PacINET 2011

The state of IP address distribution and its impact

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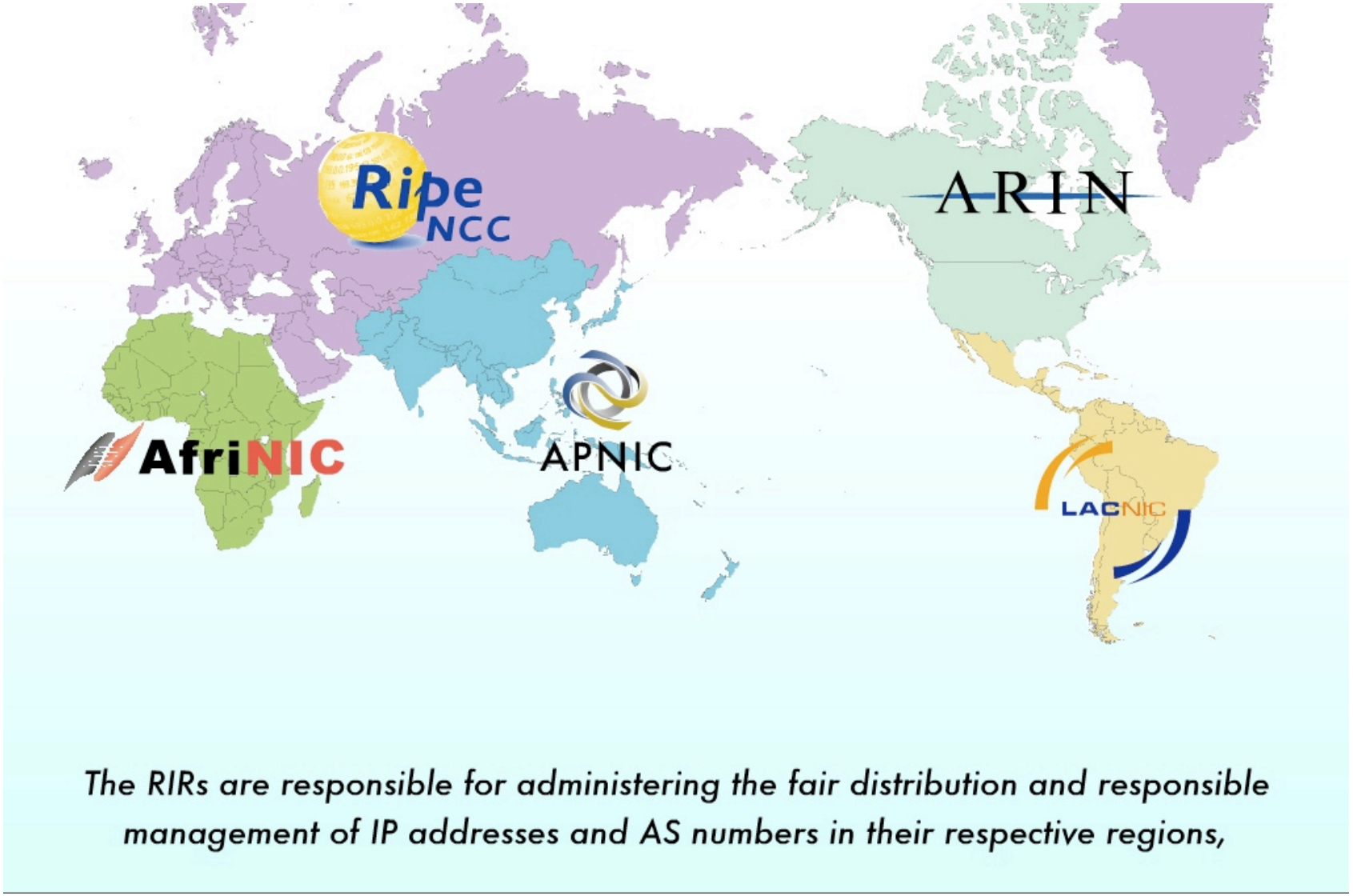
Regional Internet Registries



The RIRs are responsible for administering the fair distribution and responsible management of IP addresses and AS numbers in their respective regions,

