IPv6

The New Internet and What it Means to You

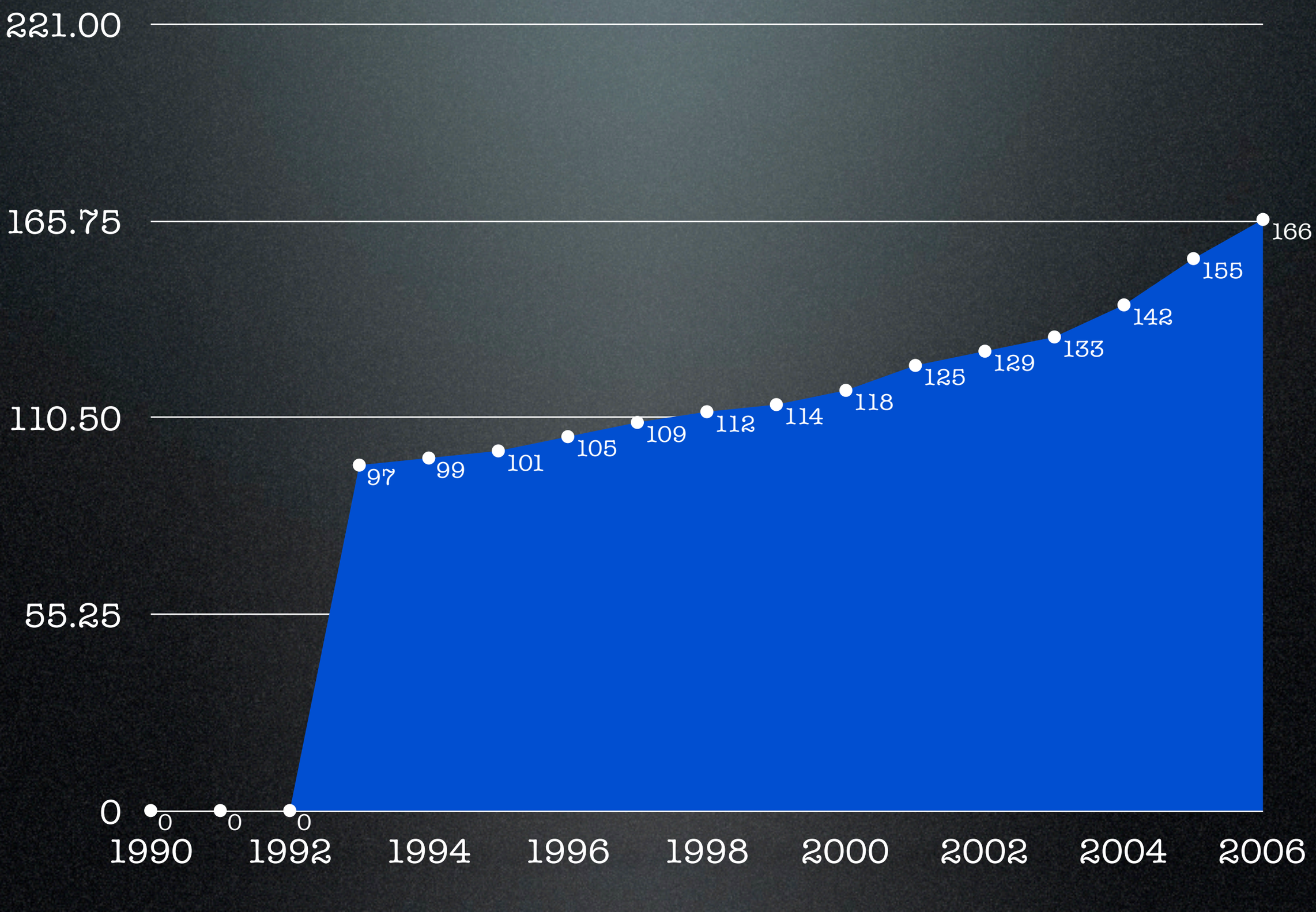
IP in Action
Hoofddorp, Thursday, September 13, 2007
Iljitsch van Beijnum

