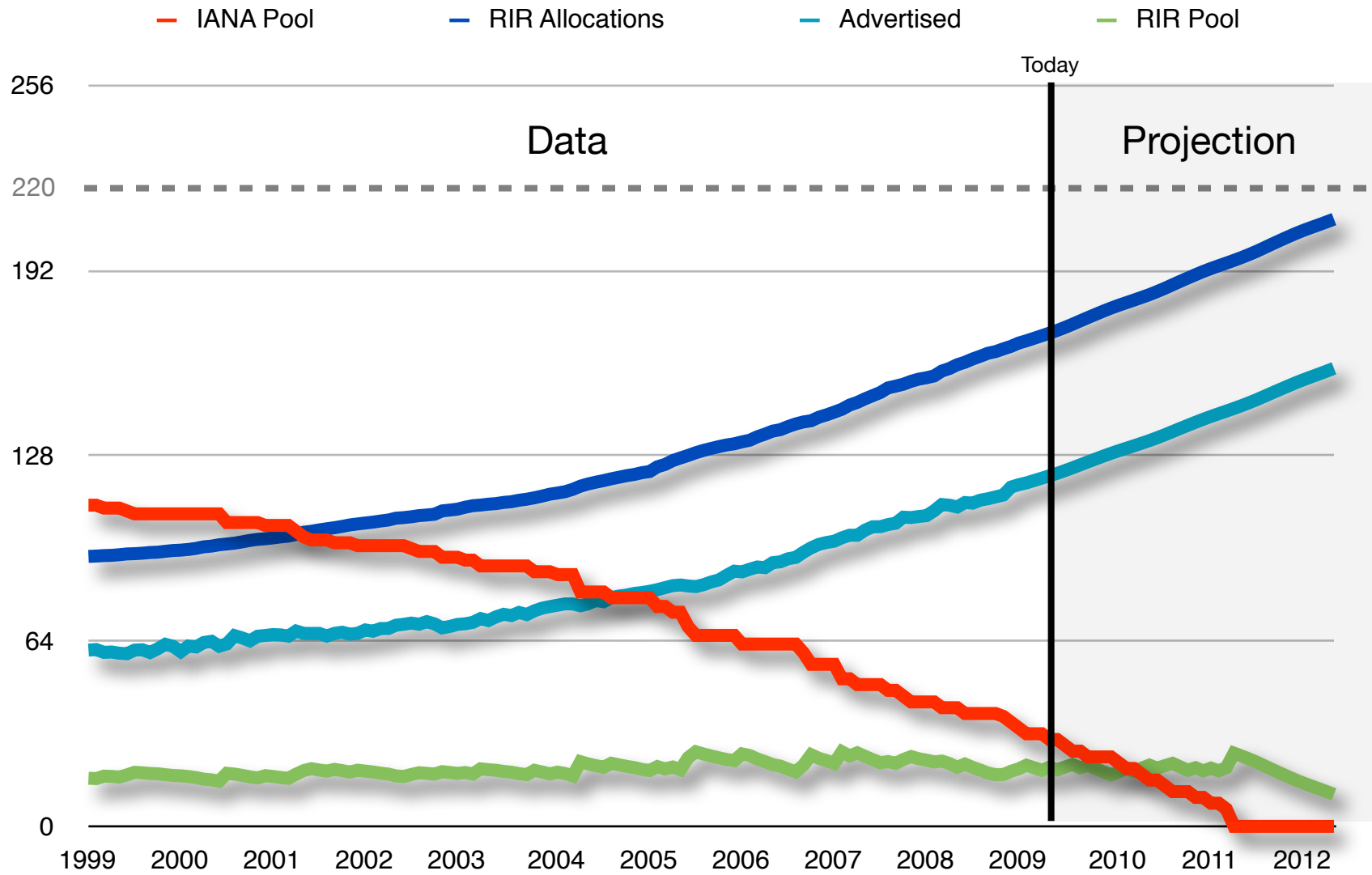# Migrating from IPv4 to IPv6

Arno Meulenkamp

RIPE NCC

IPv6 workshop

Vilnius 30-06-2009

IPv4 Pool - The Future

Stages of Grief

Denial

Anger

Bargaining

Depression

Acceptance

Internet Registries

RIPE NCC

Located in Amsterdam

Not for profit membership organisation

6064 active members (1 jan 2009)
695 new members in 2008

