# MENOG Tutorial

RIPE NCC
October 2012

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# Overview

- The Internet Registry (IR) System
- IPv4 Address Pool Exhaustion
- IPv6
- Getting Resources
- The RIPE Database
- Other RIPE NCC Services

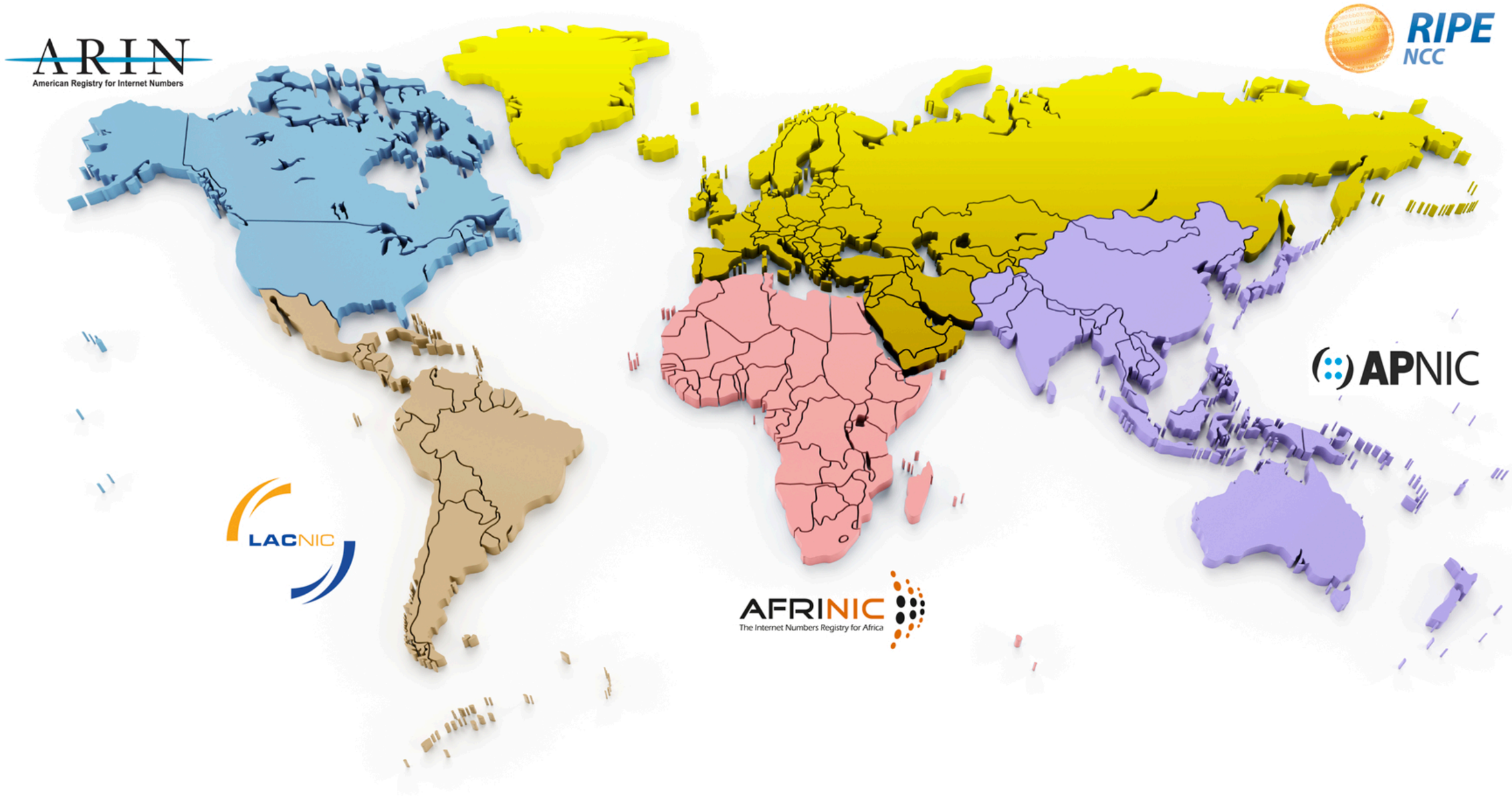
# The Internet Registry (IR) System

RIPE NCC

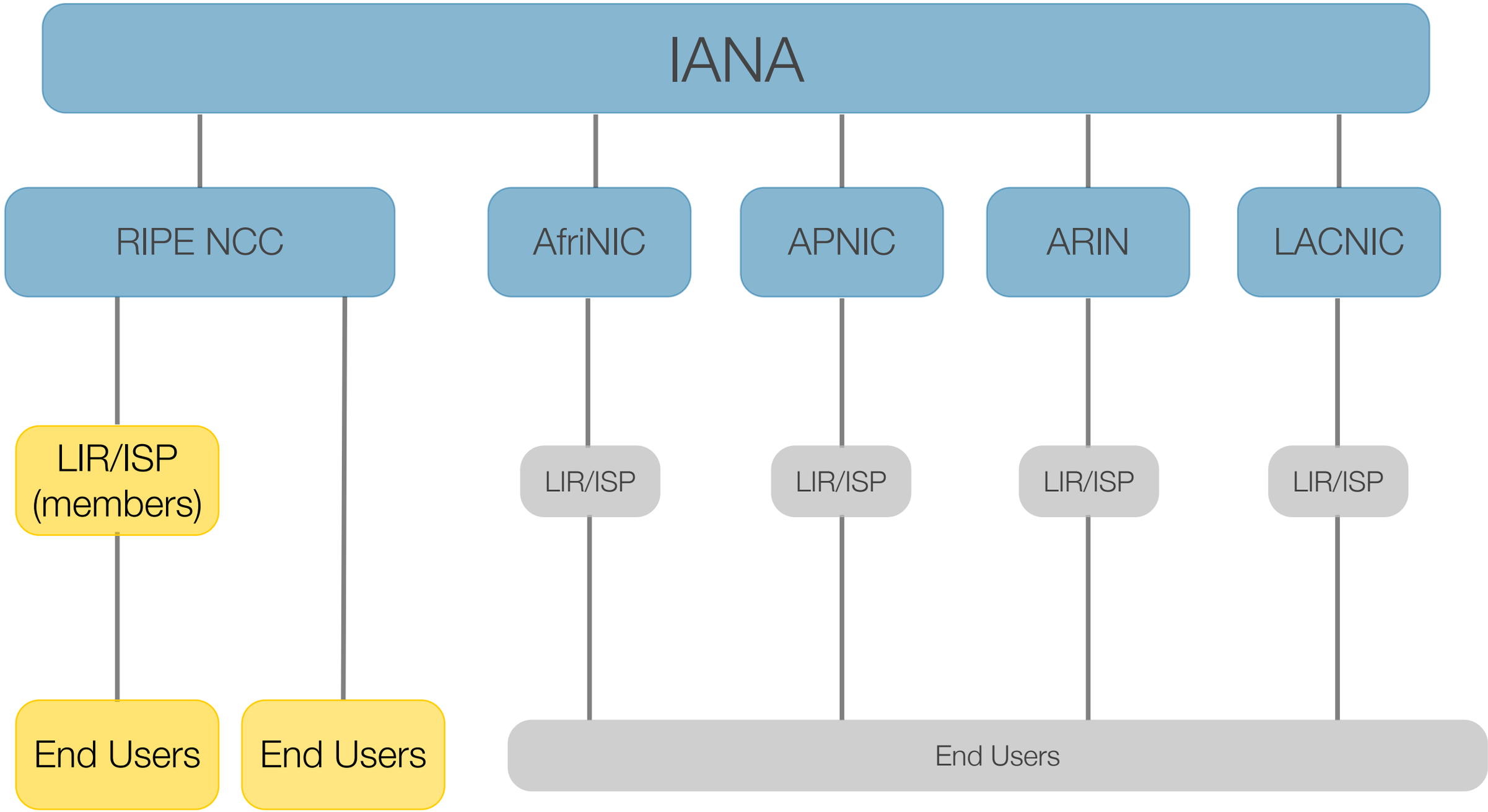
# Regional Internet Registries

- Not-for-profit organisations
- Open membership
- Funded by the members
- Neutral towards its members