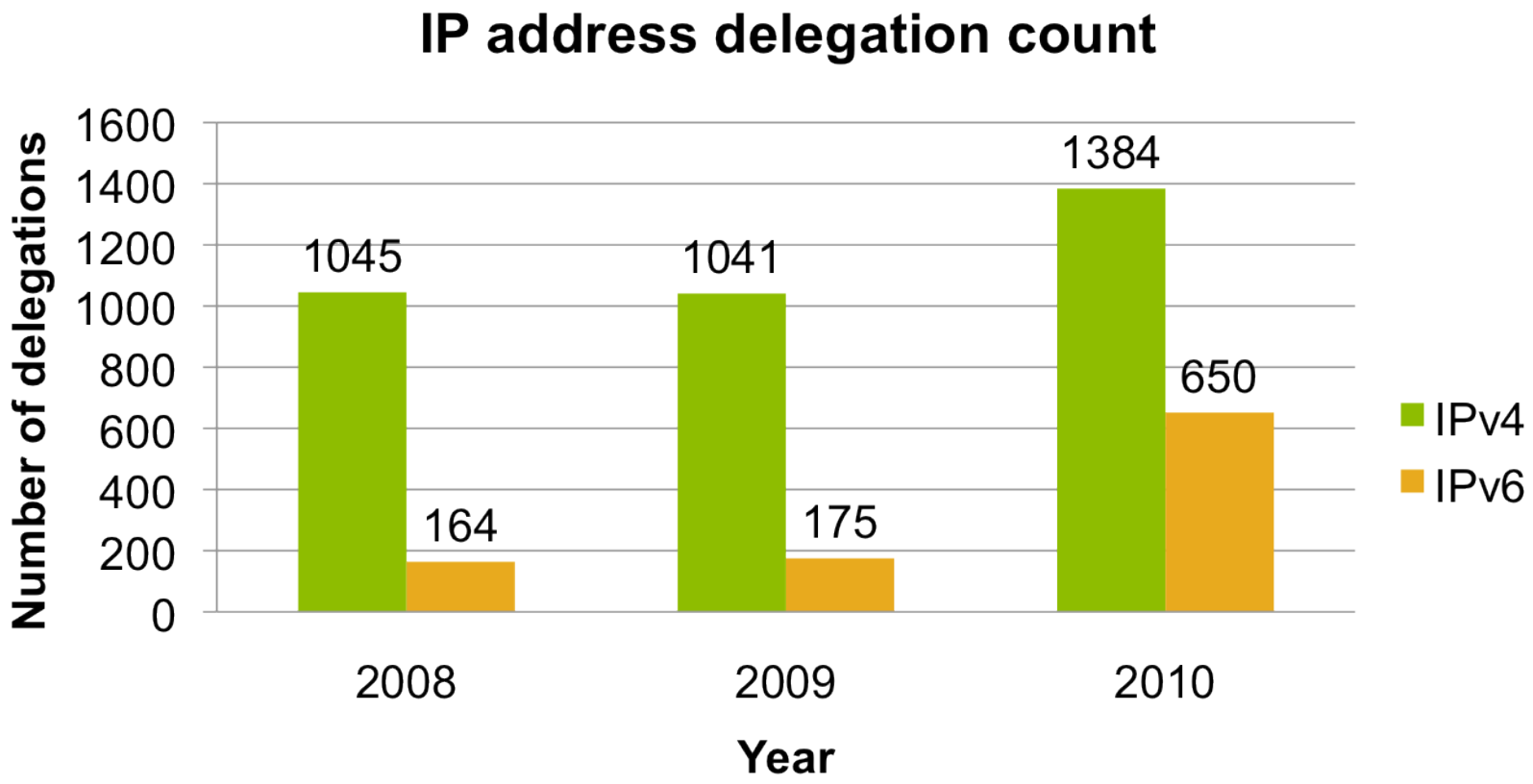
About APNIC

- What we do
  - “Regional Internet Registry”
- Why we do it
  - Needed technical/administrative service
  - Support development of the Internet as a single, seamless, routable, global network
- How we do it
  - Non-profit mutual organization
  - Bottom-up policy process