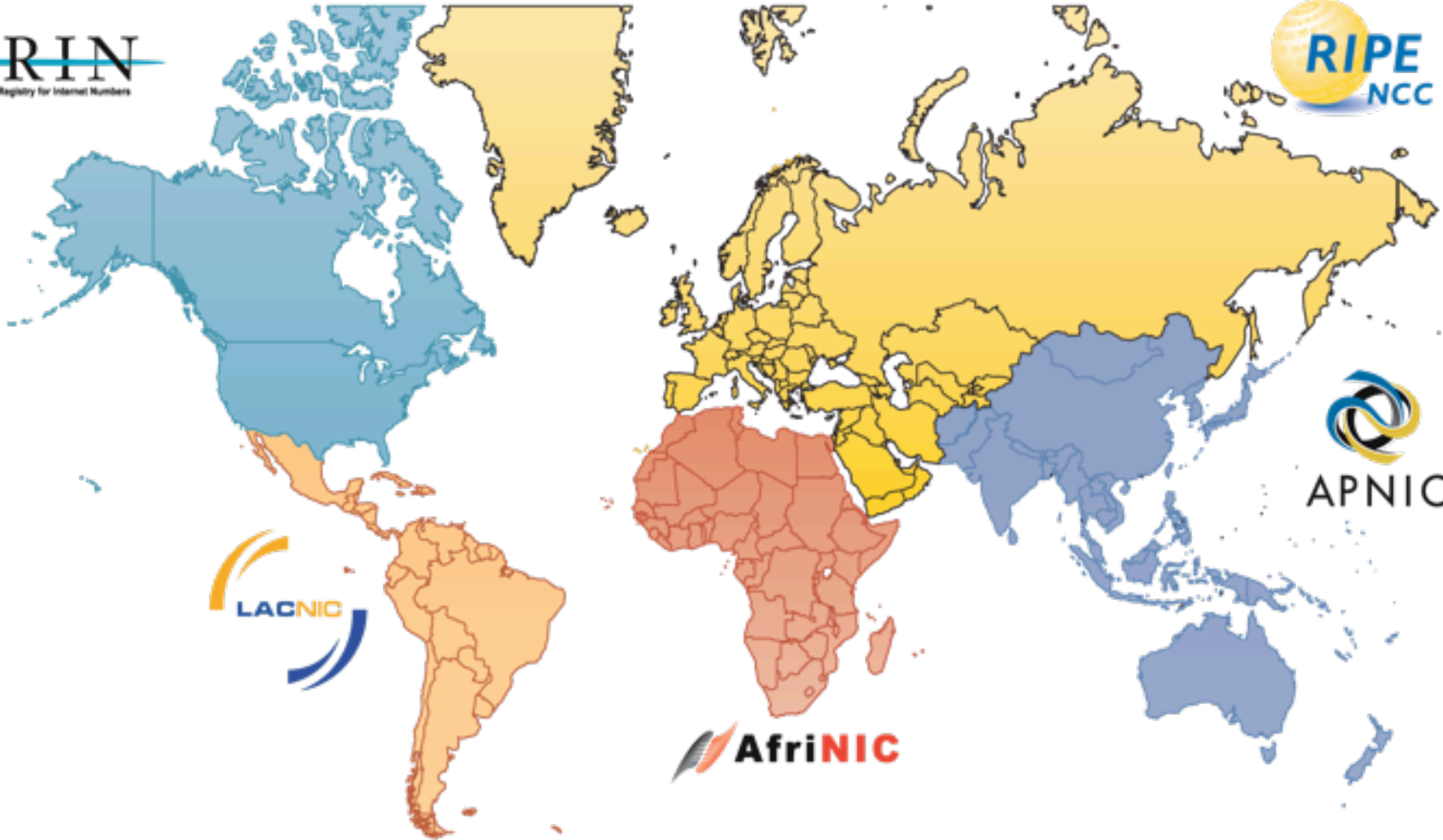Started by the RIPE community in 1992

One of five RIRs

The 5 RIRs

Registration

Aggregation

Conservation

How Policy Is Made

ICANN / IANA

ASO / NRO

Reach consensus across communities

AfriNIC community

RIPE community

ARIN community

APNIC community

LACNIC community

Global Policy Proposal
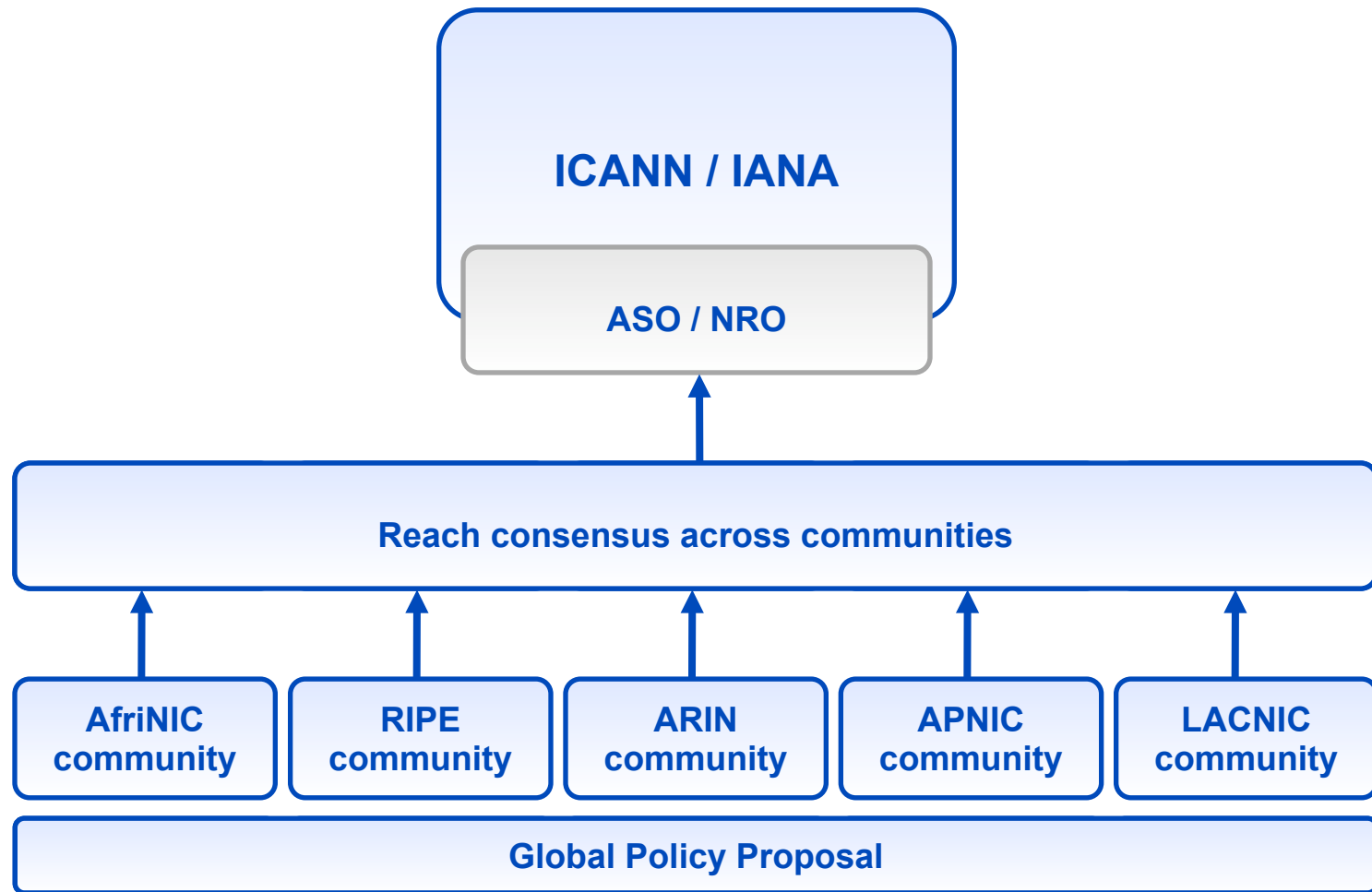
IP Address Distribution

