

World IPv6 Day - What Did We Learn?

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What Was World IPv6 Day?

- 8 June 2011
- Goal: A test-flight for IPv4+IPv6 websites
- 1000+ sites participated
 - including Google, Facebook, Yahoo
- ... and the RIPE NCC measured it



Measurement Network

▼ CAIDA Ark ▼ RIPE NCC TTM ▼ Other



RIPE NCC Measurement Details

- Sources: 40 servers, globally distributed
- Destinations: 53 participant or already dual-stacked sites
- We measured vital IPv6 metrics
 - DNS: A and/or AAAA records
 - ping(6)/traceroute(6)
 - HTTP over IPv4 and IPv6

Lesson: Test And Monitor



You Don't Want This To Happen

On IPv4:



On IPv6:



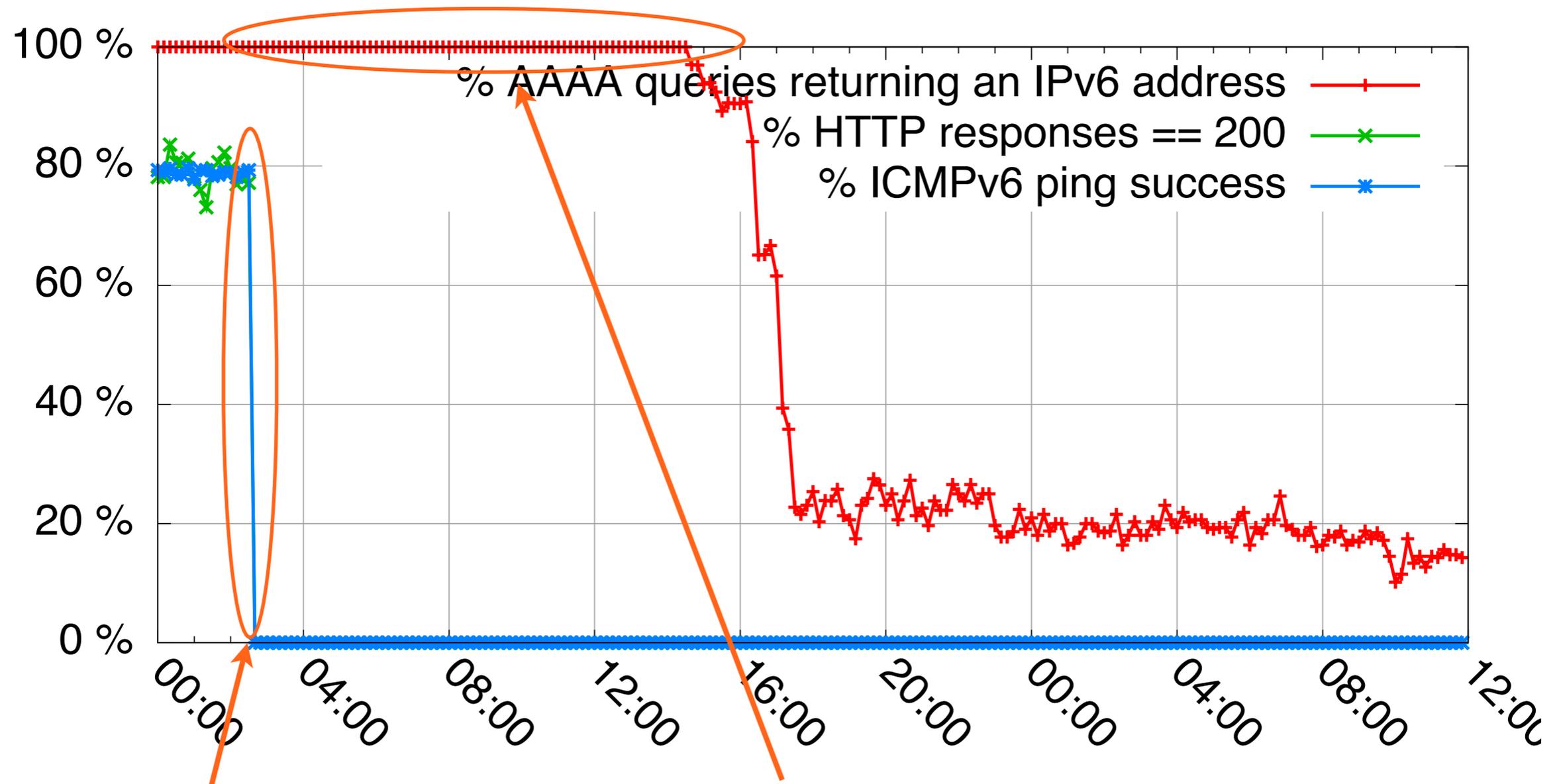
Not Found

HTTP Error 404. The requested resource is not found.