# The Five RIRs



# The Internet Registry System



# Three Goals

- Registration
  - Ensure uniqueness
  - Provide contact information
- Aggregation
  - Limit number of routes
- Conservation
  - Ensure efficient use

# Membership and Community

## community

Decides on policy

- Valid reasons for getting resources
- Amount of resources
- RIPE Database features

## membership

Decides on business

- Charging scheme
- Activity plan
- Additional Services
  - Atlas
  - RIPEstat

# Membership and Community

## community

Decides on policy

- Valid reasons for getting resources
- Amount of resources
- RIPE Database features

## grey area

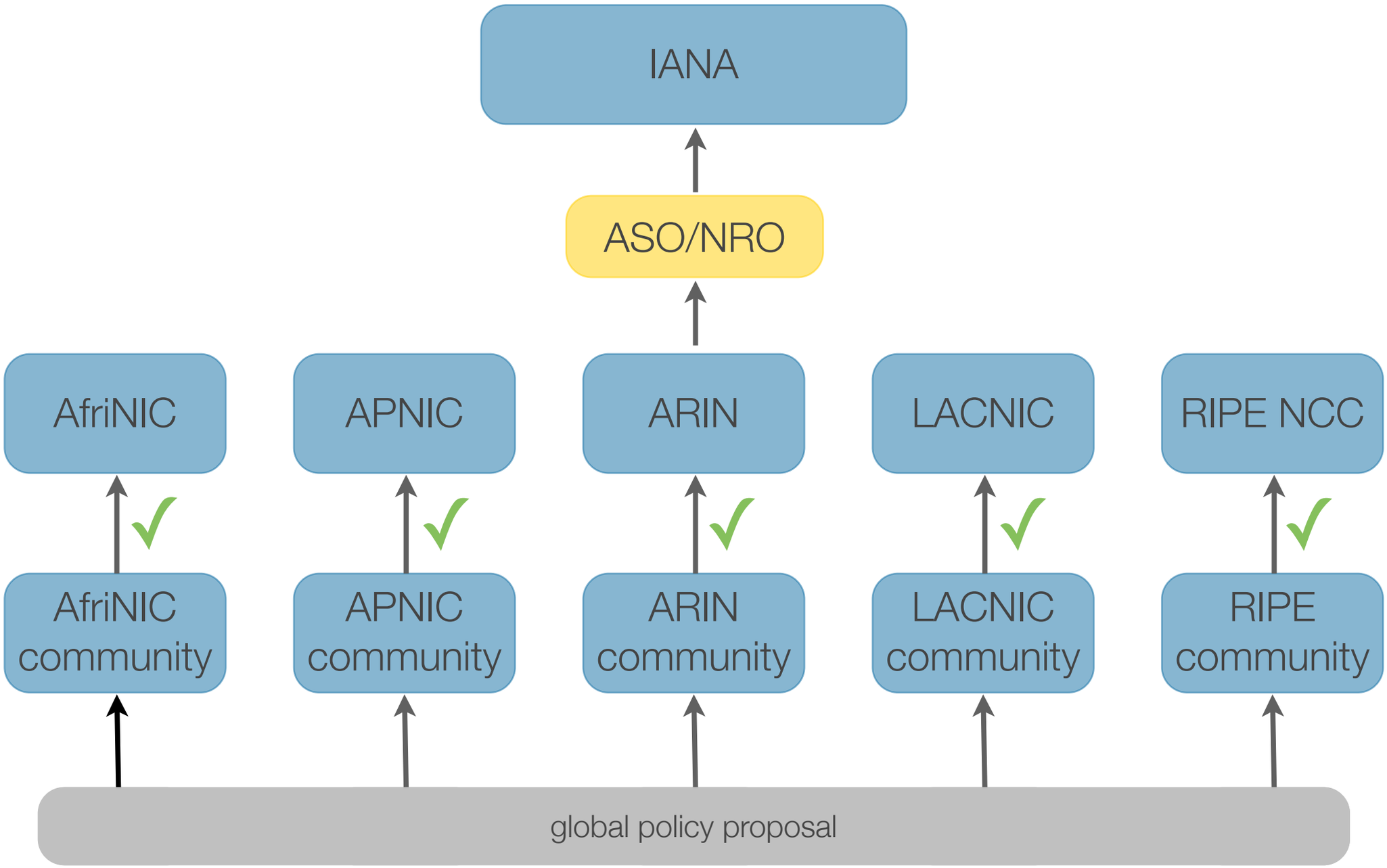
- K-root.servers
- Reverse DNS
- Mergers and takeovers

## membership

Decides on business

- Charging scheme
- Activity plan
- Additional Services
  - Atlas
  - RIPEstat

# Bottom Up Policy Making



# Policy Development Process

- Open
  - Anyone can participate
  - On mailing lists and at meetings
- Transparent
  - List discussions archived publicly
  - Meetings transcribed

# Who Does What?

- The RIPE community
- Working Group (WG) chairs
- The RIPE NCC

# The RIPE Community

- Creates proposals
- Discusses proposals
- Seeks consensus

# Working Group Chairs

- Accept proposals
- Chair the discussions
- Decide if consensus has been reached

# The RIPE NCC

- Acts as the secretariat to support the process
- Publishes the documents
- Implements the proposals

