

A large, smooth, brown egg is positioned on the left side of the frame. To its right, a small, green, translucent plastic dinosaur toy stands on a dark, reflective surface. The background is solid black. The egg and dinosaur are both reflected on the surface below them.

IPv6::Staying connected

Vesna Manojlovic, RIPE NCC (BECHA @ ripe.net)

Sensor Fest, Ignite Amsterdam, 24 November 2010

Sensor networks & IPv6

- (some) Sensor networks connect to the Internet
- Can **your** applications, SW & HW support IPv6?
- IPv6 features for sensor networks
 - huge address space
 - auto-configuration, mobility, end-to-end reachability
- Literature:
 - <http://ipv6.com/articles/sensors/IPv6-Sensor-Networks.htm>
 - <http://www.viagenie.ca/publications/2006-05-31-sensornetworks-ipv6primer.pdf>
 - http://www.usipv6.com/CES_Presentations/CES_Itaru_Mimura.pdf

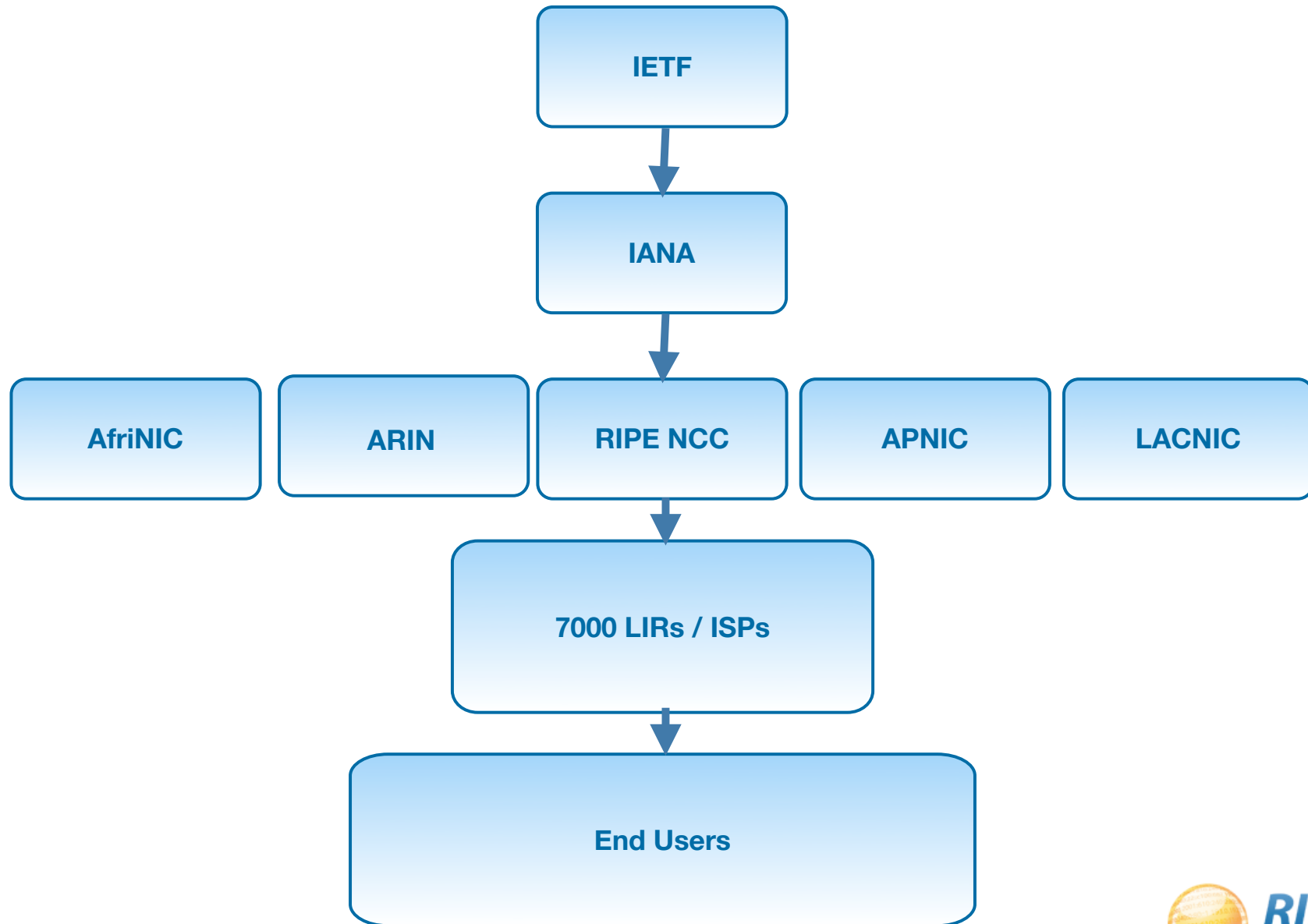
IPv4: 32 bits

IPv6:: 128 bits

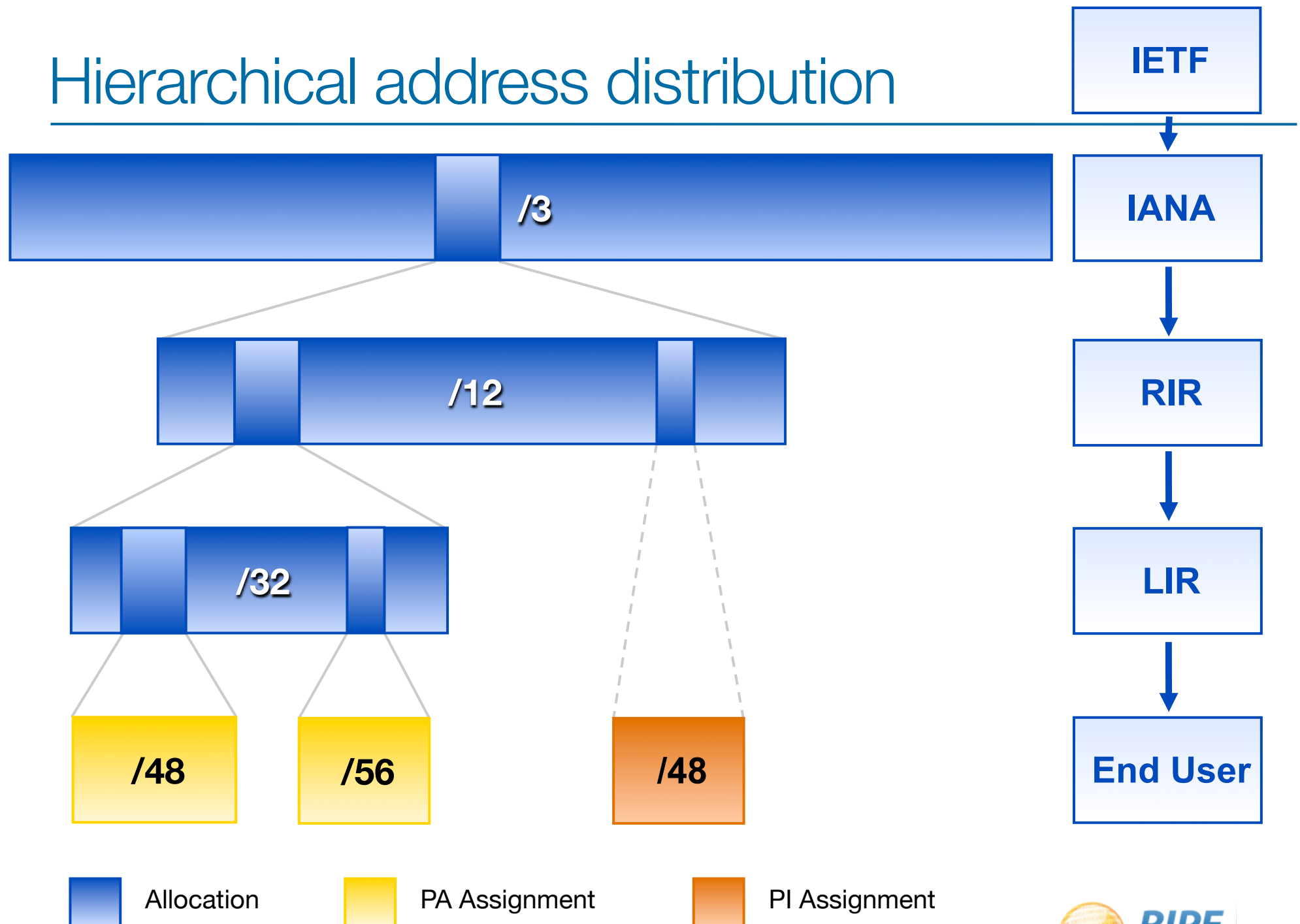
4% left

99.99% left

Where are all IP addresses coming from?