Or This ...

Comparing DNS, ping and HTTP IPv6 measurements to www.commerce.gov from 2011-06-09 0:00 UTC to 2011-06-10 12:00 UTC



v6 service turned off at end of v6day

but v6 service still announced

Test And Monitor - Lessons Learned

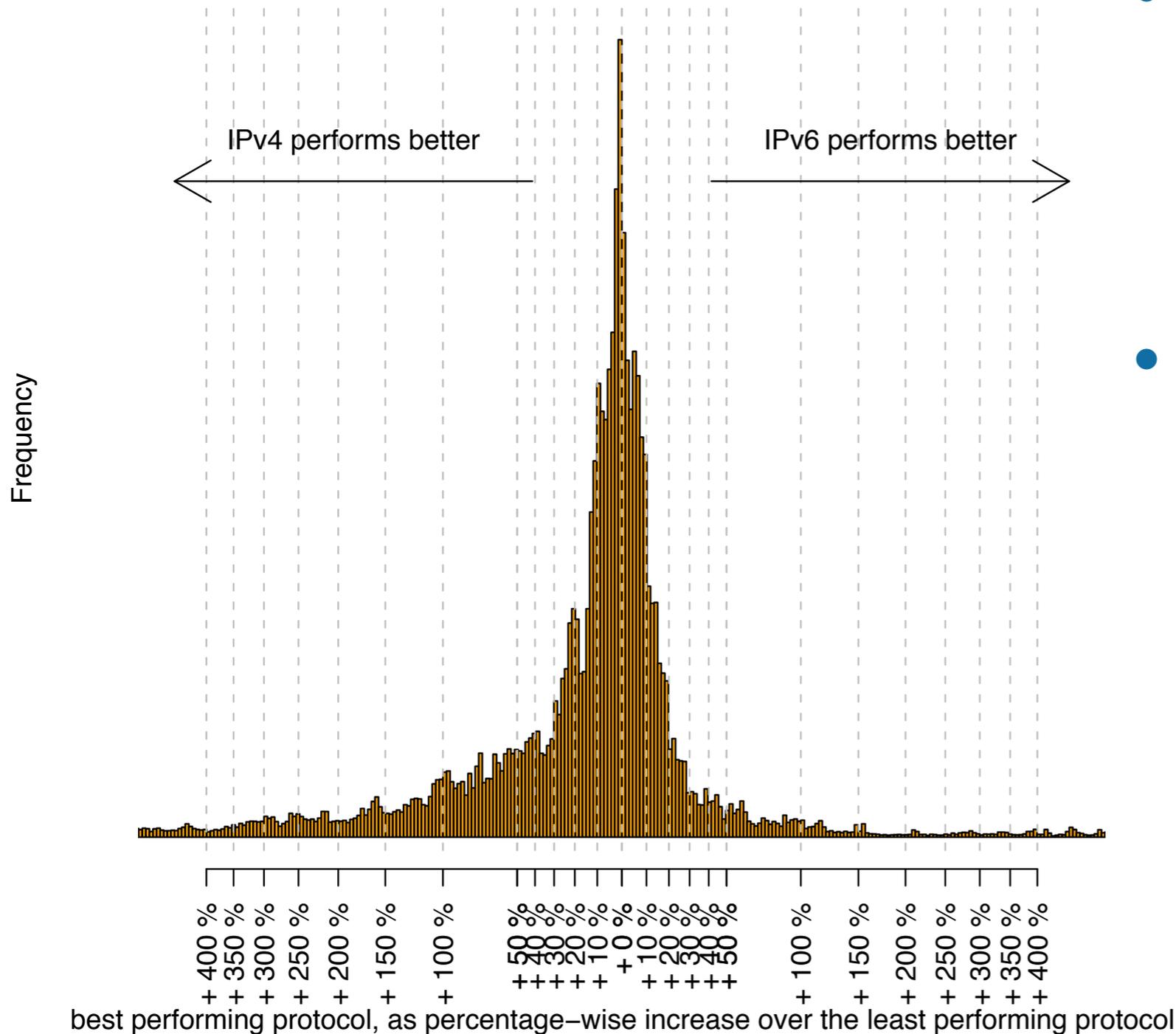
- Test when deploying something
 - The more real-life, the less likely you !@#-\$-ed up
- Monitor your infrastructure
- People2people reachability
 - Avoidable situations like Level3 and Dept. Commerce
 - Contact info up to date in RIR databases (whois)
 - Monitor the web (NANOG, *NOG, Twitter, ...)