# Participating

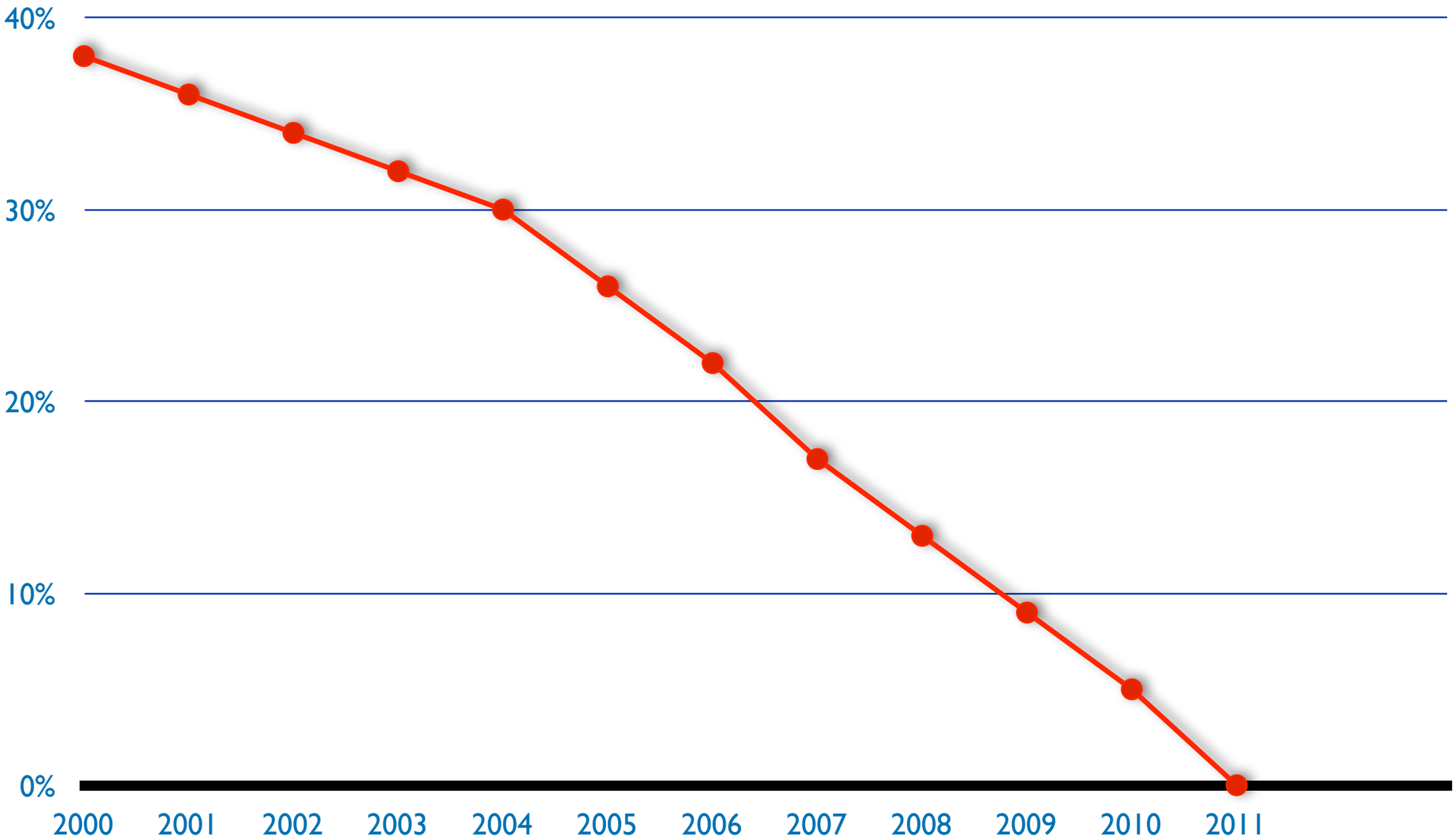
- Sign up for the Policy Development Process Announcements mailing list
- Join in discussions about policy proposals
- Stay up to date with new policies
- Propose a new policy