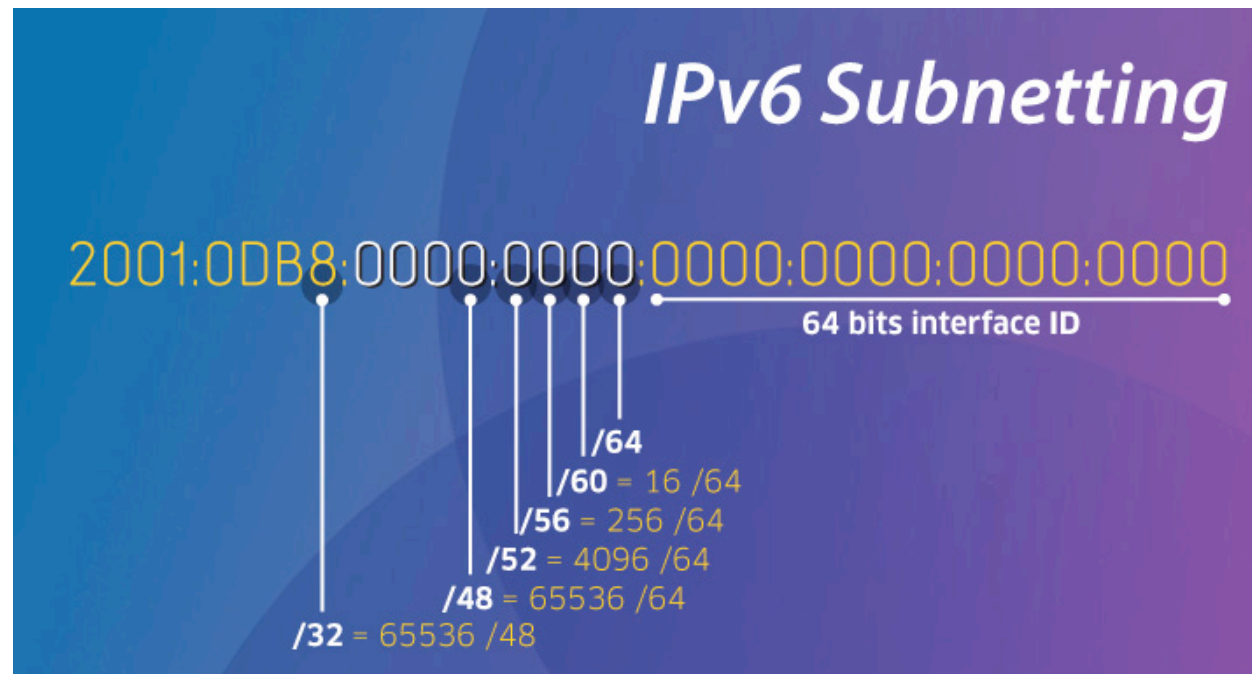


Hierarchical address distribution



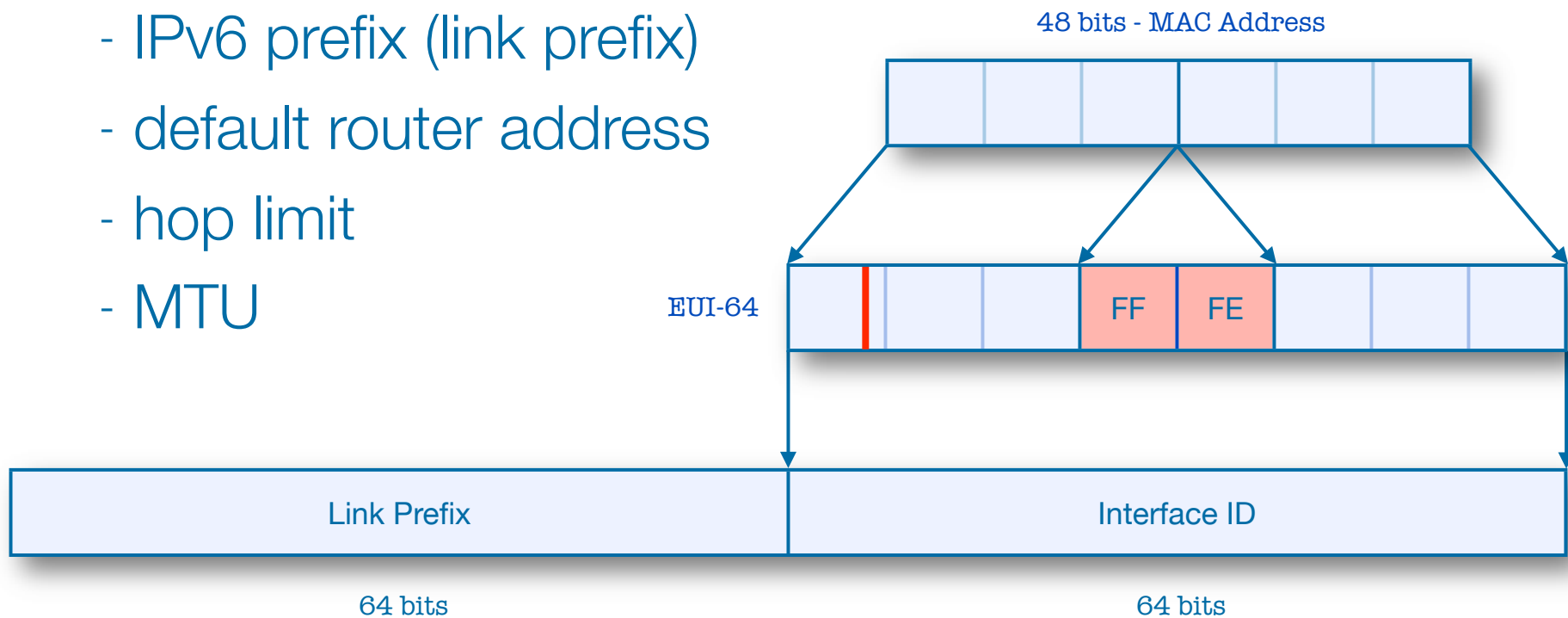
Feature: multiple addresses per interface