Global View



IPv4/IPv6 Performance On World IPv6 Day

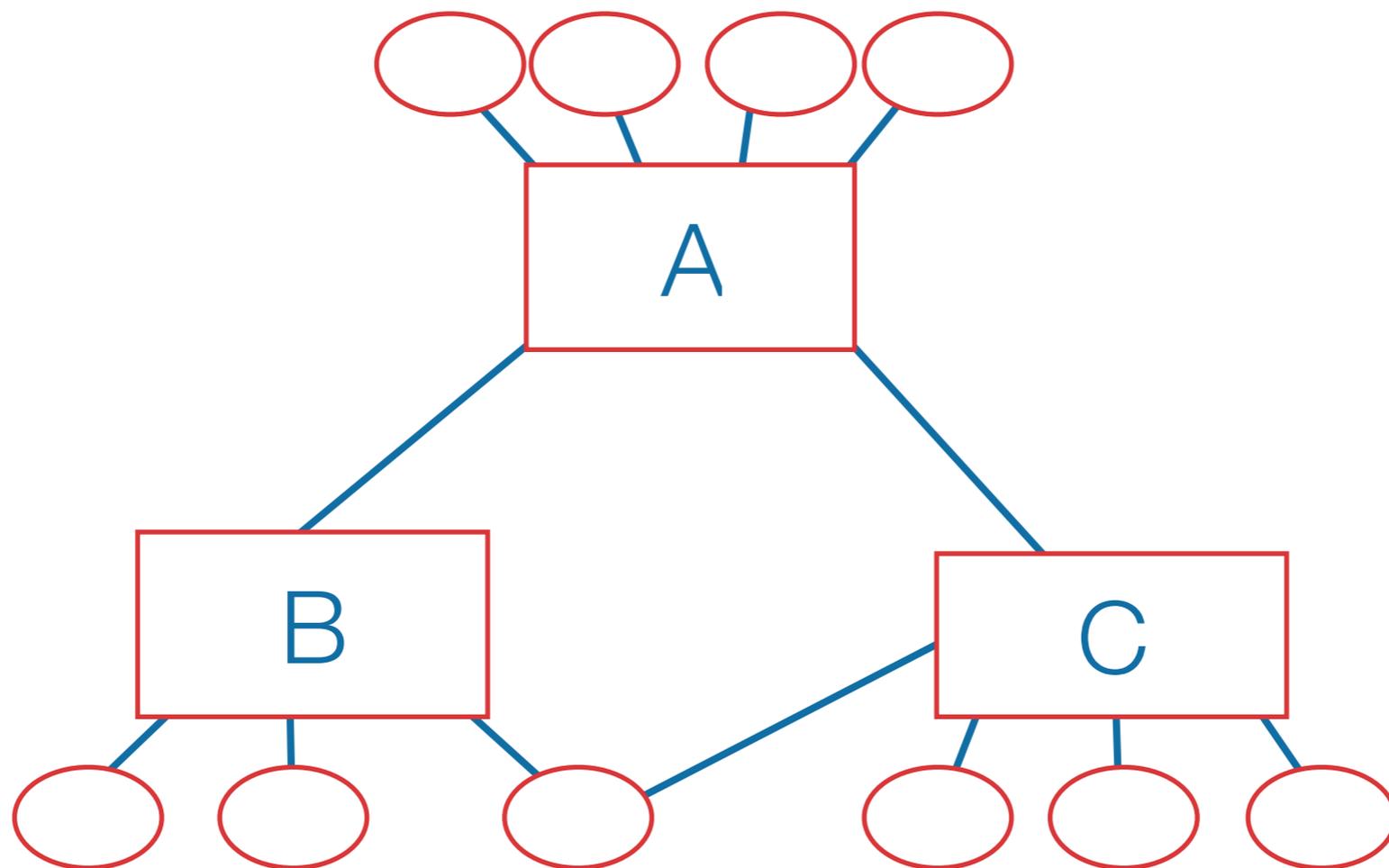
Distribution of IPv4/IPv6 relative performance



- Bell-shaped
 - centered around 0
 - with fatter IPv4-side
- Dual-stack = two chances for best performance!
 - Real-time apps can exploit this (voice, gaming)

