

World IPv6 Day Recap

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YAHOO!

Agenda

- Motivations and Concerns for IPv6
- World IPv6 Day
 - › Implementation
 - › Customer Outreach
 - › Pre-event trials
 - › Event Day Stats
- What's next?
- Questions



Motivation for IPv6

Why not just rely on Carrier Grade NAT (CGN)?



If IPv4 addresses were Motor Cycles ...



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Running out of space



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- Wildly successful
- Few free spots left
- Need to support more people



Is NAT an alternative?



- Geolocation becomes less precise with carrier-grade NAT
- Abuse prevention is also more difficult because blocking an IP causes collateral damage.
- We have concerns about performance (TCP port exhaustion; CPU exhaustion) of NAT devices.



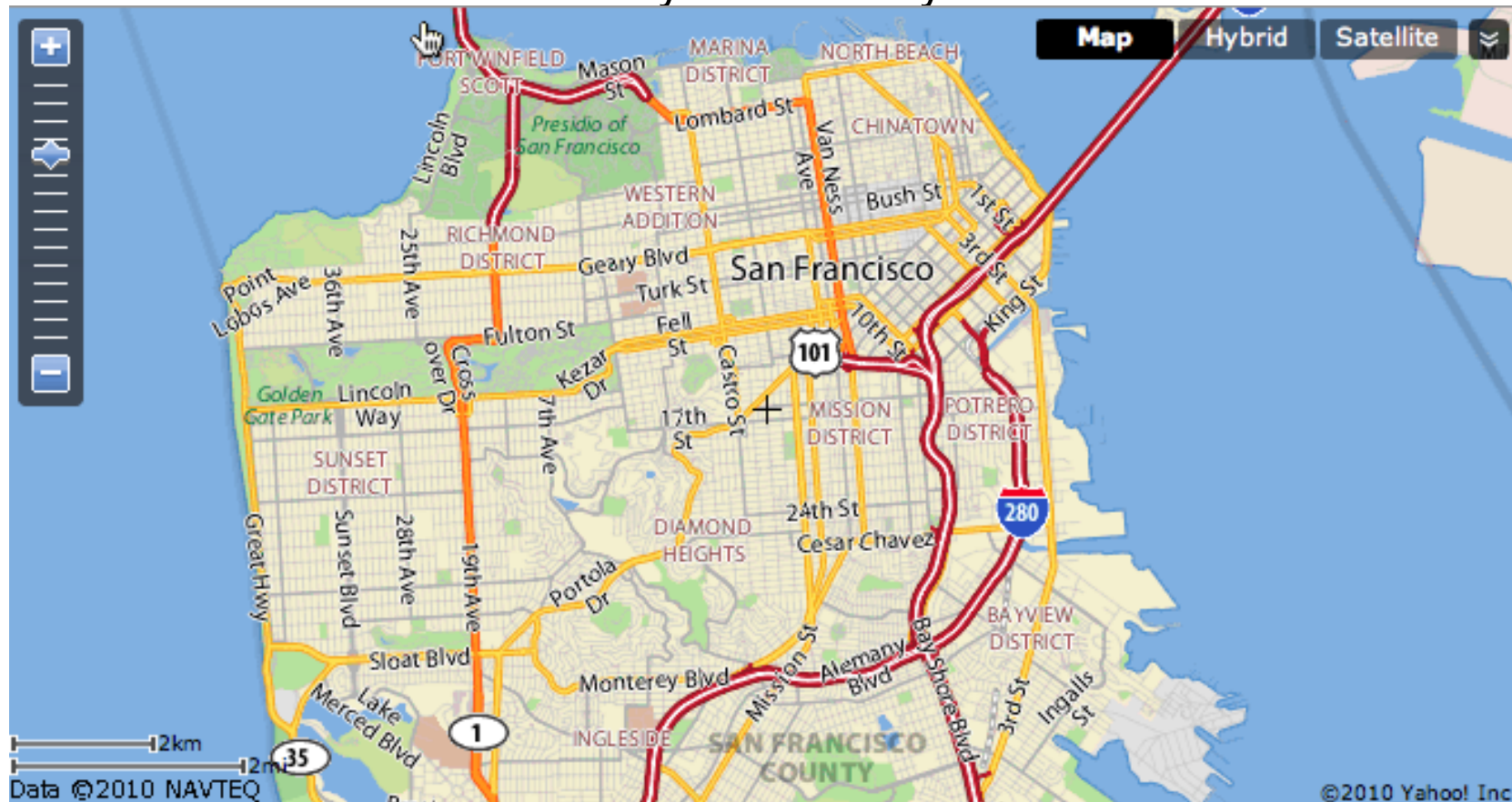
Connections via IPv4 today

- Most customers connect directly to Yahoo
- No ISP proxy, no ISP NAT



IP to Location: Great!