Legend:
- Allocation
- PA Assignment
- PI Assignment

Hierarchy: /0, /12, /32, /48, /56, /48

IANA → RIR → LIR → End User
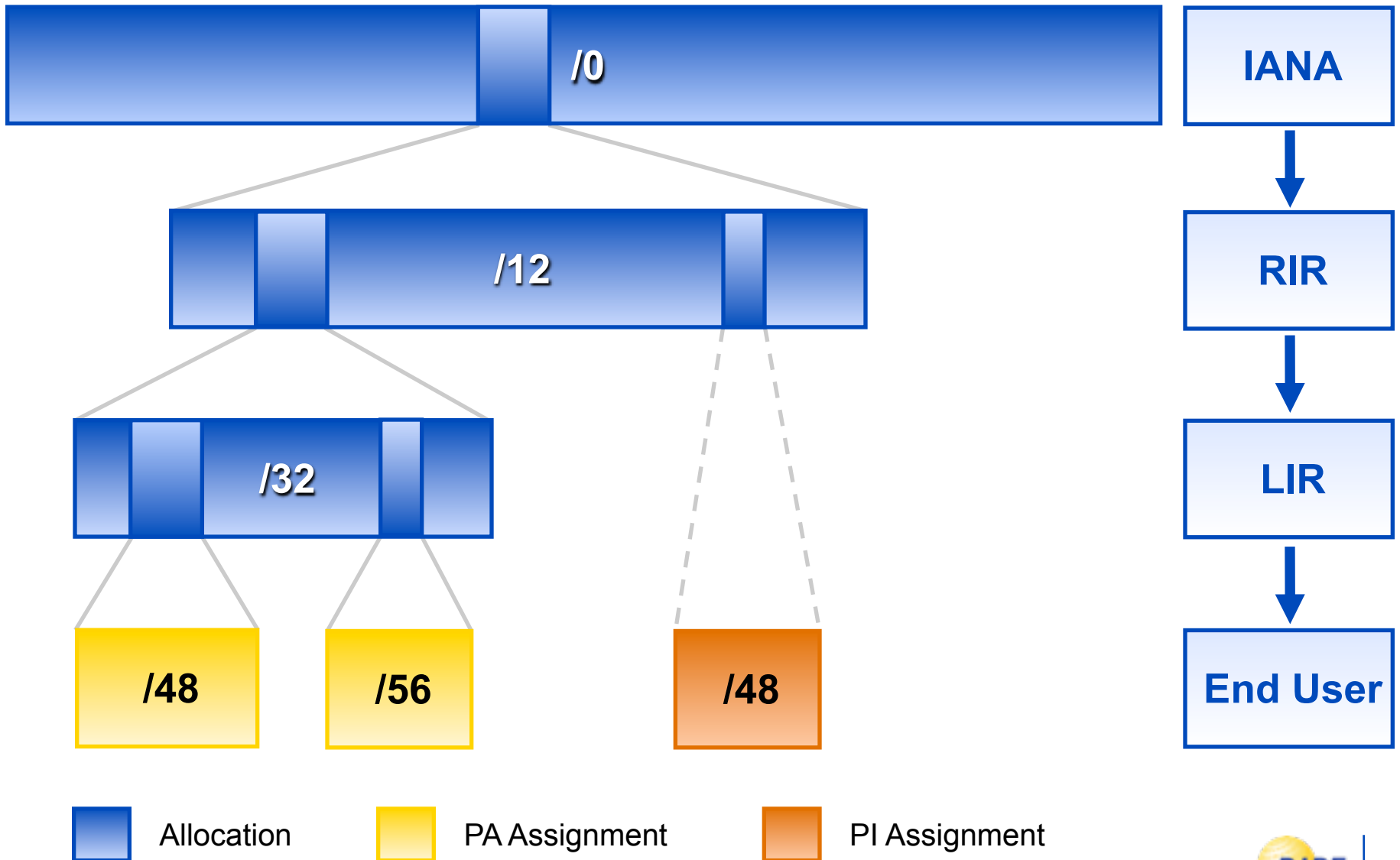
IPv4?