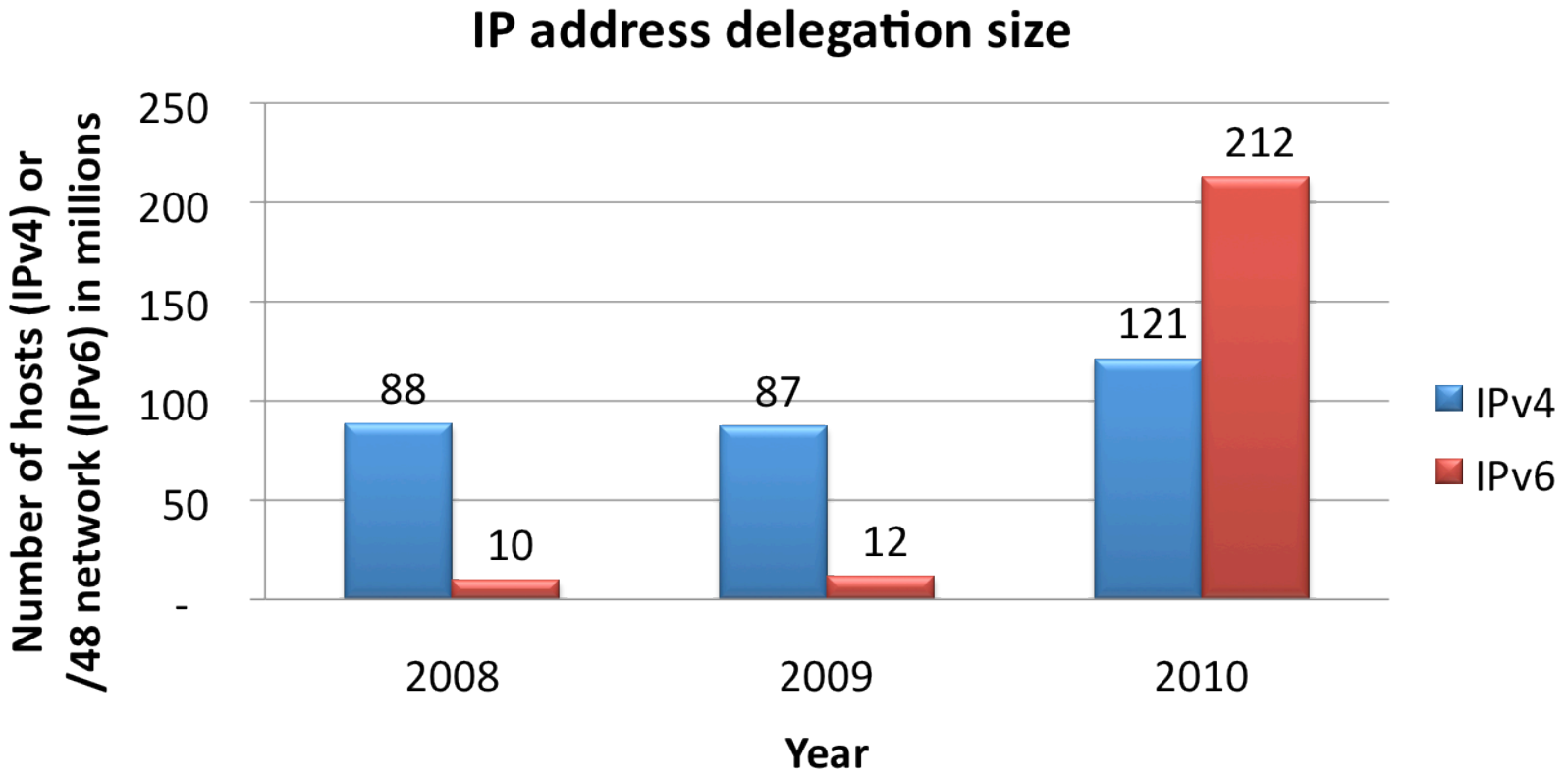
Overview

- IP address distribution in the AP region
- Status of IPv4 exhaustion
- Observations of W6D day
- Way forward

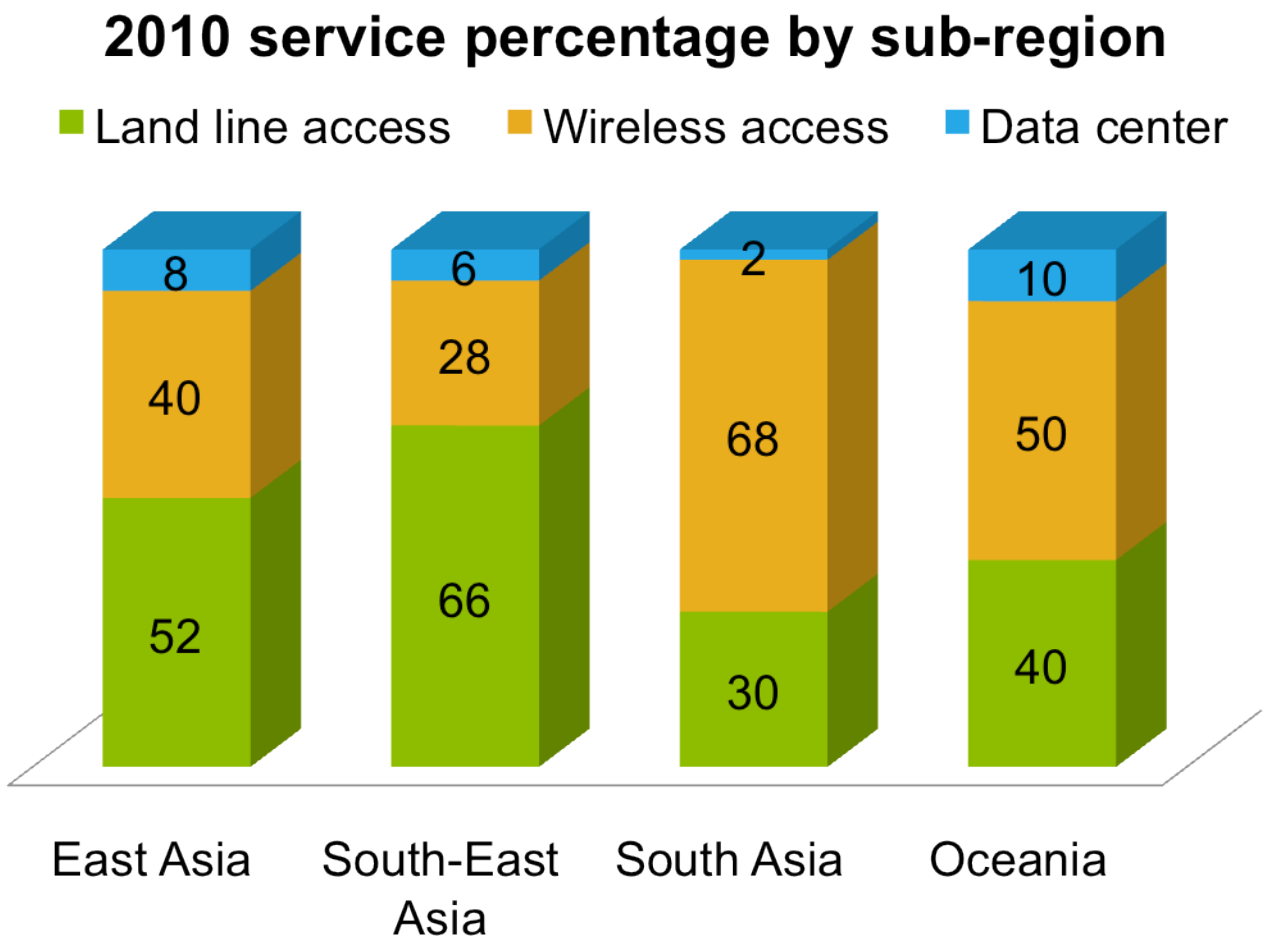
APNIC IP Address Distribution 2008 - 2010



APNIC IP Address Distribution 2008 - 2010



What Services Do These IP Addresses Go To?