Addresses	Range	Scope
Loopback	::1	machine
Link Local	fe80::/10	link layer
Unique Local	fc00::/7	site
Global Unicast	2000::/3	global
6to4	2002::/16	global
Multicast	ff00::/8	variable



Feature: stateless autoconfiguration

- Neighbor Discovery ICMPv6 messages
 - Router / Neighbor advertisement & solicitation
- Host asks for network information:
 - IPv6 prefix (link prefix)
 - default router address
 - hop limit
 - MTU



Global level of IPv6 deployment

**Global
routing
table
prefixes**

IPv4

350,000

IPv6

3,700

v6/v4

1%

ASNs

36,070

2,730

7.5%

**RIPE NCC
LIRs**

7,187

2,284

32%

IPv6 Ripeness - rating of ISPs (LIRs)

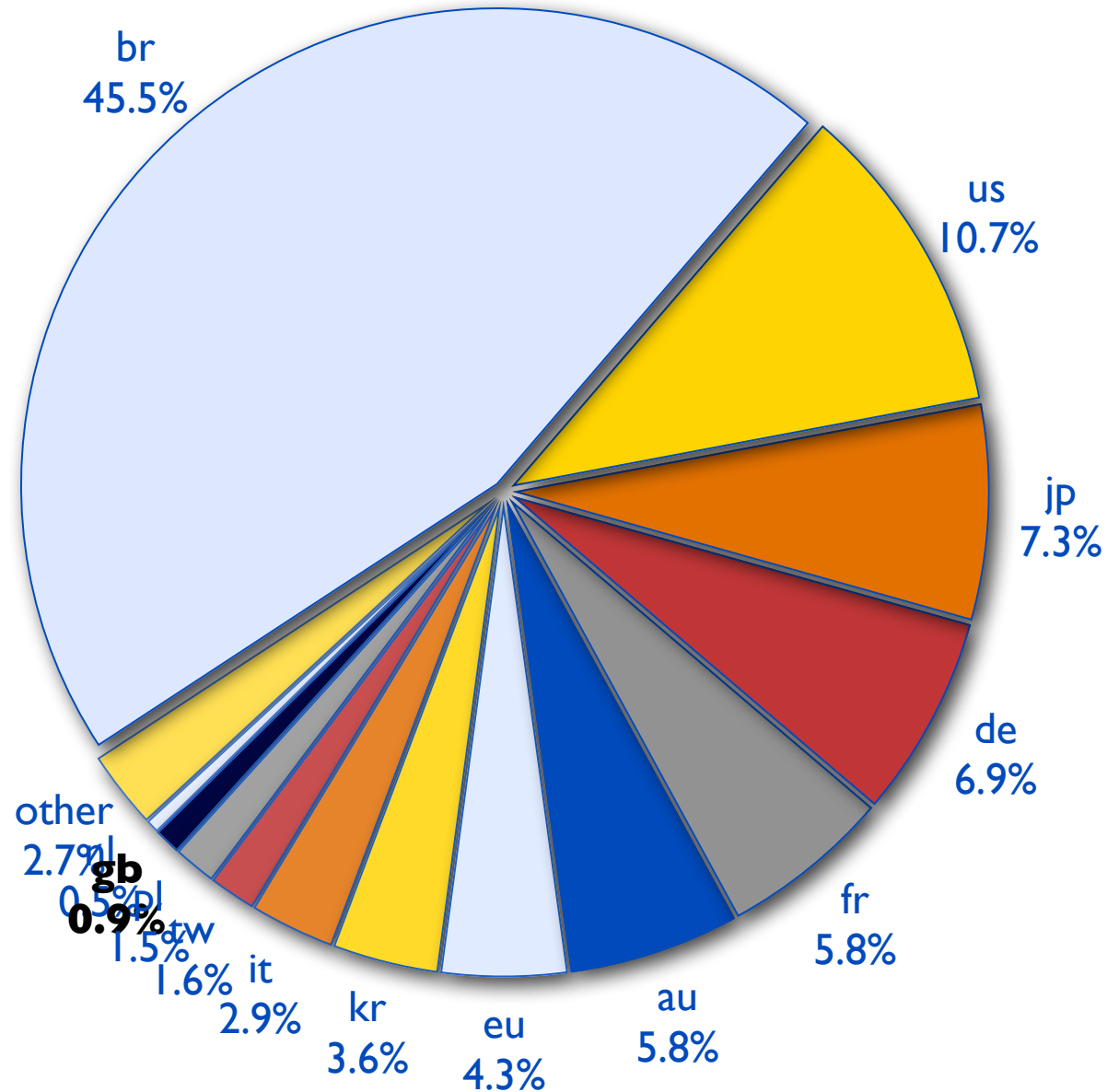
- ★ Address space
- ★ Routing security
(route6 object in
RIPE Database)
- ★ Reverse DNS
- ★ Routed on Internet
(visible in RIS)