# Questions?

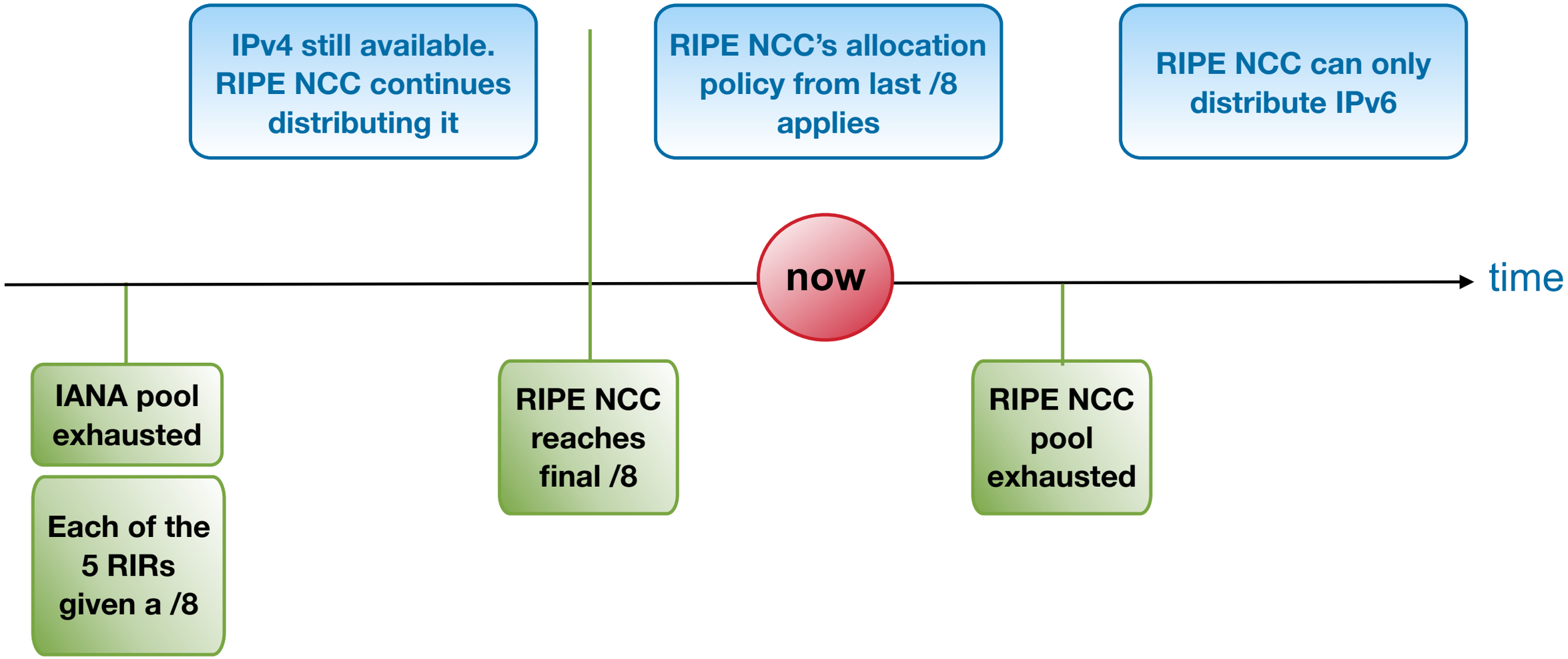
# IPv4 Address Pool Exhaustion

RIPE NCC

# IANA IPv4 Pool



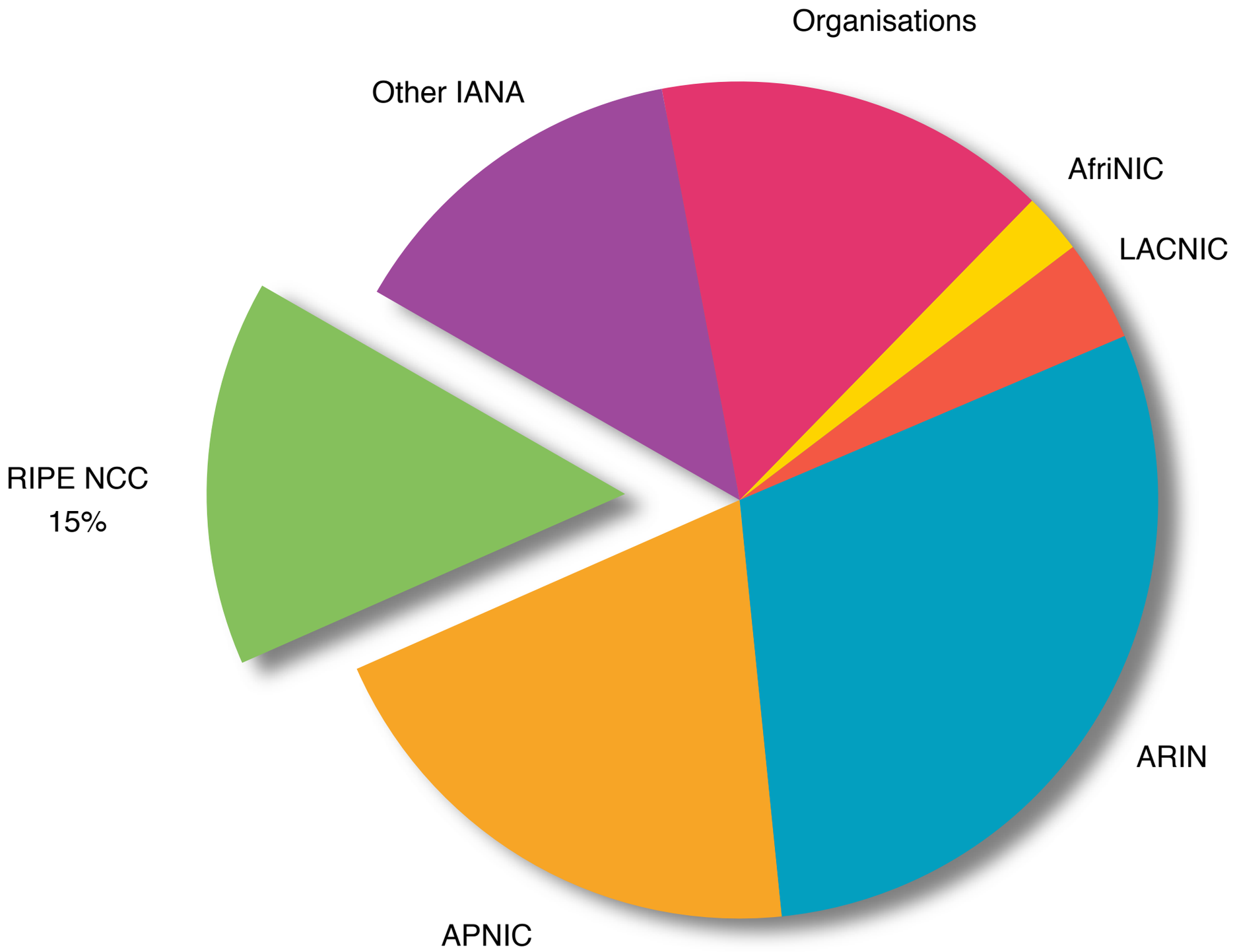
# IPv4 Exhaustion Phases



# RIPE NCC's Last /8

- We do things differently!
- Ensure IPv4 access for all members
  - 16000+ /22s in a /8
  - members can get **one /22** (=1024 addresses)
  - must already hold IPv6
  - must qualify for allocation
- /16 set aside for unforeseen situations
  - if unused, will be distributed
- **No PI**

# Our Slice of the IPv4 Pie



# Questions?

# IPv6

RIPE NCC

# IPv6 Basics

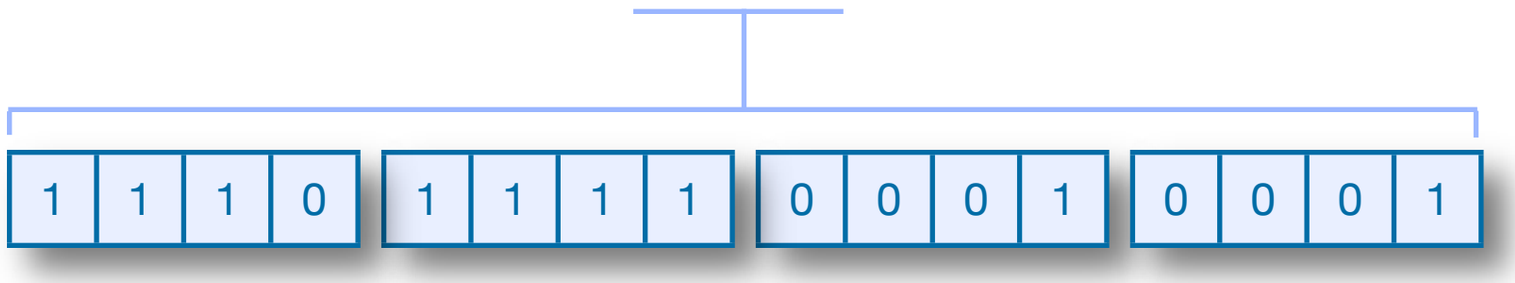
- IPv6 address is 128 bits
  - compared to 32 bits in IPv4
- Subnets work the same
  - Every physical subnet should be a /64
  - End users typically can get up to a /48 (65.536 individual subnets)
- IPv6 addresses are written in hexadecimal