The Problem

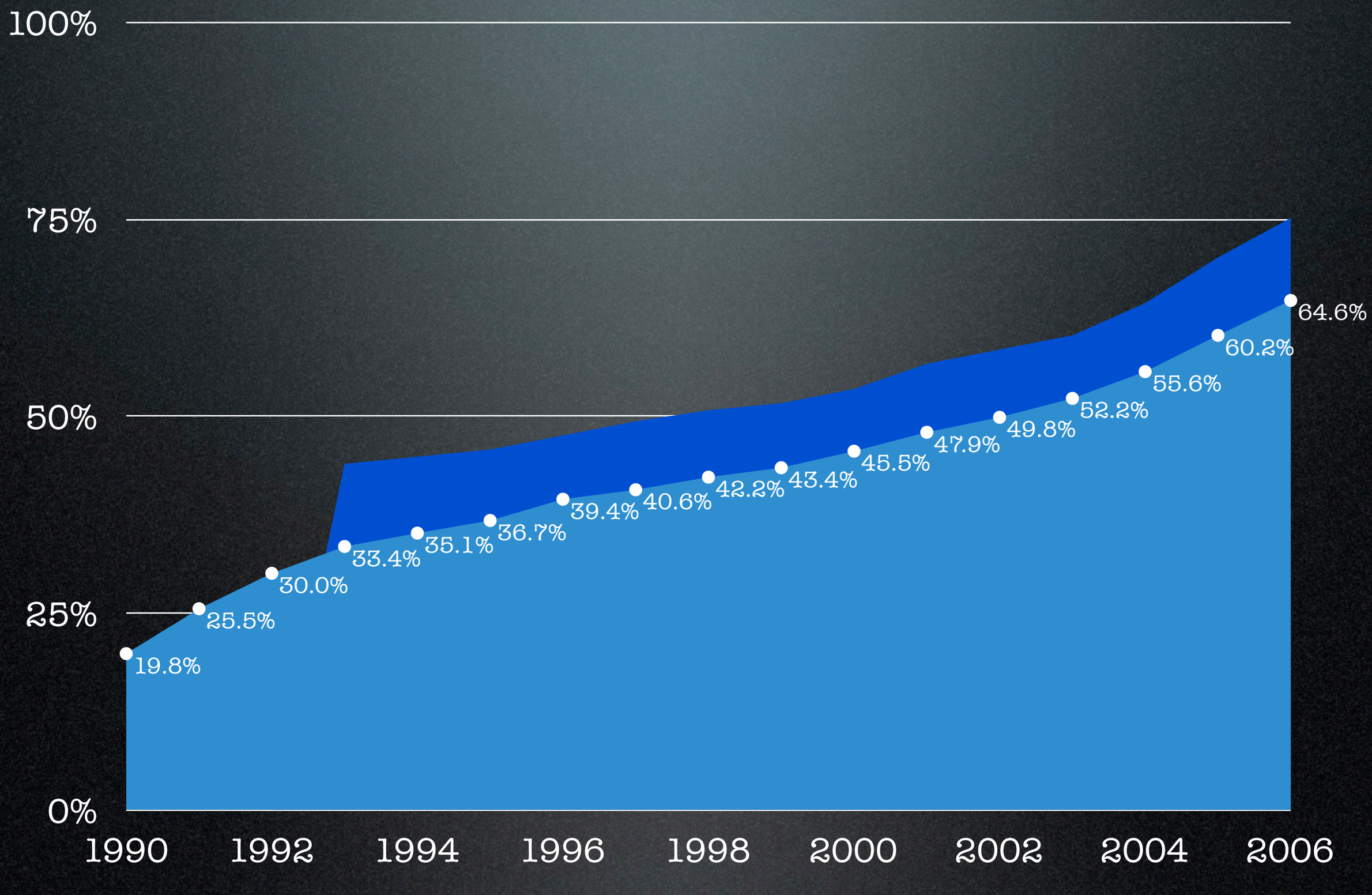
- IP address:
  - every computer (VoIP/smart phone, network printer, etc) needs one
  - 3.7 billion possible addresses
    - not really possible to use them all
  - 2542 million used, 1166 million still free
  - Will be flat out in 3 - 6 years

Really?

"IANA global pool"



Given to ISPs



The Solution

- Make addresses bigger!
- Old:
  - 32 bits
    - 3.7 billion
- New:
  - 128 bits
    - 340282366920 billion billion billon

But...