Overall ripeness: 32% has at least 1*; 10% has 4*

<http://ipv6ripeness.ripe.net>

World top 12: allocated IPv6 space

<http://bgp.potaroo.net/iso3166/v6cc.html>



Next 20 years: Protocol Translation



ISPs: make it Dual Stack



IPv4 is running out

- Right now, you can get IPv4 space you need, for up to:
 - ... 9 months (July 2010)
 - ... 6 months (January 2011)
 - ... 3 months (July 2011)
- From the last /8, RIPE NCC will give LIRs only one last /22 block (2000 addresses) only if they already have IPv6!

5 years from now... on the IPv4 Internet

... “private” IPv4 addresses
will be the only ones
available for new
connections!

PRIVATE
PROPERTY
NO

which leads to more...

Network Address Translation...

... breaks End to End communication principle.

E2E enables innovation on the Internet



- UK Centre for the Protection of National Infrastructure working on a security assessment of the IPv6 protocol suite
- <http://www.lacnic.net/documentos/presentaciones/lacnicxiv/ipv6-security-assessment.pdf>

Re-write your applications to include IPv6

- Application Aspects of IPv6 Transition: <http://tools.ietf.org/html/rfc4038>
- Porting applications to IPv6 HowTo:
 - <http://gsyc.escet.urjc.es/~eva/IPv6-web/ipv6.html>
 - http://www.euchinagrid.org/IPv6/IPv6_presentation/Introduction_to_IPv6_programming.pdf
- Ecdysis: open-source implementation of a NAT64 gateway:
 - <http://ecdysis.viagenie.ca/>
- Information for Applications Developers:
 - <http://icons.apnic.net/display/IPv6/Information+for+Application+Developers>
- A Recommendation for IPv6 Address Text Representation
 - <http://tools.ietf.org/html/draft-ietf-6man-text-addr-representation-03>
- IETF WGs: Behave: Standardising NATs and protocol translators
 - <https://www.ietf.org/dyn/wg/charter/behave-charter.html>
- Transmission of IPv6 Packets over IEEE 802.15.4 Networks
 - <http://tools.ietf.org/html/rfc4944>

Ask your providers about IPv6

- Ask your ISP if they can give you IPv6
- Ask your equipment vendor for IPv6 features
- Ask your political representative what will they do about the transition to the IPv6 Internet

Take part!

- IETF
- RIPE
 - [IPv6 Working Group: mailing list](#)
- Learn:
 - [IPv6ActNow.org](#)
 - [GetIPv6.info](#)
 - [ripe.net/training](#)
 - [twitter](#) @TrainingRIPENCC



IPv6