# IPv6 Address Notation

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

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

2001:db8:3e:ef11:0:0:c100:4d

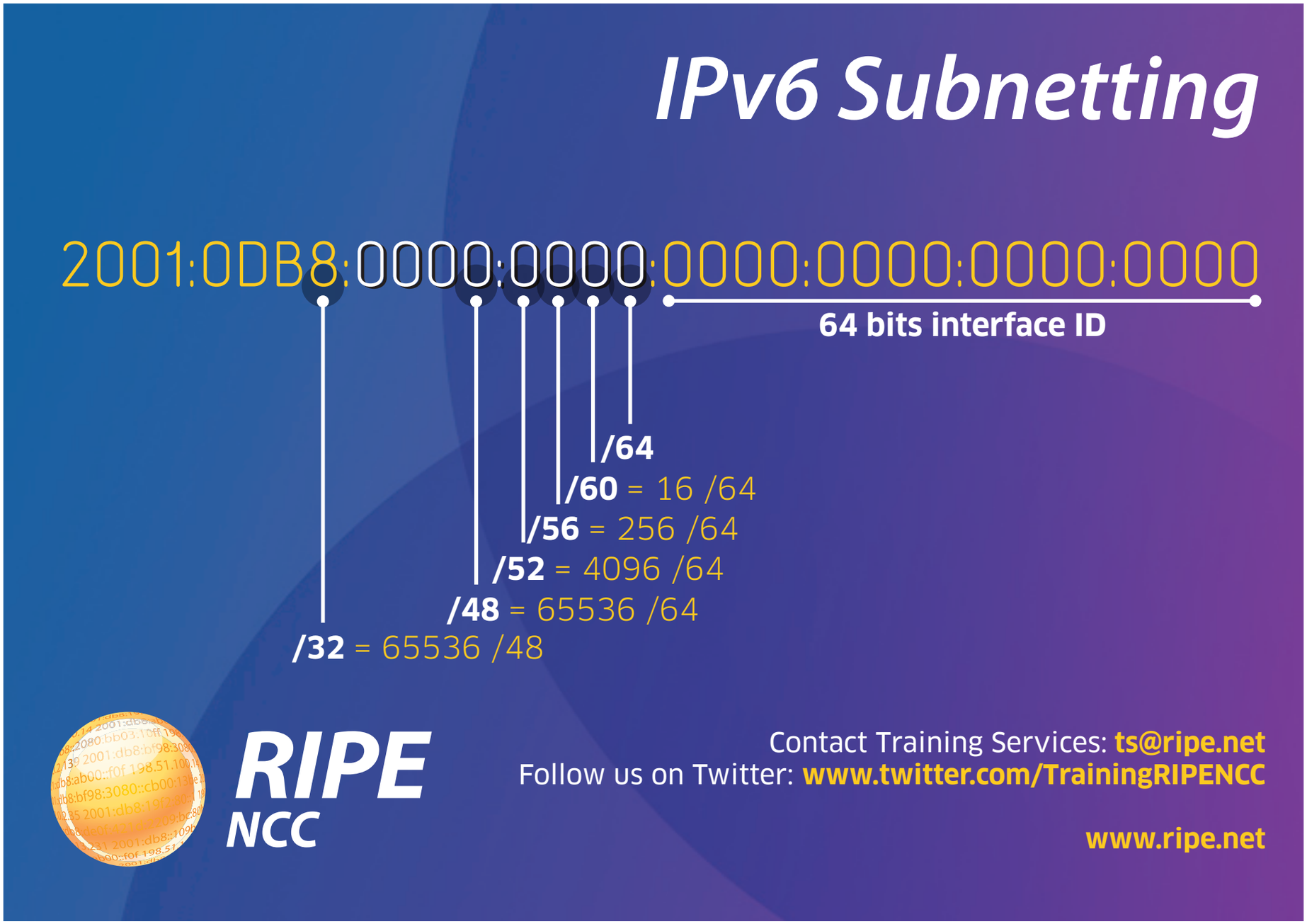


# Exercise

## IPv6 Address Notation

RIPE NCC

# IPv6 Subnetting



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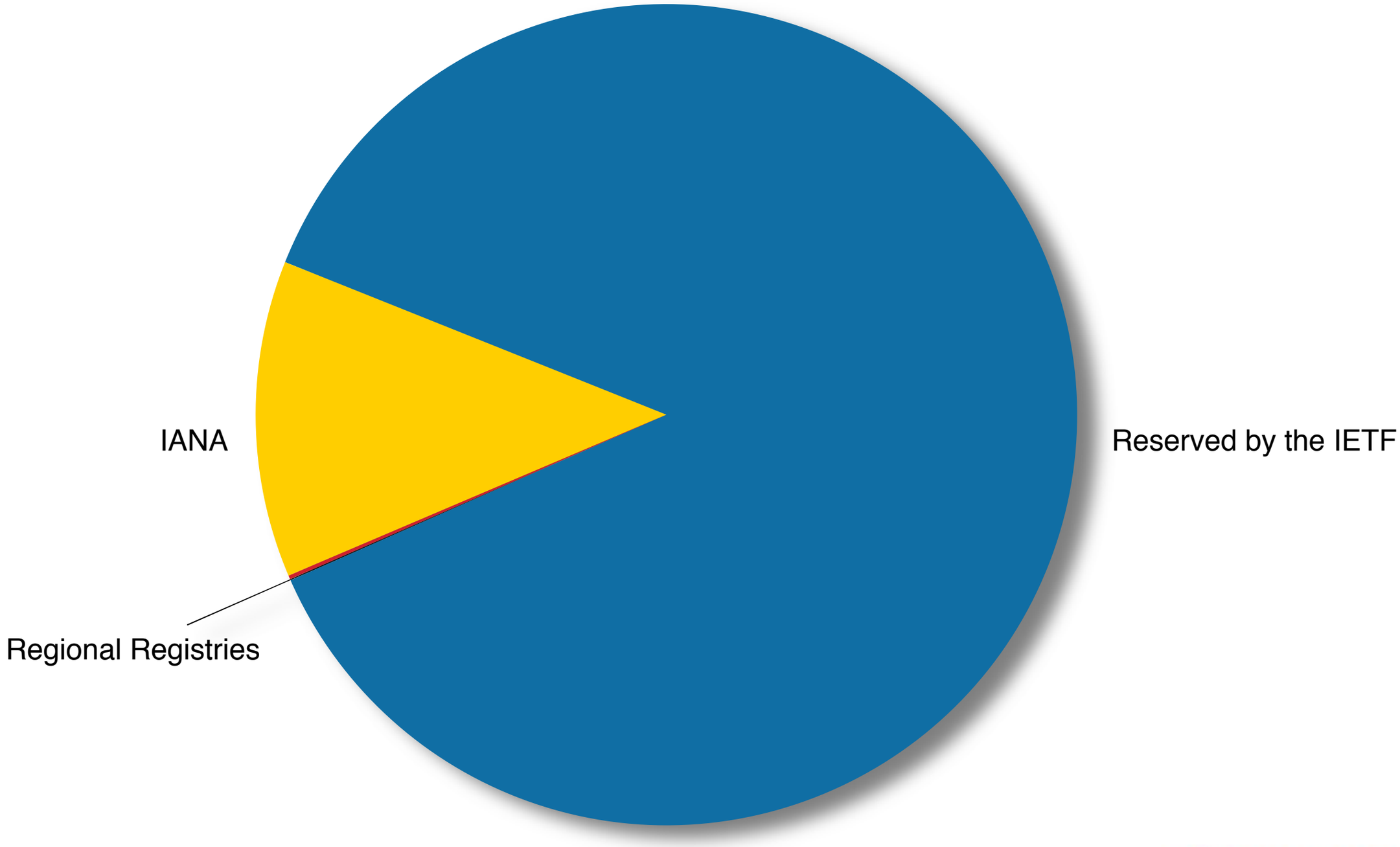

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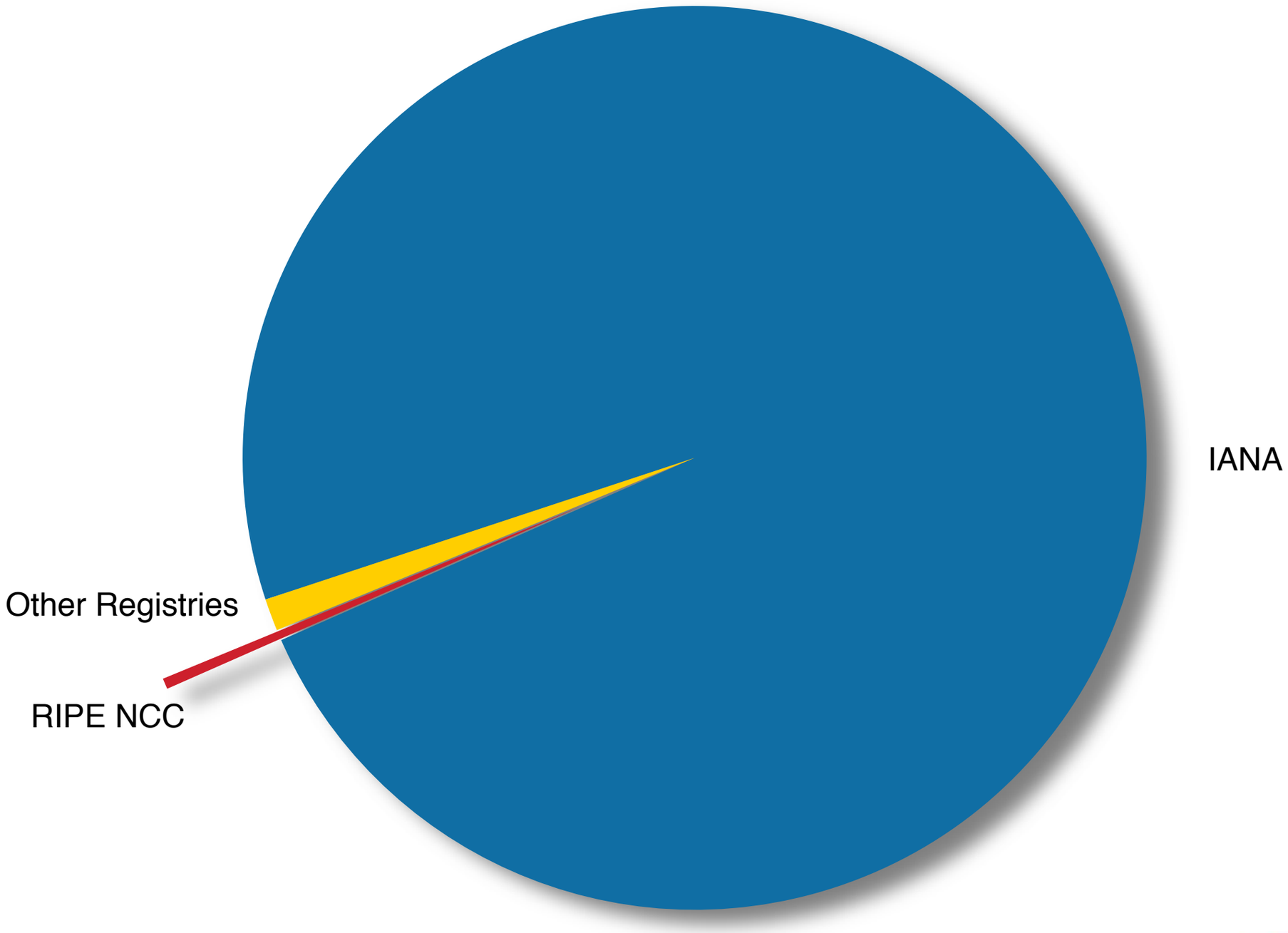