- There's always a but...
- Only room for 32 bits in the packets!
- So make a new packet type
  - old type has "4" in it: IPv4
  - new type "6" in it: IPv6

The Difference

IPv4

https://noc.sixxs.net/main/

SixXS

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SixXS - IPv6 Deployment & Tunnel Broker

SixXS (*Six Access*) is a free, non-profit, non-cost service for Local Internet Registries (LIR's). The main target is to create a common portal to help company engineers find their way with IPv6 networks deploying IPv6 to their customers in a rapid and controllable fashion. To reach these targets we are providing a whitelabel IPv6 Tunnel Broker and Ghost Route Hunter, an IPv6 route monitoring tool and various other services to help out where needed.

This service accommodates an enhanced version of the IPng IPv6 tunnel broker to assist LIR's in having a rapid IPv6 deployment in their organisation by providing a whitelabeled IPv6 Tunnel Broker, giving IPv6 access to their clients without the burden of developing their own software allowing full and easy integration into their existing systems.

SixXS offers the RIPE, ARIN, APNIC, LacNIC and AfriNIC communities pre-production deployment expertise based on the experience gathered while running the IPng IPv6 tunnel broker since 1999 combined with it's successor, SixXS, totaling in more than 5 years of massive experience.

Most of the PoP's are publicly available and provide free IPv6 connectivity to endusers allowing them to enjoy quality IPv6 connectivity. SixXS also aims to keep the IPv6 routing system stable and clean making sure that users experience a quality IPv6 internet. To assure this we provide Latency monitoring and the so called Ghost Route Hunter (GRH) service which determines the anomalies in the IPv6 routing tables. Full public statistics for this project are available from the Misc page.

Contact information
Points of Presence
AICCU
10 Easy St...
Signup for new users
Login for existing users
Ghost Route Hunter
Frequently Asked Questions
SixXS for ISP's
SixXS for endusers
SixXS Archive

Not logged in.
SSL IPv4 connection from 82.192.90.27

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Last revision: Fri 24 Mar 2006 16:58:42 CET

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Signup for new users
Frequently Asked Questions

Not logged in.
SSL IPv6 connection from 2001:1af8:6:0:20a:95ff:fef5:246e

...yment & Tunnel Broker
...Mar 2006 16:58:42 CET

What Now?

- Add IPv6 address/packet format to:
  - Windows, MacOS, UNIX, LINUX
  - routers, firewalls, load balancers
  - DNS
  - applications: web, mail, audio/video, VoIP, etc, etc