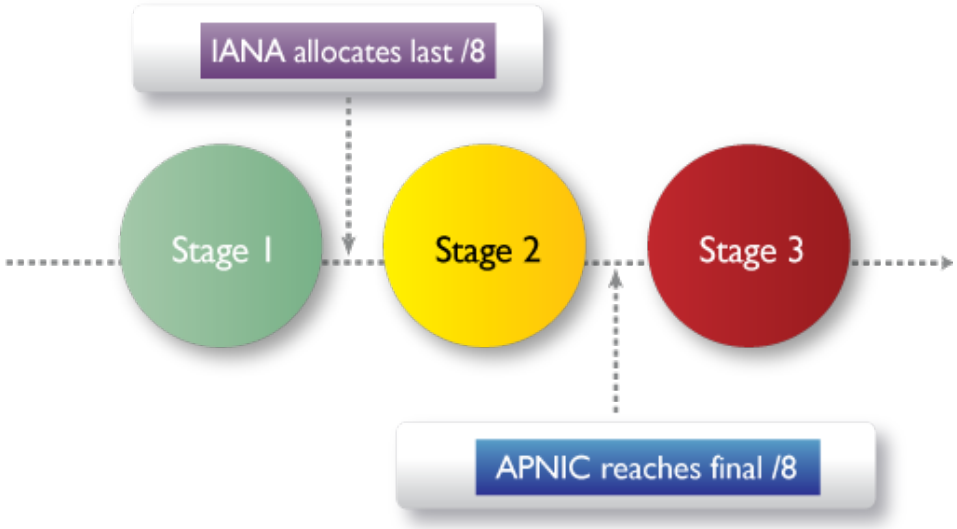


What Do the Stats Say?

- The Internet in the Asia Pacific region is growing at an accelerated rate, particularly in access networks
- APNIC IPv4 requests continue because of network growth to meet the population demand while IPv6 is being deployed
- IPv6 is being deployed globally!

Registry Update

- IPv4 exhaustion
  - Now in stage 3, as of 15 April 2011



  - IANA handed out APNIC's last /8 block, **103/8**, on 3 February 2011

Policy Changes

- IPv4 policy during Stage 3
  - To extend the life of APNIC's last /8, each organization can only receive a limited size from it
    - Limited to a single maximum delegation of /22
    - Minimum delegation size is a /24
      - Implemented May 2011

Resource Services

- 2010 IPv6 delegations more than tripled
  - 650 delegations in 2010
  - Strong response to “Kickstart IPv6” with over 402 new applications
    - Members with existing IPv4 allocations or assignments may instantly qualify for an IPv6 block

What we observed on the W6D day

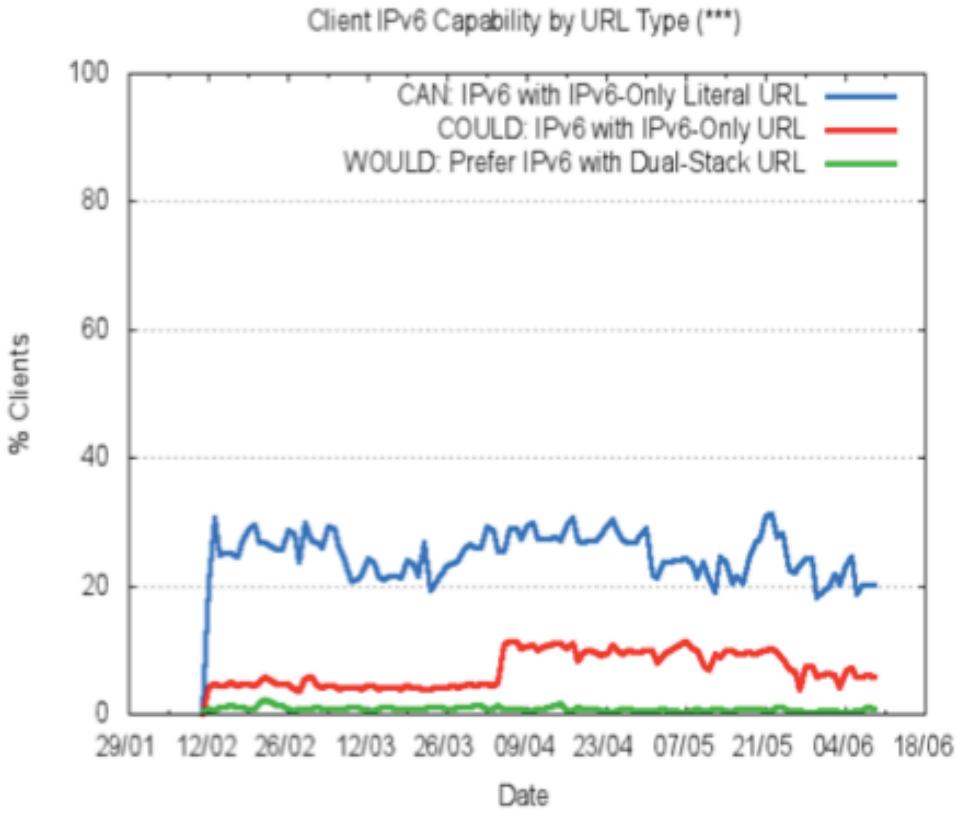
- 8th June 2011, World IPv6 Day
  - Labs.apnic.net
- Adding IPv6 to your website may have risks
  - Will your clients still be able to ‘see’ you?
  - What % of clients will experience issues?
- Finding out in advance what to expect is useful
  - Way to measure end-user behaviour
  - Without affecting your own website investment
- Measuring failure is hard
  - Website logs only measure successful connections