# Questions?

# Getting Resources

# Terminology

- Allocation
  - Block of IP addresses reserved for future use

- Assignment
  - A block of addresses out of an allocation that is in use:
    - in your own infrastructure
    - in a customer's network

# Different Types of Assignments

- Provider Aggregatable (ASSIGNED PA)
  - Assignments made from member's allocation
  - Address space remains with member
  - Customer has to renumber when changing ISP

- Provider Independent (ASSIGNED PI)
  - Assignment made directly by the RIPE NCC
  - Address space remains with the end user

# Getting an IPv6 Allocation

- To qualify, an organisation must:
  - Be an LIR
  - Have a plan for making assignments within two years

- Minimum allocation size /32
  - Up to a /29 without additional justification
  - More if justified by customer numbers

# Getting an IPv4 Allocation

- To qualify an organisation must:
  - Be an LIR
  - Have an IPv6 allocation
  - Demonstrate the need

- One /22 per LIR (and no more!)
  - For new and existing LIRs

# Additional IPv4 Allocation

- Existing LIRs can apply for their /22
  - Clean up the RIPE Database
  - 80% usage of current allocations
  - Demonstrate a need

- We audit the LIR!

# Provider Independent Assignments

- No more IPv4 PI assignments
- Exception for Internet Exchange Points
  - For the peering LAN only
  - Minimum /24
  - Maximum /22

# IPv6 PI Assignments

- To qualify, an organisation must:
  - Meet the contractual requirements for provider independent resources
  - LIRs must demonstrate special routing requirements

- Minimum assignment size /48

- PI space can not be used for sub-assignments
  - Not even for 1 IP

# Transfer of IPv4 Address Space

- Allocation Transfer Policy
  - LIRs can transfer unused allocations to another LIR
  - Minimum transferable allocation size /22
  - Evaluated by RIPE NCC
    - 80% usage criteria applies
    - 3 month period applies

# Autonomous System Numbers

- ASN are independent resources
  - Contractual requirements apply
  - Demonstrate multi-homing
  - Must have address space

- 32 bit is the default
  - 16 bit available on request and while supplies last

# Questions?

# The RIPE Database

# RIPE Database

- Public Internet resource and routing registry database

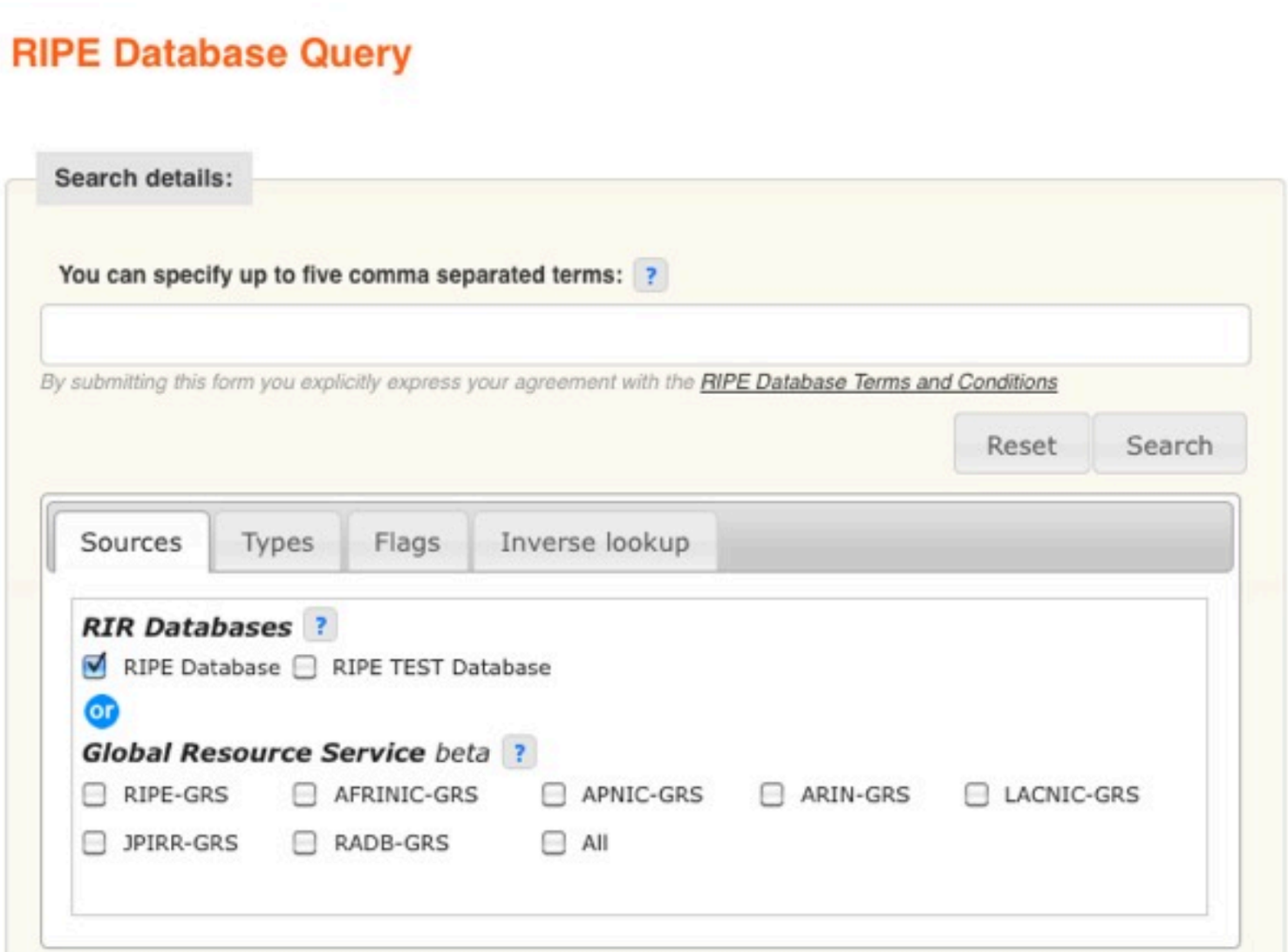
  - Numeric resources (IP addresses, AS numbers)
  - Contact informations for resources
  - Reverse DNS delegations
  - Routing policy

# RIPE Database objects

- Resources
  - inetnum, inet6num, aut-num, domain
- Routing
  - route, route6, aut-num
- Security
  - mntner
- Contact
  - organisation, person, role