- We can often tell what city a user is by their IP address



Examples of Location in our products...

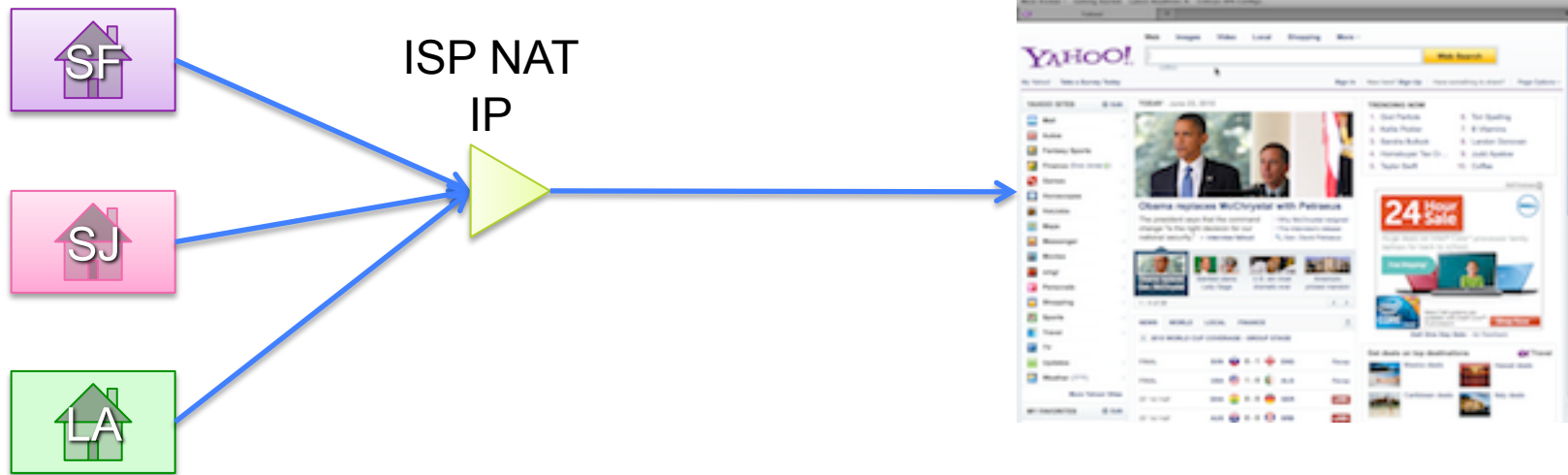
The image shows a screenshot of the Yahoo! search engine interface. The search term "landscape" is entered in the search bar. The results page is divided into several sections:

- Left Sidebar:** Includes "QuickApps", "SafeSearch - On", "57,500,000 results for landscape:", "Show All", "Wikipedia", "HGTV.com", "Dictionary.com", "Sponsored Results", and "Related Searches" (landscaping, landscaping ideas).
- Main Content Area:** Features "Also try: landscape design, landscape pictures, landscape ideas, more...", "Get A Lush TruGreen@Lawn" (Total Landscape Care Enhances Lawn. Enjoy Lush Green Lawns. TruGreen.com), "CA Landscaping Services" (Call 916-538-5815 for Beautiful Landscaping Services for your home or business. www.QualityLandscapeCA.com), "Landscape" (Find Five-Star Rated Landscape Pros, Backed By Our 20+ Years of Experience. www.ServiceMagic.com), "Become a Landscaper" (Learn about plant health, soil and fertilizers, creating landscapes. www.pennfoster.edu), and "More Sponsors: landscape, landscaping company, landscape design, landscape maintenance, landscape architecture, landscape photography, landscape painting, landscape lighting, landscape irrigation, landscape construction, landscape maintenance, landscape architecture, landscape photography, landscape painting, landscape lighting, landscape irrigation, landscape construction".
- Video Spotlight:** Lists three NFL Draft videos: "NFL Draft: Watch it live" (Posted Apr 24 2011), "Dolphins' Brandon Marshall Out Of Hospital, Wife Out Of Jail" (Posted Apr 23 2011), and "NFL Draft: Sure to be a star" (Posted Apr 20 2011).
- Yahoo! LOCAL Sacramento City Guide:** A prominent overlay for Sacramento, CA. It includes a search bar for "Find Businesses & Services (e.g. restaurant, address, City & State)", a "Sacramento, CA" dropdown menu, and a "Sacramento City Guide" section with categories: "Restaurants" (Cf Cheng Chinese... 4.5 stars, Golden Palace 4.5 stars, Full Moon Seafood... 4.5 stars), "Health & Beauty" (Pham, Quynh-Trang... 4.5 stars, Natomas Family... 4.5 stars, Sacramento Surgical... 4.5 stars), and "Home & Garden" (Kohl's Department... 4.5 stars, Aviary Management... 4.5 stars, Bed Bath & Beyond 4.5 stars). A "Most Popular" sidebar lists "Events", "Maps", and "Buzz".
- News Overlay:** A "LOCAL" news overlay for Sacramento, California, listing several news items such as "Sacto 9-1-1: Sacramento County jury..." and "Sacto 9-1-1: Sacramento Sheriff to hold...".