Adding IPv6

- Older Windows XP hosts experience problems with dual stack (IPv4, IPv6) DNS records
  - May refuse to connect to the IPv4 address
- Some hosts cannot process IPv6 DNS properly
  - Not supported in all DHCP backed configurations?
- ‘Partial IPv6’ problems
  - Locally IPv6 enabled, no IPv6 routes to global Internet
- Loss of eyeballs = loss of revenue?
  - When your core business presents via the web, what risks to loss of web access are you willing to take?

How much IPv6 is out there?

IPv6: “can” vs “could” vs “will”

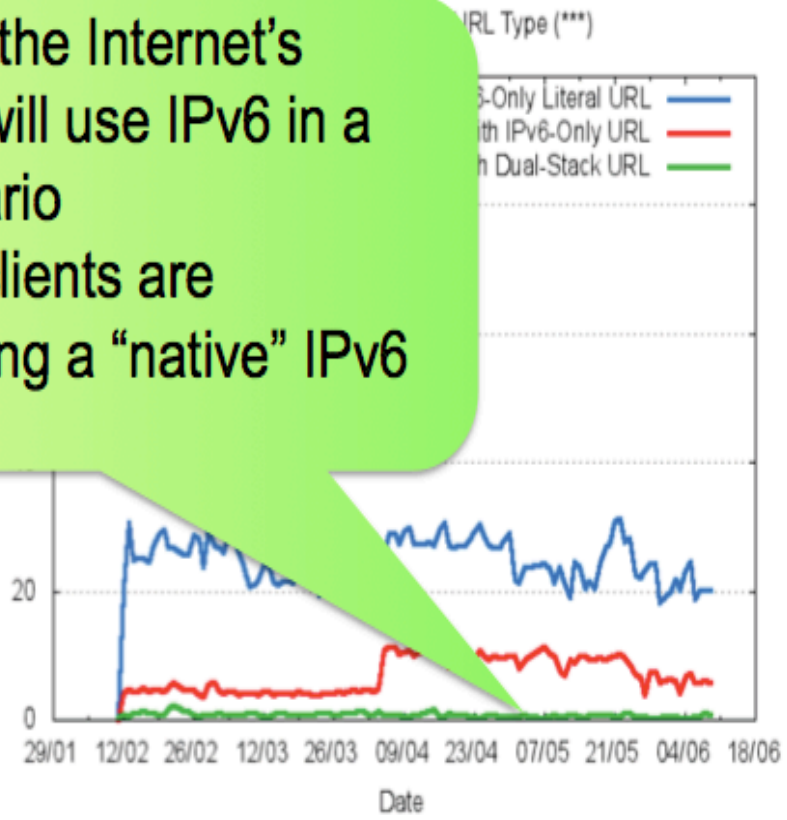


http://www.nanog.org/meetings/nanog52/presentations/Tuesday/huston-2011-06-15-dualstack.pdf

How much IPv6 is out there?

IPv6: “can” vs “could” vs “will”

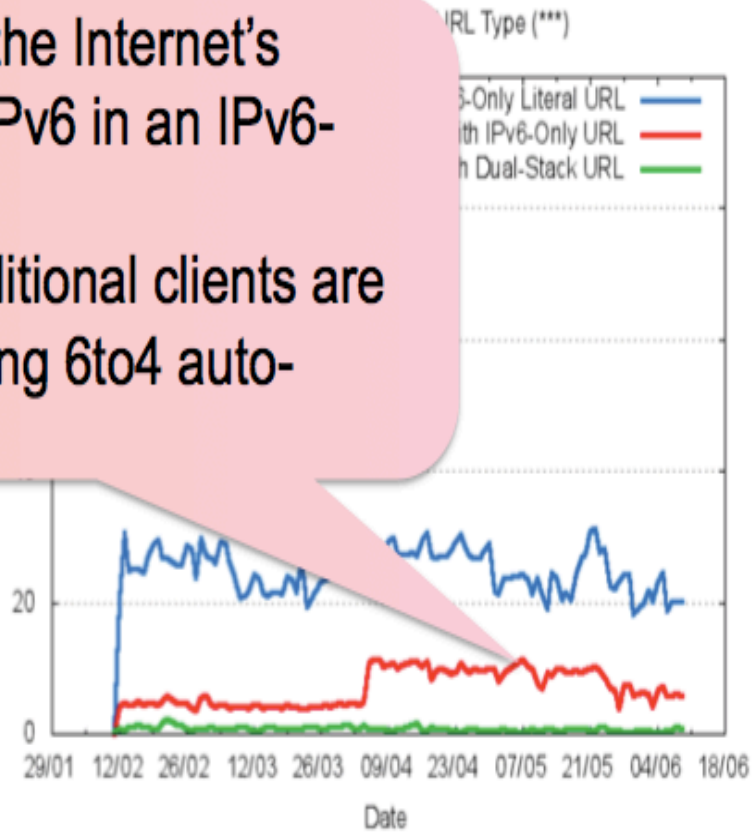
- ✓About 0.4% of the Internet’s clients can and will use IPv6 in a dual stack scenario
  - ▪And these clients are generally using a “native” IPv6 service



How much IPv6 is out there?

