Liðugt
German
Ende
Breton
Finvezh
Ukrainian
Кінець
(Kinec))
Czech
Konec
Letzeburgisch(LUX)
Albanian
Fund
Persian
پایان
(Payan)
Croatian
Kraj
Ënn
Serbian
Крај
(Kraj)
Estonian
Lõpp
Latvian
Beigas
Hungarian
Vége
Turkish
Son
Irish
An Críoch
Hebrew
הסוף
(Ha-sof))
Icelandic
Endir
Romanian
Sfârşit
Italian
Fine
French
Fin
Greek
Τέλος
(Telos))
Belorussian
Канец
(Kanec))
Dutch
Einde
Russian
Конец
(Konec))
Swedish, Danish
Slut
Norwegian
Slutt
Georgian
დასასრული
(Dasasruli))
Lithuanian
Pabaiga
Maltese
Tmiem
Polish, Slovak
Koniec
Basque
Amaia
Finnish
Loppu
Portuguese
Fim