IPv4 Address Pool - 2005

25%
available

Central
Registry

APNIC

LACNIC

ARIN

AfriNIC

RIPE NCC
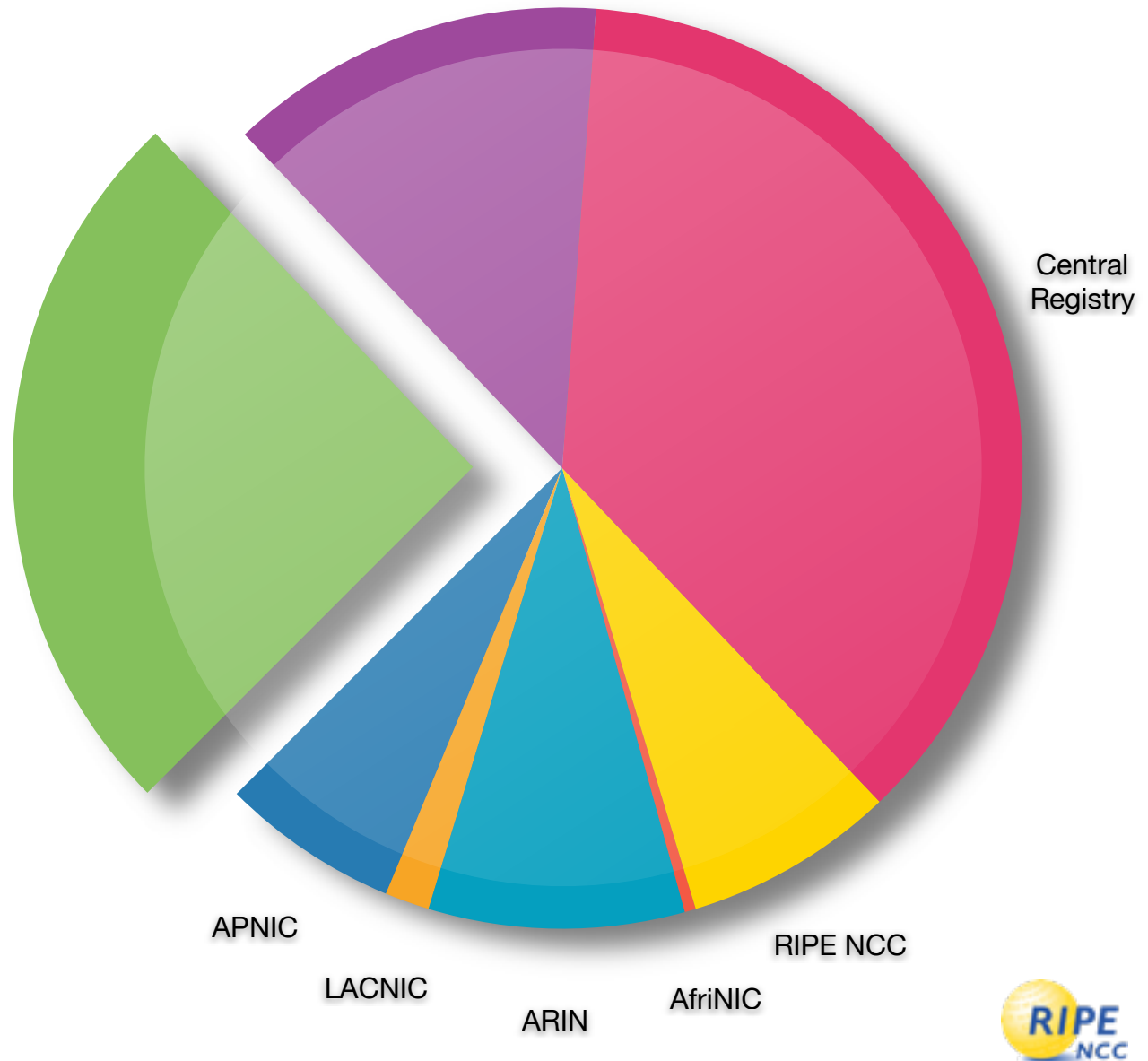
IPv4 Address Pool - Now

11%
available

Other

Central
Registry

RIPE NCC

AfriNIC

ARIN

LACNIC

APNIC
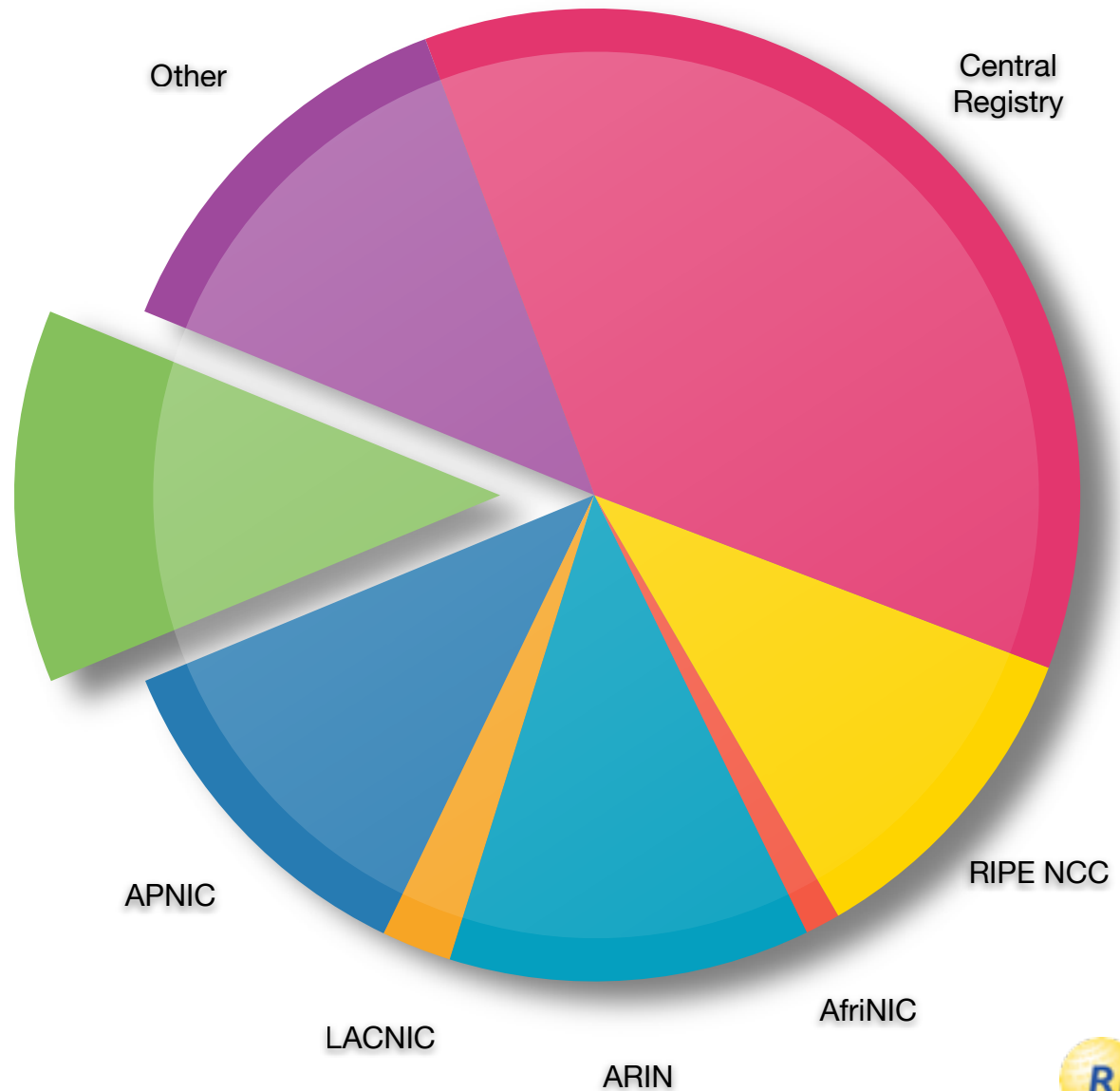