IPv6: “can” vs “could” vs “will”

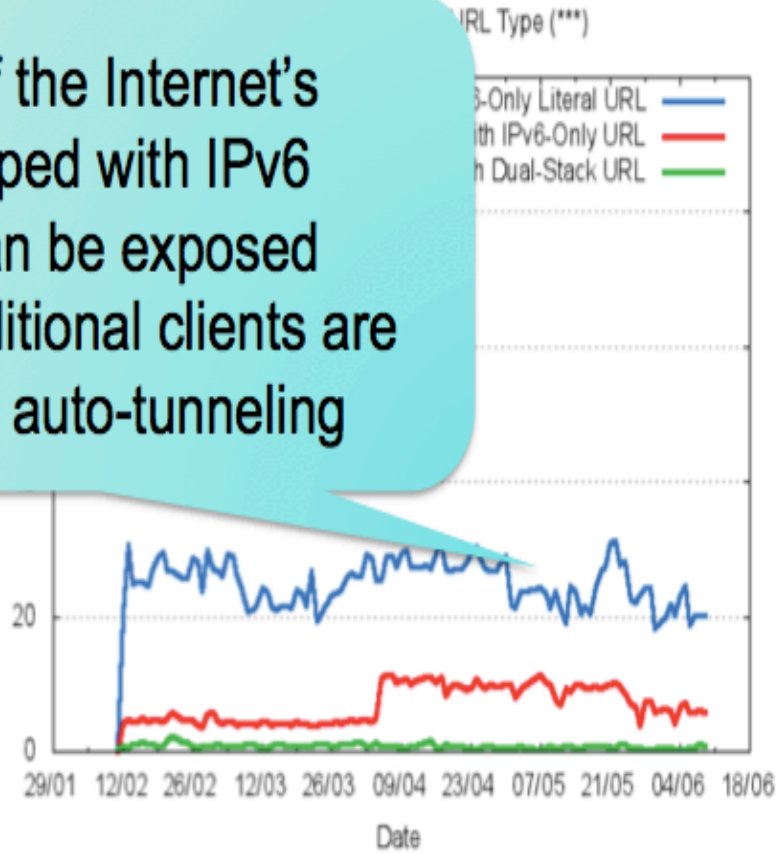
- ✓Around 4% of the Internet’s clients can use IPv6 in an IPv6-only scenario
  - ▪And the additional clients are generally using 6to4 auto-tunneling



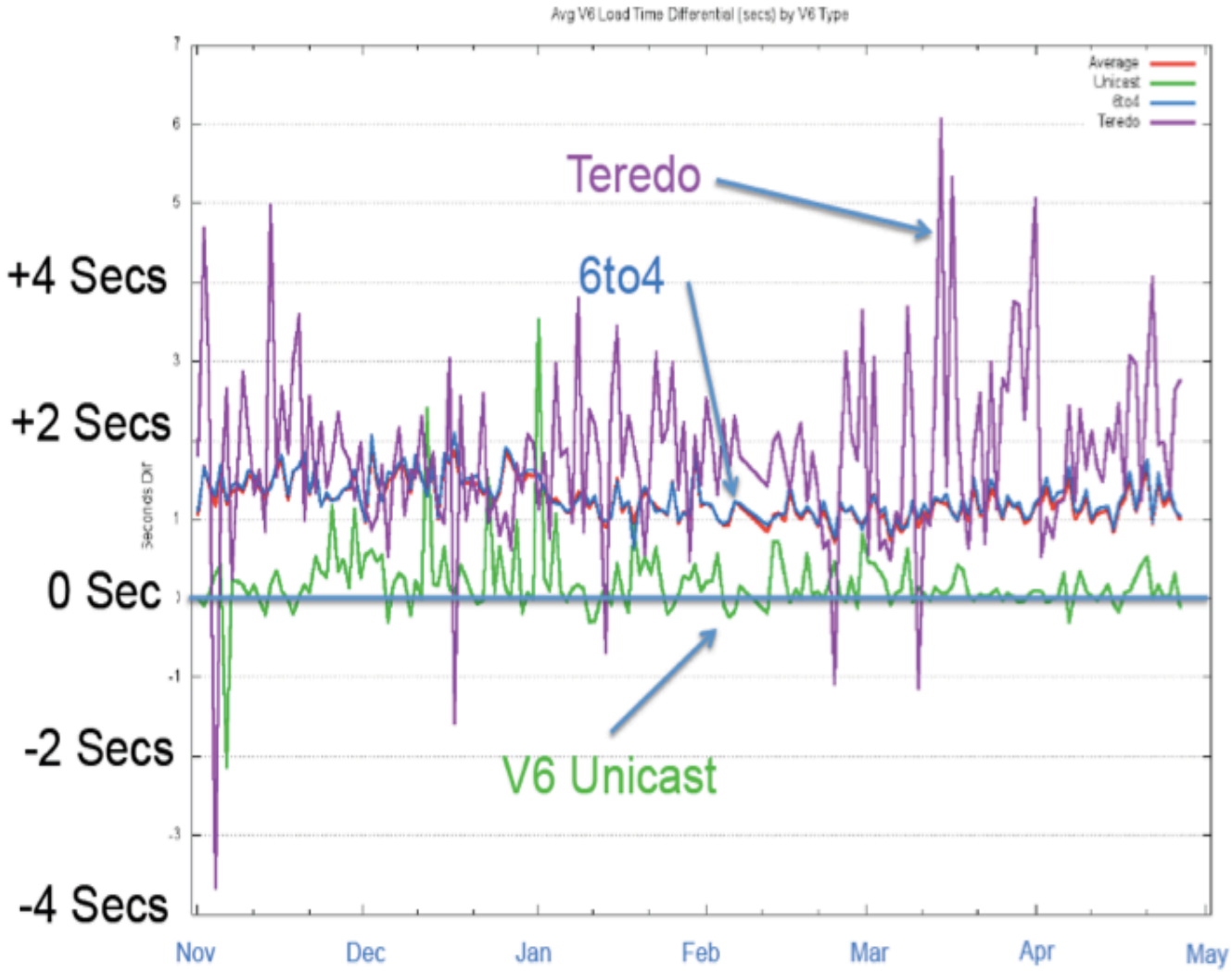
How much IPv6 is out there?