# Querying the RIPE Database

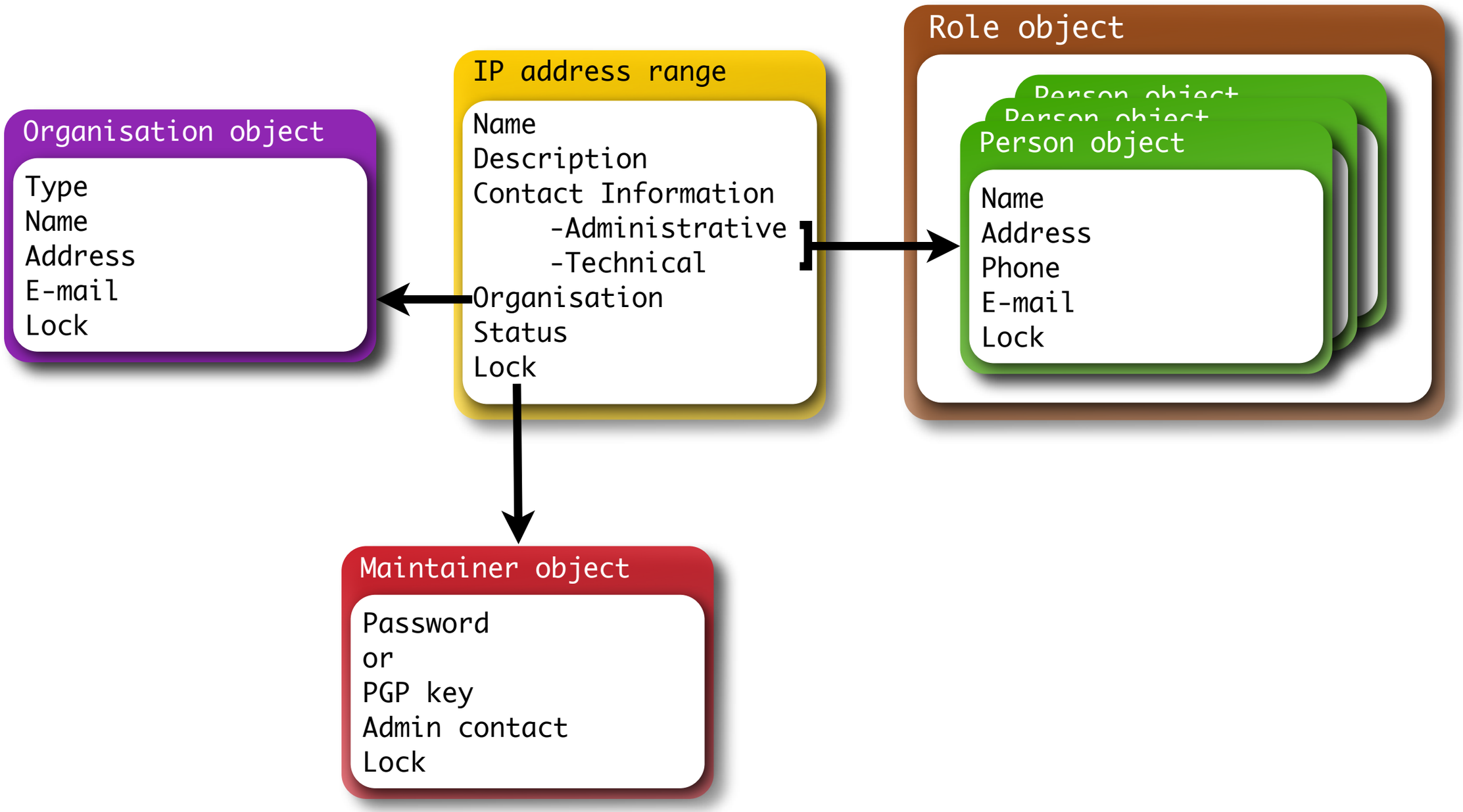
- Web interface
- Command line
- Full Text Search
- Restful API



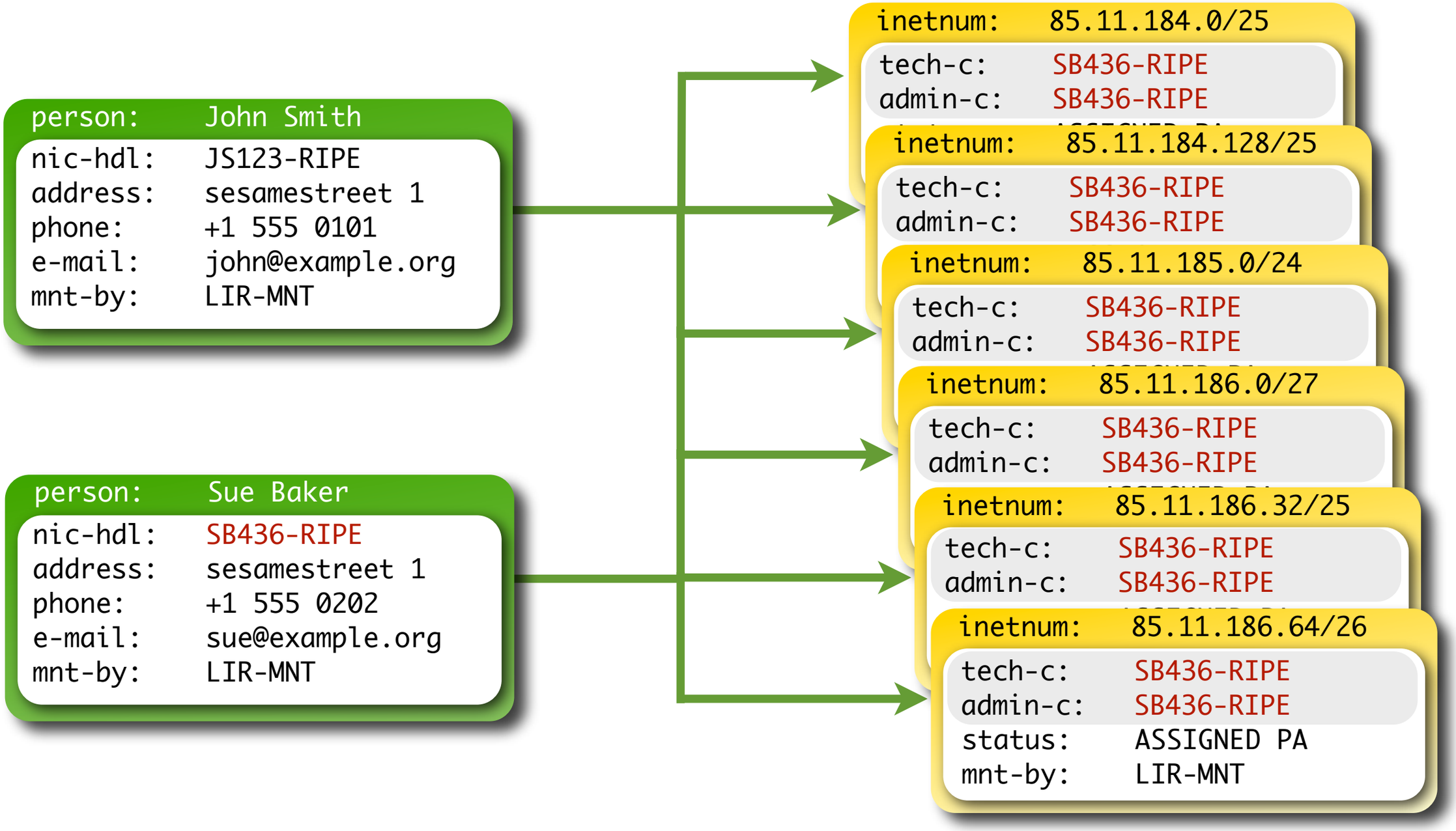
# RIPE Database Query Flags

- -i  inverse query
- -M all more specific
- -m first level more specific
- -L all less specific
- -l first level less specific
- **-r** disable recursive search for personal data
- -T restricts the type of object
- -t template