Network Address Translation = Bad

Internet

NAT Router with
public IP

NAT behind NAT = Worse

NAT Router with private IP

NAT Router with public IP

NAT Router with private IP
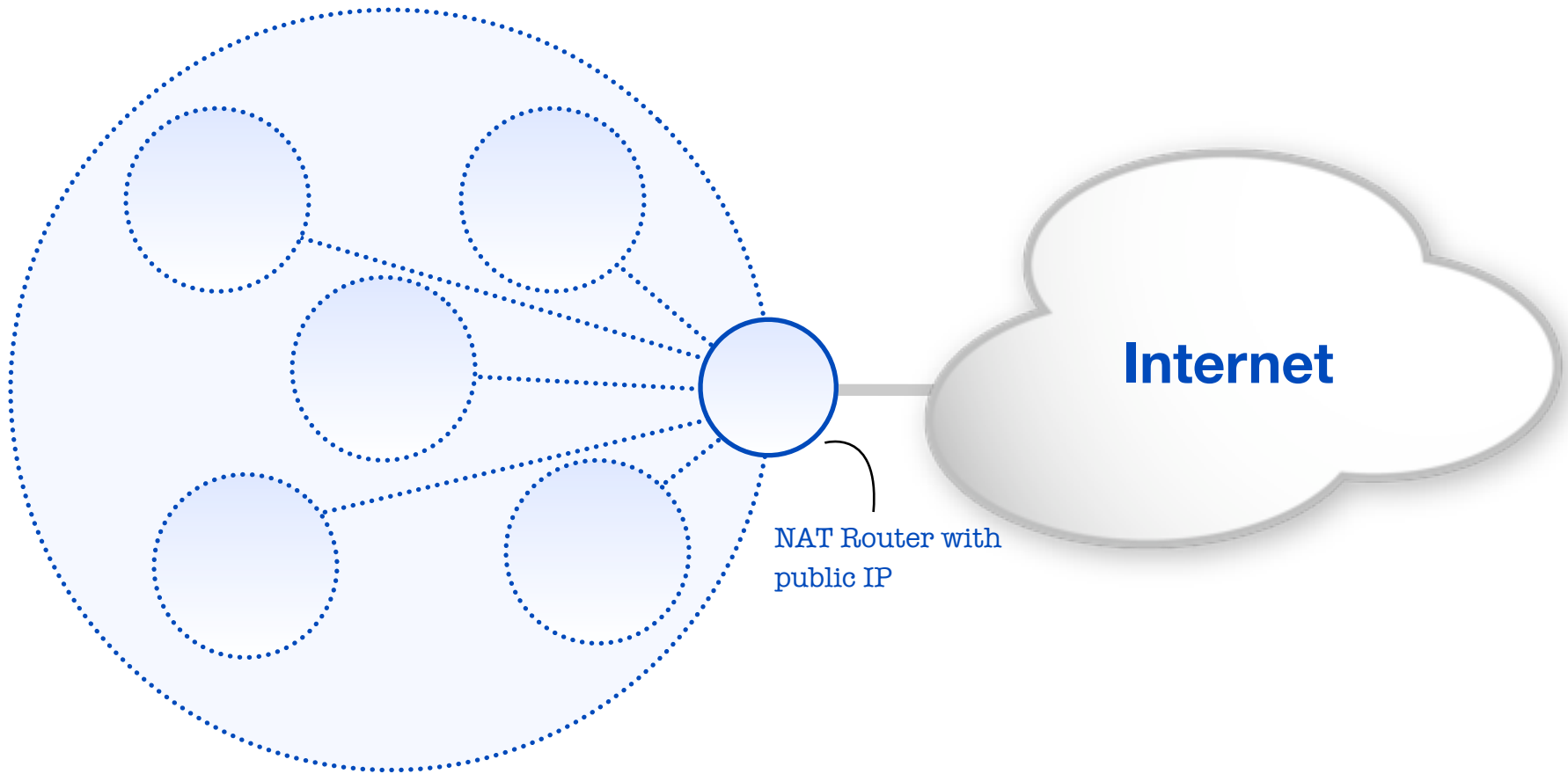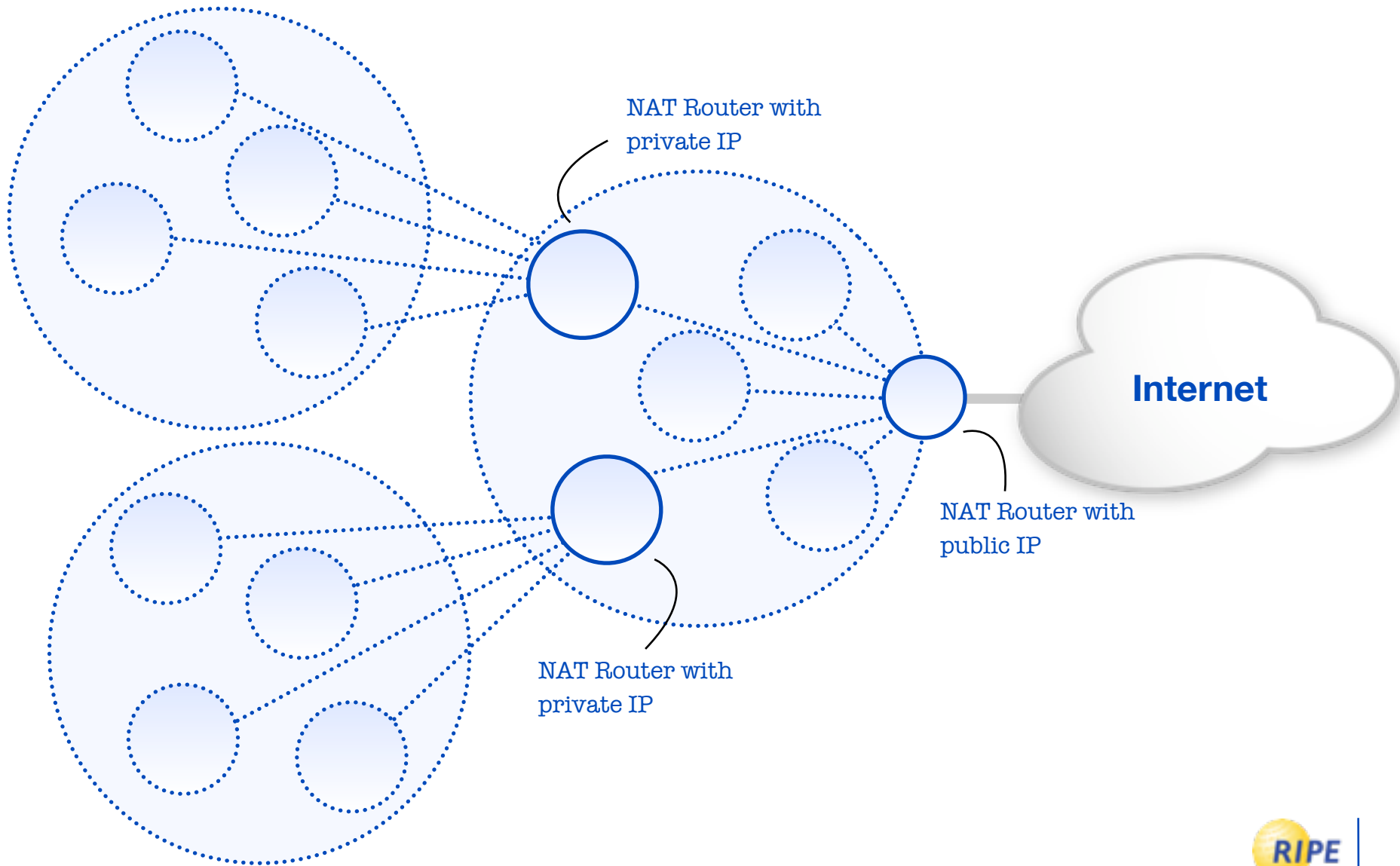
Internet