Partial Reachability - Explanation

- Internet is a collection of interconnecting networks

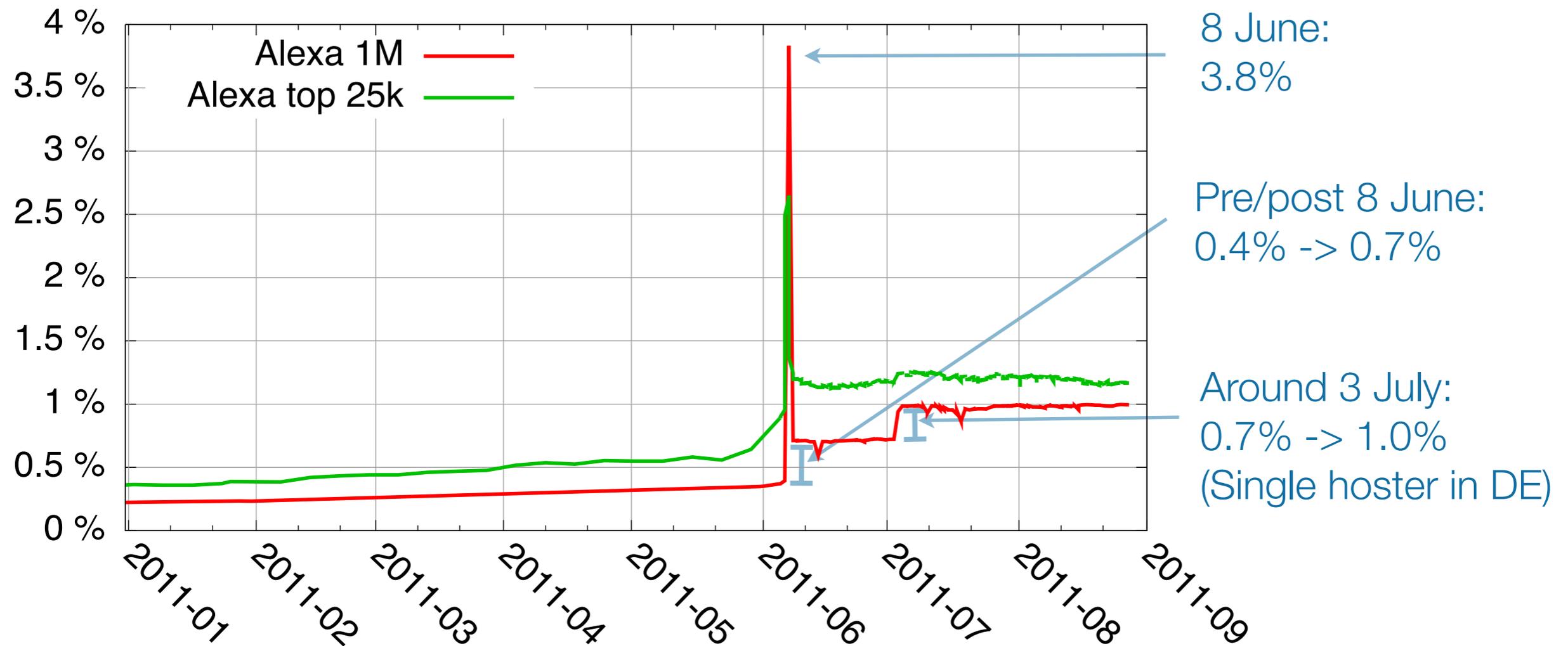


Partial Reachability - Observation

- Internet is a collection of interconnecting networks, and can be different on IPv4/IPv6
- Some vantage points couldn't reach all destinations
 - Are our vantage points representative?
 - Working on this: RIPE Atlas
 - Network partitioning, examples we encountered:
 - Level3 - Hurricane Electric (fixed as of Aug 31)
 - Cogent - Hurricane Electric
 - http://en.wikipedia.org/wiki/Comparison_of_IPv6_support_by_major_transit_providers