Progress

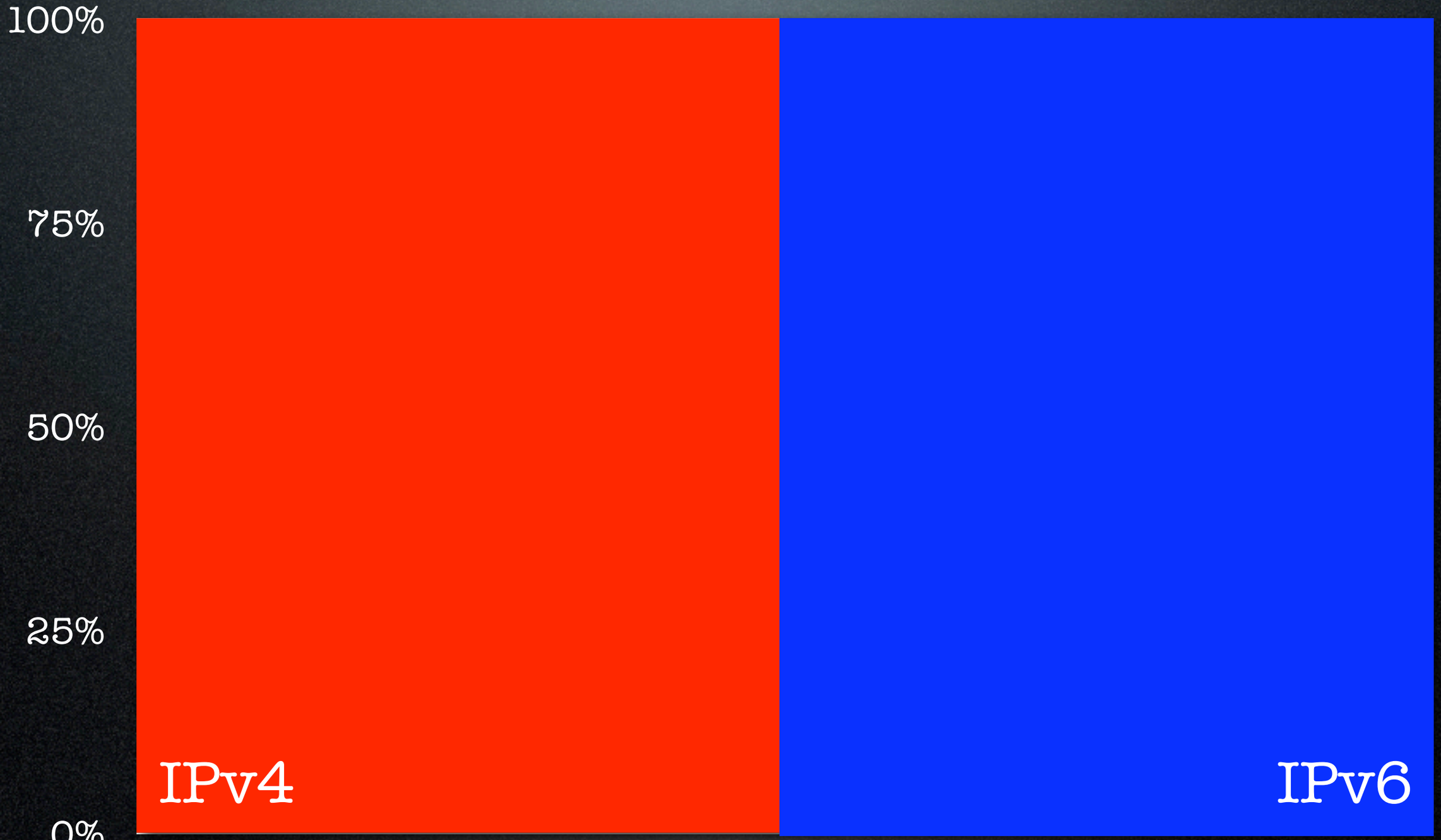
- In good shape:
  - Operating systems, big routers, DNS
- More work to do:
  - applications, firewalls, management
- Lagging:
  - home routers, load balancers

Deploy IPv6—When?