IPv6: “can” vs “could” vs “will”

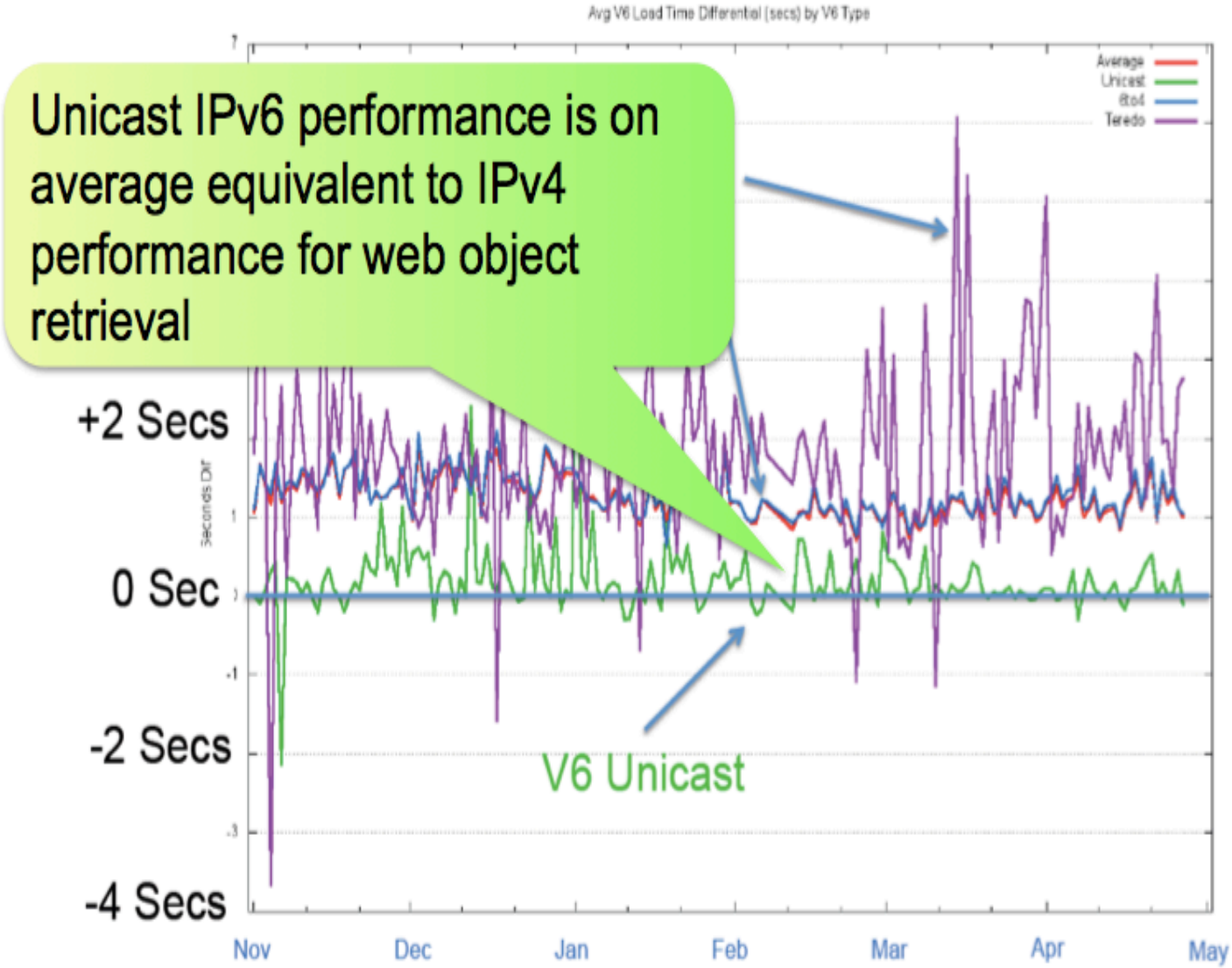
- ✓Around 35% of the Internet’s clients are equipped with IPv6 capability that can be exposed
  - ▪And the additional clients are using Teredo auto-tunneling