Reaching the next billion
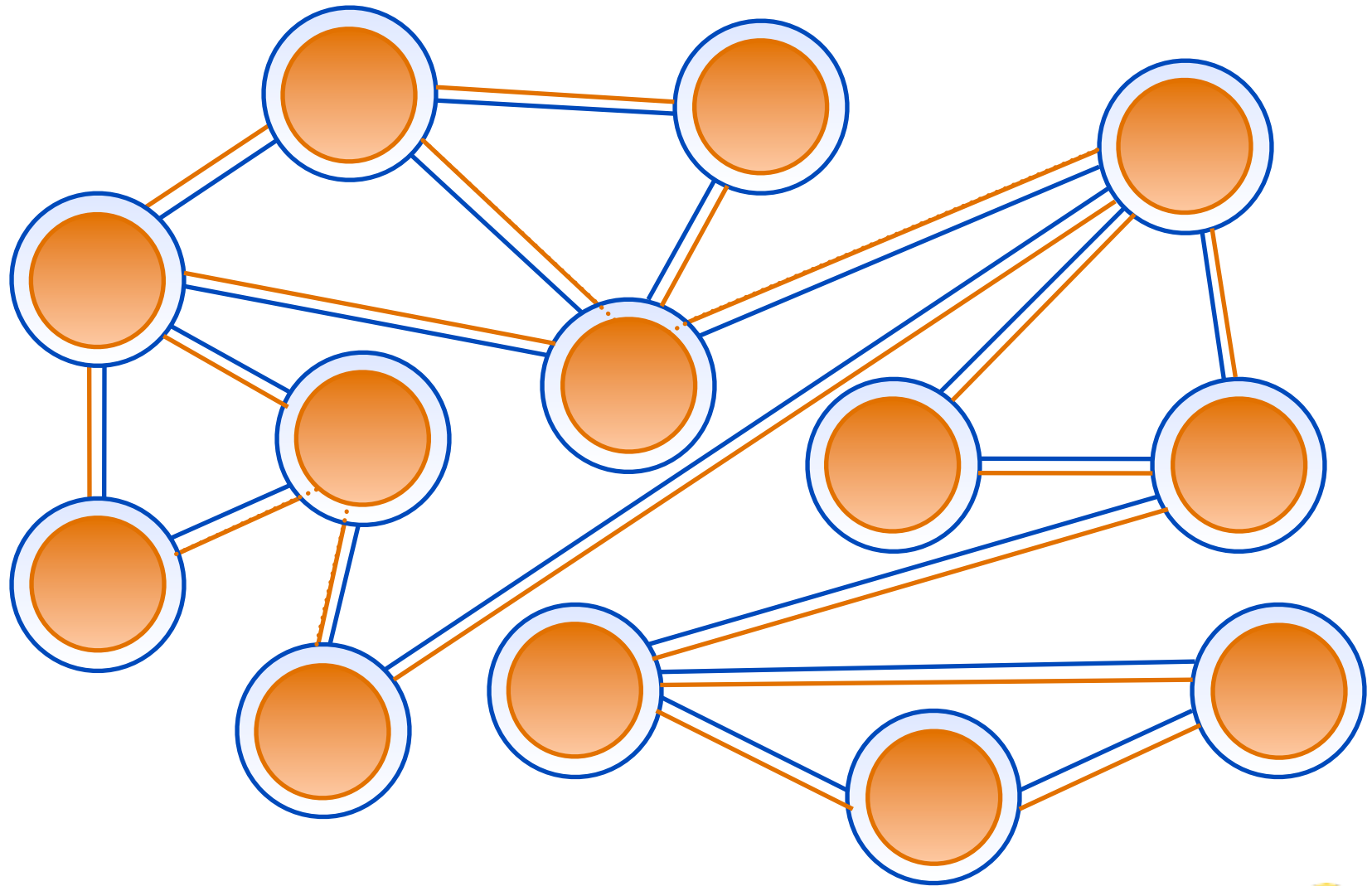
- Over 1 billion Internet users now
    - around 15% of all people
- Mobile phones are becoming Internet devices
- Wireless cameras
- The Internet of things
- and so on and so forth.....

- IPv4 is limited to 4 billion addresses
    - roughly 3,5 billion usable

IPv6 Transition

Getting it

IPv6 Basics

- IPv6 address: 128 bits
    - 32 bits in IPv4

- Every subnet should be a /64

- Customer assignments (sites) between:
    - /64 (1 subnet)
    - /48 (65536 subnets)

- Minimum allocation size /32
    - 65536 /48's

Getting an IPv6 allocation

To qualify, an organisation must:

- Be an LIR

- Advertise the allocation as a single prefix

- Have a plan for making assignments within two
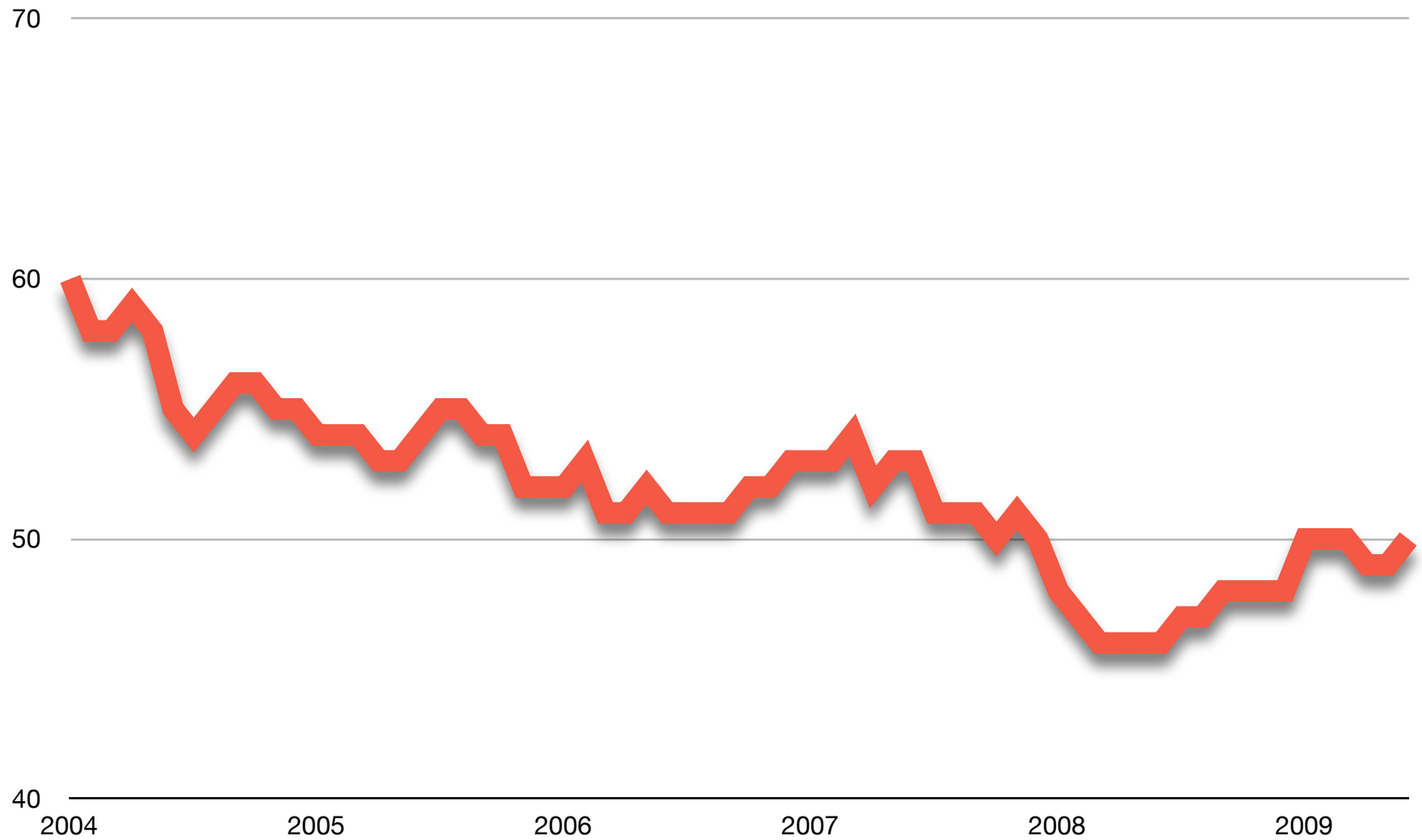 years

Minimum allocation size /32

Getting IPv6 PI address space

To qualify, an organisation must:

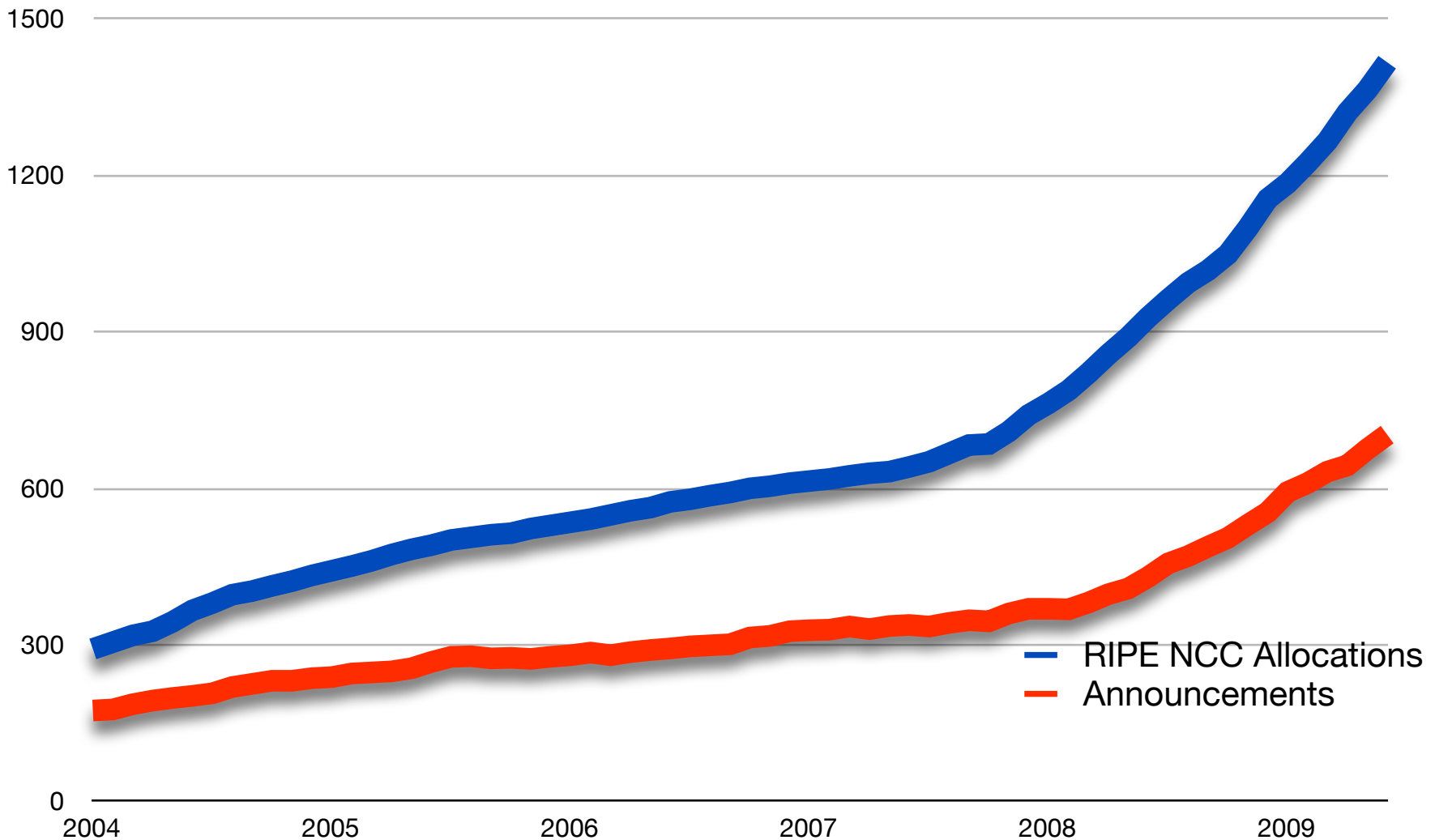- Not be an LIR

- Demonstrate it will multihome

- Meet the contractual requirements for provider independent resources
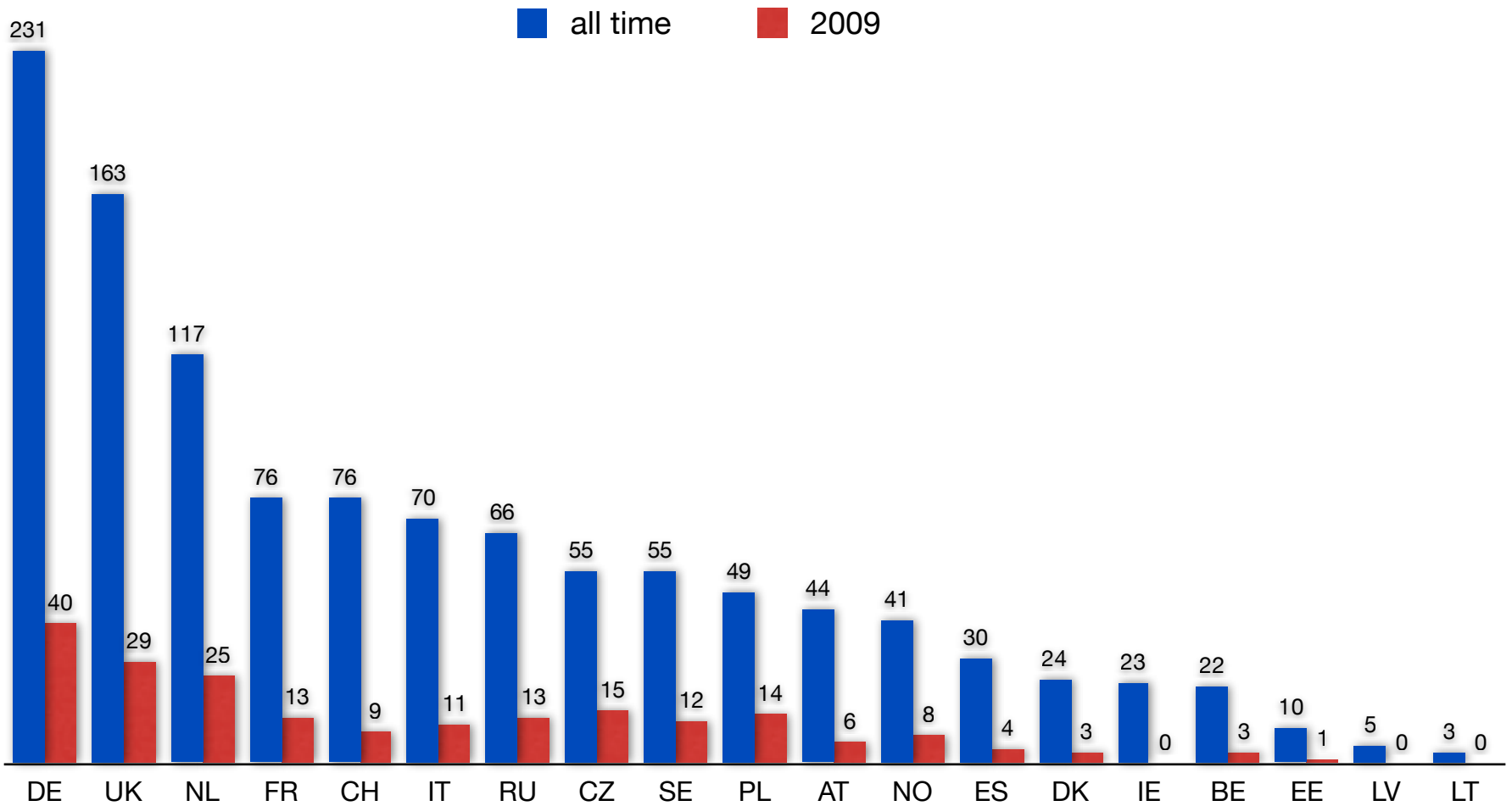
Minimum assignment size /48

Percentage of Routed IPv6 Allocations

IPv6 Allocations and Announcements

Legend:
- RIPE NCC Allocations
- Announcements

IPv6 Allocations per Country

Legend: ■ all time ■ 2009

Country	all time	2009
DE	231	40
UK	163	29
NL	117	25
FR	76	13
CH	76	9
IT	70	11
RU	66	13
CZ	55	15
SE	55	12
PL	49	14
AT	44	6
NO	41	8
ES	30	4
DK	24	3
IE	23	0
BE	22	3
EE	10	1
LV	5	0
LT	3	0

Doing it

Change your face first

- Web
- Authoritative DNS
- Mail servers

- Outsiders see these services
- Multiple mature implementations exist

Don't

- Seperate IPv6 features from IPv4

- Do everything in one go

- Appoint an IPv6 specialist
  - do you have an IPv4 specialist?

- See IPv6 as a product

RIPE NCC

Do

- Phased approach

- Change requirements for new hardware

- Work outside-in, then inside-out

- Feature parity

- Dual stack

More information:

www.ripe.net
www.ipv6actnow.org

arno@ripe.net