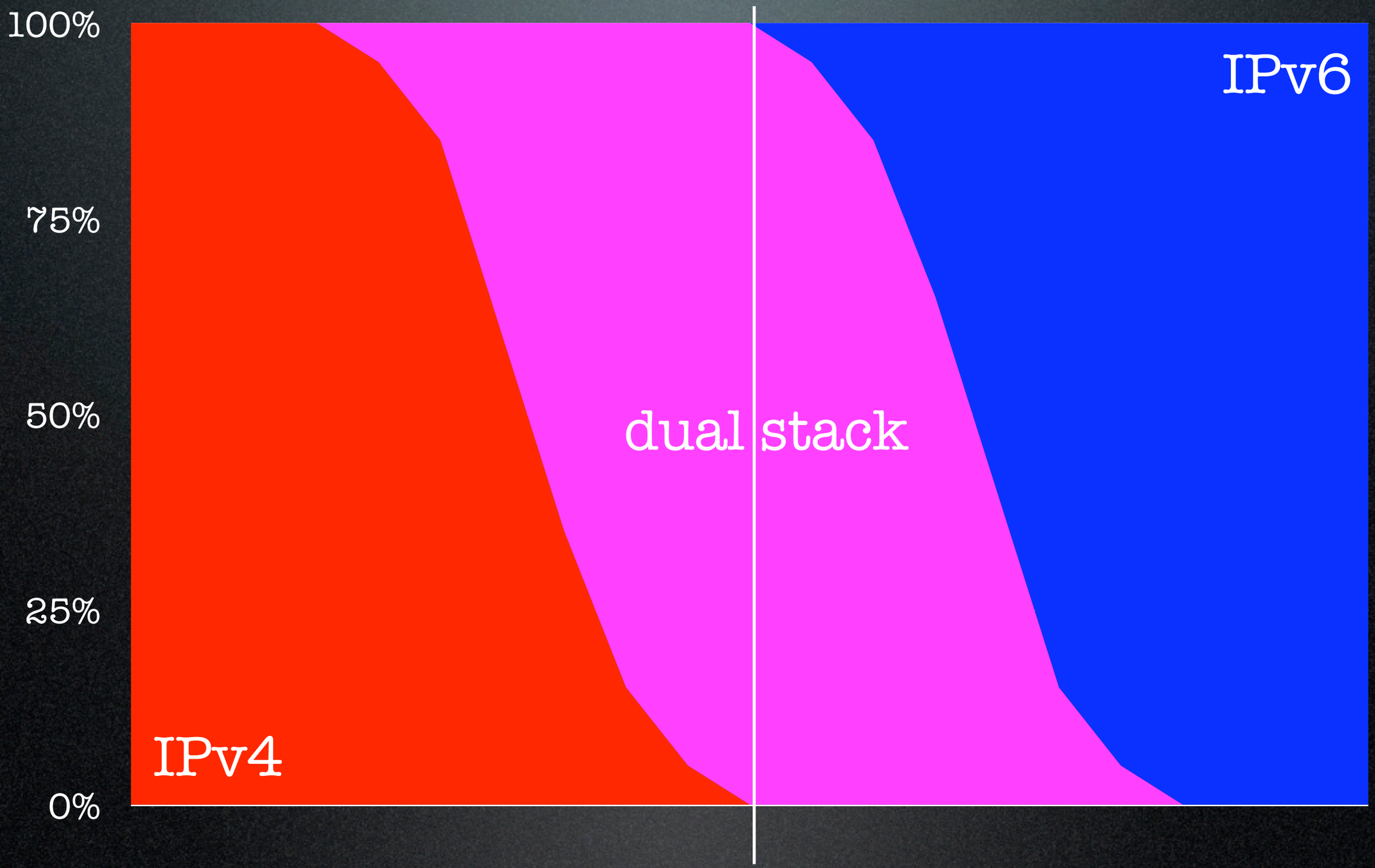
- Now!
- Not now?
- Does your business require a steady supply of fresh IP addresses?
  - then you'll need to be ready to run IPv6 within 3 years
- "I have enough addresses, thank you"
  - can afford to wait a bit longer

How?