Performance observations
IPv6 load time by IPv6 type



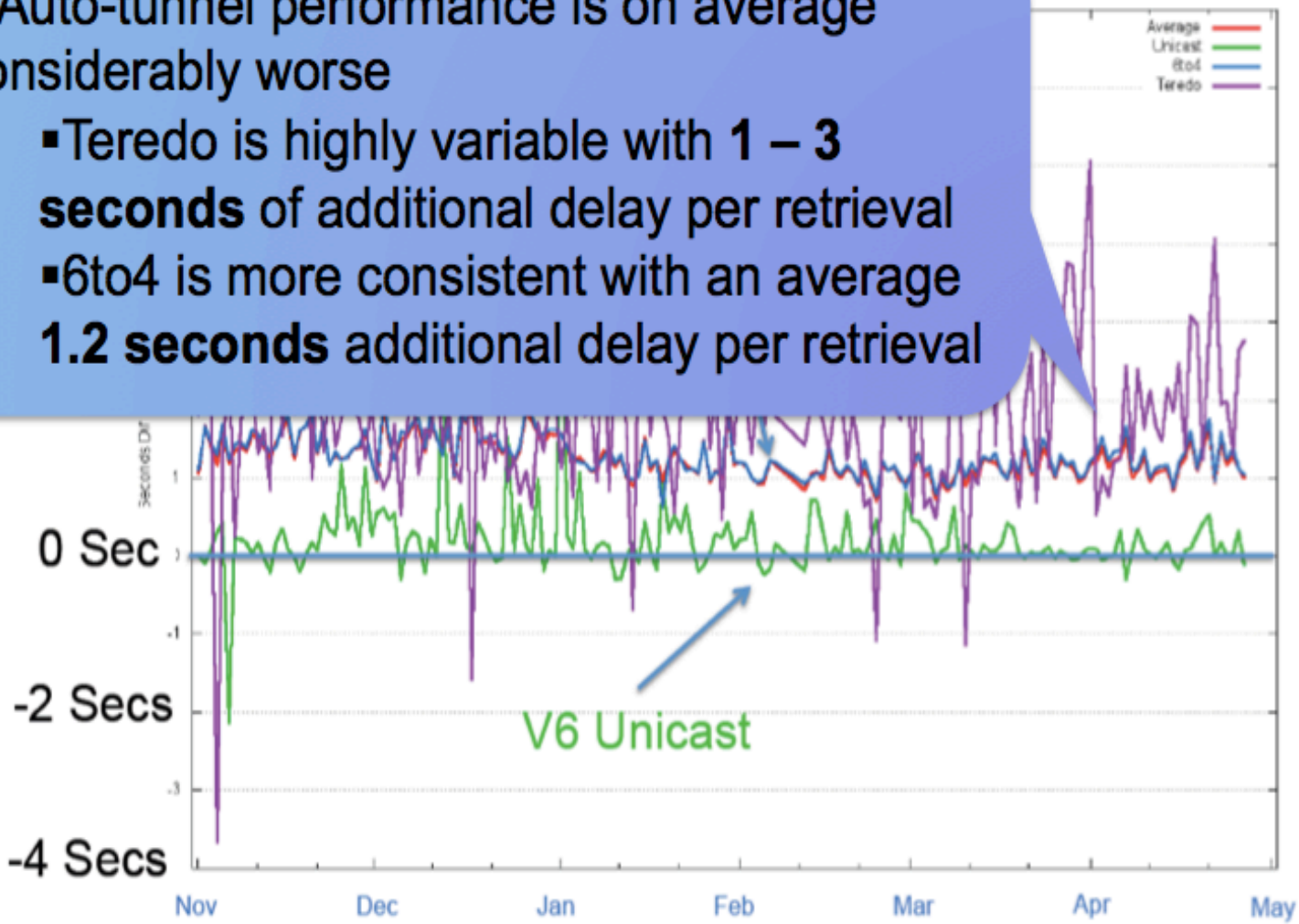
Performance observations



Performance observations

✓Auto-tunnel performance is on average considerably worse

- Teredo is highly variable with **1 – 3 seconds** of additional delay per retrieval
- 6to4 is more consistent with an average **1.2 seconds** additional delay per retrieval



IPv6 connection failure

- Some **2% – 5% of IPv6 unicast connections fail**
  - This is better than IPv6 auto-tunnels, but is still 20x the rate of IPv4 connection failure
- Some **12% - 20% of 6to4 connections fail!**
  - This is a very high failure rate
  - The failure is most likely a protocol 41 filter close to the client that prevents incoming 6to4 packets reaching the client
- Some **35% of Teredo connections fail!**
  - This is an amazingly high failure rate!

For online services

- So what will be the best IPv6 transition mechanism at the moment for an online services?
  - **Dual Stack with IPv6 native** service is a viable option in today's environment
  - ISPs with the CGN option is not your friend
    - Go with native IPv6!
- But…
  - A small fraction of existing clients will experience a much slower service or connection failure
- End-host auto-tunneling is not a solution
  - ISPs need to provide IPv6 native service

Labs.apnic.net – Measurement outcome

- Dual-stack brokenness:
  - Decreasing
    - Older host software systems upgraded with regular vendor updates
  - In worst case fewer than 3 in 10,000 clients will experience any problem with fetching from a dual-stack website

Way forward

- World IPv6 Day was not about absolute volume
  - No one expected it to suddenly bring 10% of the Internet traffic in IPv6
  - World IPv6 Day managed not to break the Internet
  - Doubled visibility IPv6 activities
- Time has come to move on making it a permanent change
  - Working on doubling the doubling = exponential growth of IPv6 traffic

Thank You

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