Long Term Effects - Content Providers

Percentage of web sites in Alexa 1M that can be reached over IPv6



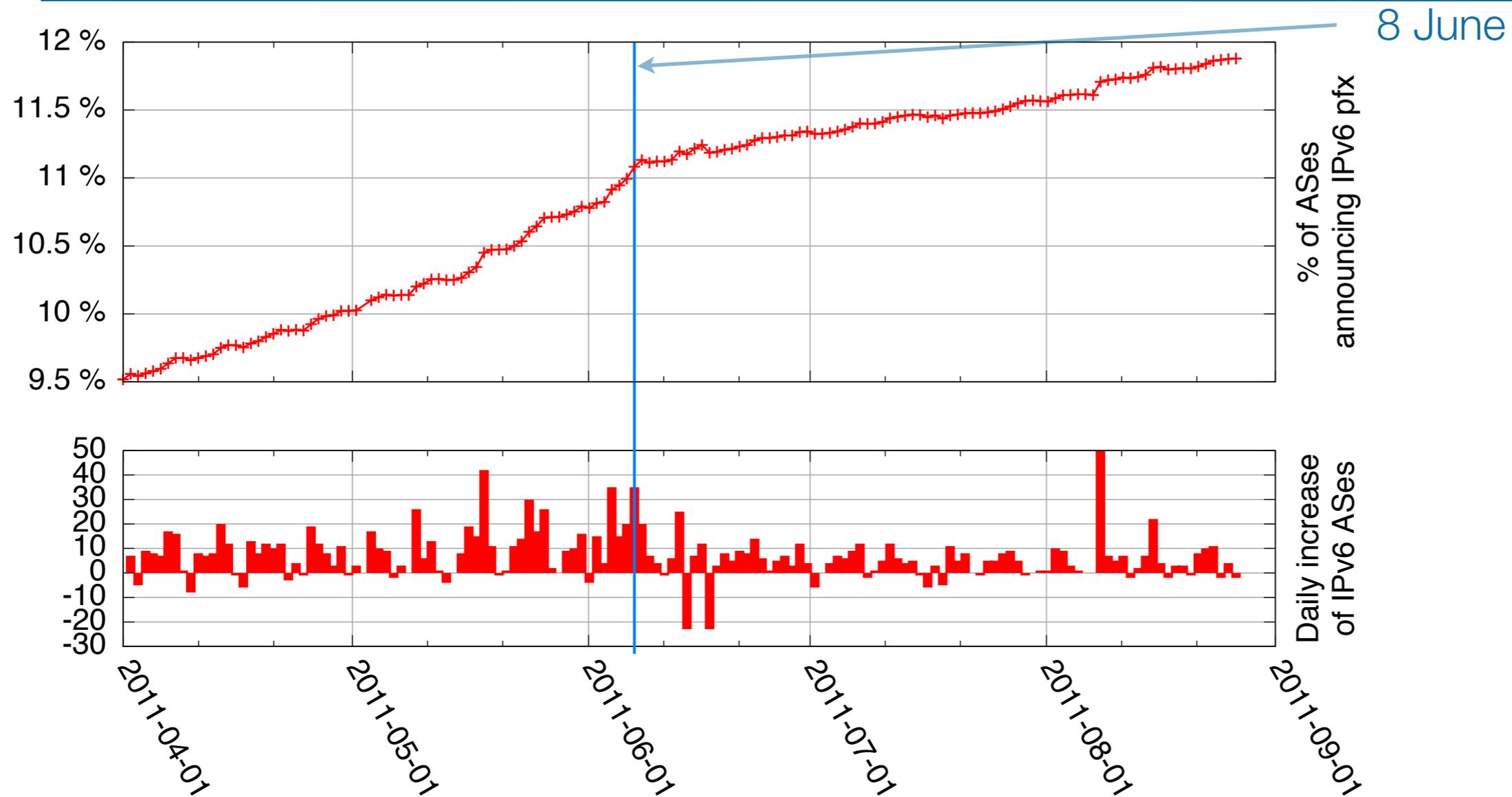
Raw data: Dan Wing

<http://banjo.employees.org/~dwing/aaaa-stats.html>

Long Term Effects - Content

- Linear extrapolation:
 - ~ an IPv6 year needed to get to 100%
- Exponential extrapolation:
 - ~ an IPv6 week needed to get to 100%
- Note: extrapolation based on two data points is not very scientific :)

Long Term Effects - IPv6 Enabled Networks



- <http://v6asns.ripe.net>

More Information

- Web interface to the measurements
 - <http://v6day.ripe.net/>
- Analysis on RIPE Labs
 - <http://labs.ripe.net/ipv6day>
- Raw data available
 - <http://labs.ripe.net/datarepository/data-sets/ripe-ncc-active-measurements-of-world-ipv6-day-dataset>

Conclusions - What We Learned

- IPv6/dual-stack works just fine, but make sure that
 - It is properly tested and monitored (like IPv4)
 - Your network can reach all others (like IPv4)
- Dual-stack = Two chances for best performance
- Days like this ‘work’
 - Raise awareness
 - Give people a target to work towards
 - We’re ready for a next IPv6(day|week|month|year|∞)

Next Steps

- Economic modeling of the transition to IPv6?
 - Possible cooperation with the OECD
 - Open, but unsponsored, item on work plan of the Working Party on Communication, Infrastructures and Services Policy (CISP)
- Next IPv6 event
 - 2012
 - Focus on user-serving ISPs (“eyeballs”)
 - Week/turn-on-forever?

Questions?