# Database Structure



# Not Using a Role Object



# Role Object

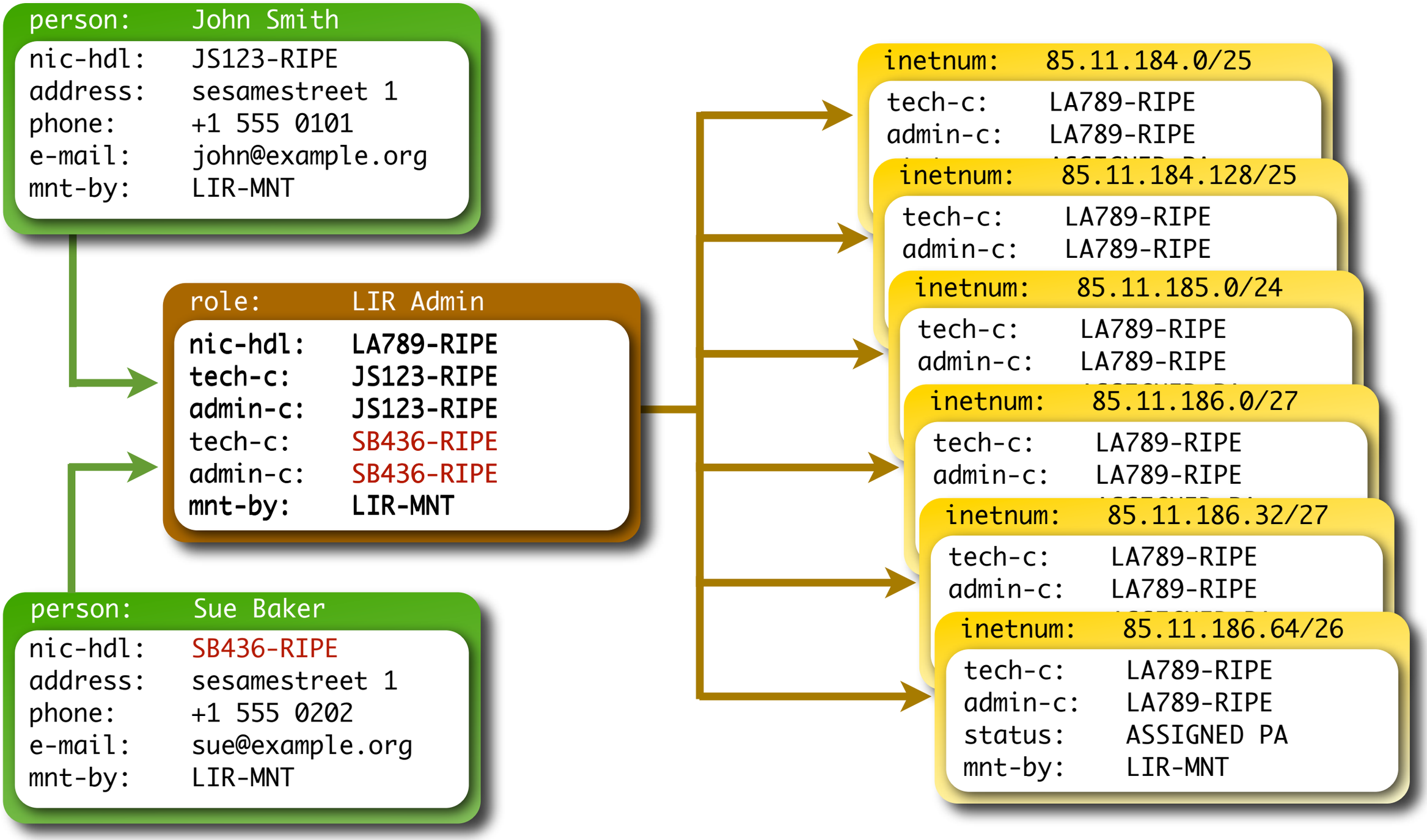
```
person:     Sue Baker
nic-hdl:    SB436-RIPE
address:    sesamestreet 1
phone:      +1 555 0202
e-mail:     sue@example.org
mnt-by:     LIR-MNT
```

```
person:     John Smith
nic-hdl:    JS123-RIPE
address:    sesamestreet 1
phone:      +1 555 0101
e-mail:     john@example.org
mnt-by:     LIR-MNT
```

```
person:     Steven Miller
nic-hdl:    SM984-RIPE
address:    sesamestreet 1
phone:      +1 555 0303
e-mail:     steve@example.org
mnt-by:     LIR-MNT
```

```
role:       LIR Admin
nic-hdl:    LA789-RIPE
admin-c:    SB436-RIPE
admin-c:    JS123-RIPE
tech-c:     SM984-RIPE
tech-c:     JS123-RIPE
mnt-by:     LIR-MNT
```

# Using a Role Object



# Registering Assignments

- All assignments must be registered
- In IPv4 business as usual
  - Create inetnum object with status “ASSIGNED PA”
  - For every IPv4 address in use
- In IPv6 two options
  - Create inet6num object with status “ASSIGNED”
  - Use “AGGREGATED-BY-LIR” status
    - Group a number of assignments

# Individual Assignments

**2001:888::/30**

```
netname:  NL-XS4ALL-20020807
org:      ORG-XIB1-RIPE
descr:    XS4ALL Internet BV
country:  NL
admin-c:  XS42-RIPE
tech-c:   XS42-RIPE
status:   ALLOCATED-BY-RIR
mnt-by:   RIPE-NCC-HM-MNT
mnt-lower:XS4ALL-MNT
```

/30

**2001:888:3001::/48**

```
netname:    CUSTOMER-1
descr:      One of my IPv6 customers
remarks:    And I have more
country:    NL
admin-c:    XS42-RIPE
tech-c:     XS42-RIPE
status:     ASSIGNED
mnt-by:     XS4ALL-MNT
```

/48

# Status: AGGREGATED-BY-LIR

```
2001:888:3001::/36
netname:          CUSTOMERS
descr:            My DSL Customers
assingment-size: 48
country:          NL
admin-c:          XS42-RIPE
tech-c:           XS42-RIPE
status:           AGGREGATED-BY-LIR
mnt-by:           XS4ALL-MNT
```

Every customer gets a /48

```
2001:888:3001::/48
netname:    CUSTOMER-1
descr:      One of my IPv6 customers
remarks:    And I have more
country:    NL
admin-c:    XS42-RIPE
tech-c:     XS42-RIPE
status:     ASSIGNED
mnt-by:     XS4ALL-MNT
```

# Questions?

# Other RIPE NCC Services

RIPE NCC

# RIPE NCC Resource Quality Assistance

- Address distribution - no claims about routability
  - but assistance in case of filtering issues:

*http://www.ripe.net/lir-services/resource-management/ripe-ncc-resource-quality-assistance*

# RIPE **Labs**

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

labs.ripe.net

# RIPE **Atlas** - Active Measurements

- Next generation Internet measurement network
- Gives a big picture about Internet traffic
- Currently over 1500 active probes worldwide
- User Defined Measurements available for LIRs


atlas.ripe.net

# RIPE **Stat**

- One interface for Internet resource data
  - interactive graphical browsing through DB objects
  - combines RIPE NCC and external data
  - immutable, shareable URL for each result
  - developed together with community - you!
- Shows IPv4/IPv6 and ASN info
  - statistics (time, aggregation, zoom)
  - status (real time, aggregation, zoom)

stat.ripe.net

# Follow us!


## @TrainingRIPENCC

The End!

Край

Y Diwedd

Fí

Finis

النهاية

Соңы

Վերջ

Liðugt

Ende

Finvezh

Кінець

Konec

Kraj

Ënn

Fund

پایان

Son

Kpaj

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