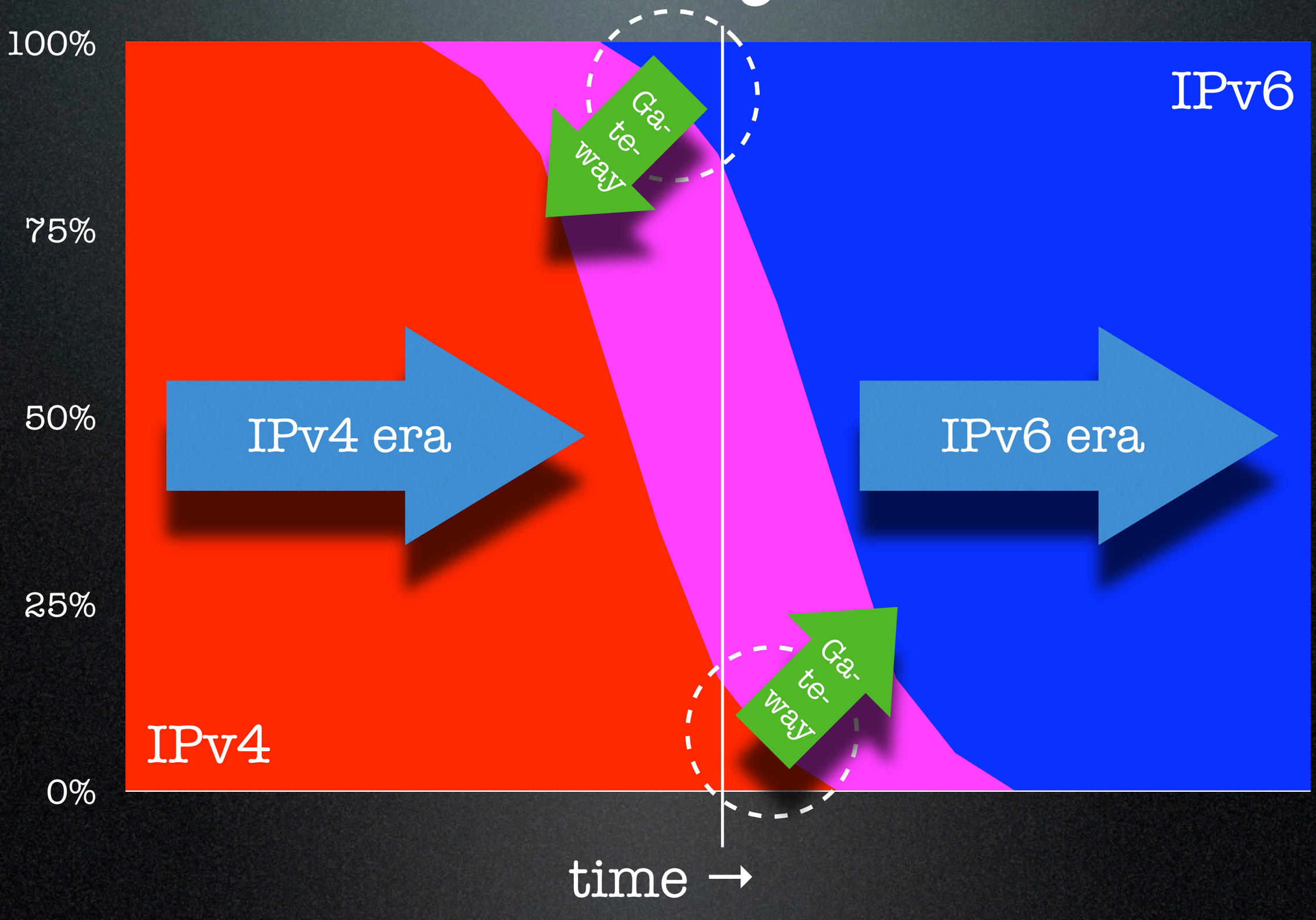
"Flag day"



Dual Stack



Reality?


100%
75%
50%
25%
0%
IPv4
IPv6
IPv4 era
IPv6 era
Ga-
te-
way
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way
time →

Security

IPv6 is More Secure!

- Not really...
  - mandatory IPsec:
    - doesn't mean much in practice
      - harder to scan large address space
        - worms like SQL Slammer impossible
        - still **lots** of other worm/virus opportunities

Less Secure?

- Fun with **ping**:

```
$ ping6 -I en1 -c 2 -w ff02::1
PING6(72=40+8+24 bytes) fe80::21b:63ff:fe02:3c13%en1 --> ff02::1
39 bytes from fe80::21b:63ff:fe02:3c13%en1: nirrti.mshome.net.
56 bytes from fe80::20d:93ff:fe89:bd0a%en1: john-does-powerbook-g4-15.local
39 bytes from fe80::21b:63ff:fe02:3c13%en1: nirrti.mshome.net.
```

- But I don't even run IPv6!
  - That's what **you** think....

Lurking in the Background

- MacOS, many LINUXes, Windows Vista:
  - use IPv6 when IPv6 router present
    - but can use IPv6 locally regardless
- Vista and Apple Extreme WiFi router:
  - create IPv6 out of thin air!

Privacy

- "We don't need no stinkin' DHCP servers"
- Put ethernet address in IPv6 address
- Travel around with laptop:
  - I'm trackable by my ethernet address!
- Solution: use random number instead
  - not enabled out of the box on all OSes

The Future is Bright!

IPv6 Advantages

- IPv4 requires address conservation
  - expensive for large networks
  - need "NAT" at home, gets in the way of some applications
- With IPv6: simpler networks
  - easier to build, cheaper to maintain
  - more predictable, fewer random errors

More Advantages

- No limits on number of internet-connected devices
- Having two ISPs at home?
- No more headaches when merging enterprise networks
- Room for developing world
- We've only just begun, not ossified like IPv4

Questions?

www.ipv6forum.com

www.RunningIPv6.net

iljitsch@muada.com

See you on the IPv6 internet!