At the bottom of the page, there is a banner for "HOCKEY NIGHT ON YAHOO! SPORTS" with a "VS" logo. In the bottom right corner, there is a small circular logo featuring a grid of colorful icons.

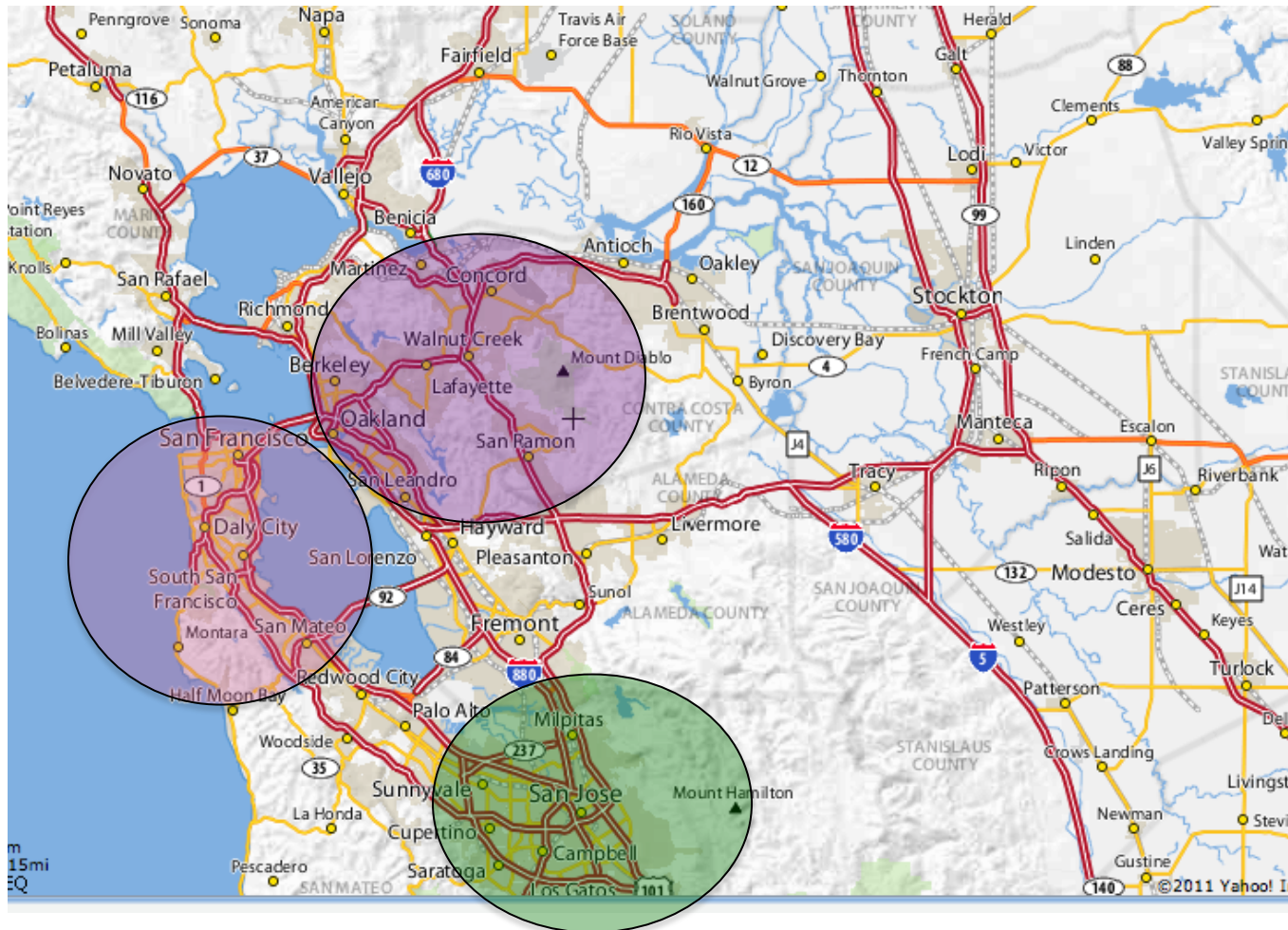
Future of IP Location with IPv4 NAT

- Carrier Grade NAT or Large Scale NAT (CGN, LSN)
- Several customers share one public IP address
 - › One ISP tells us they will **start** at 1000 private IPv4 addresses per 1 public!



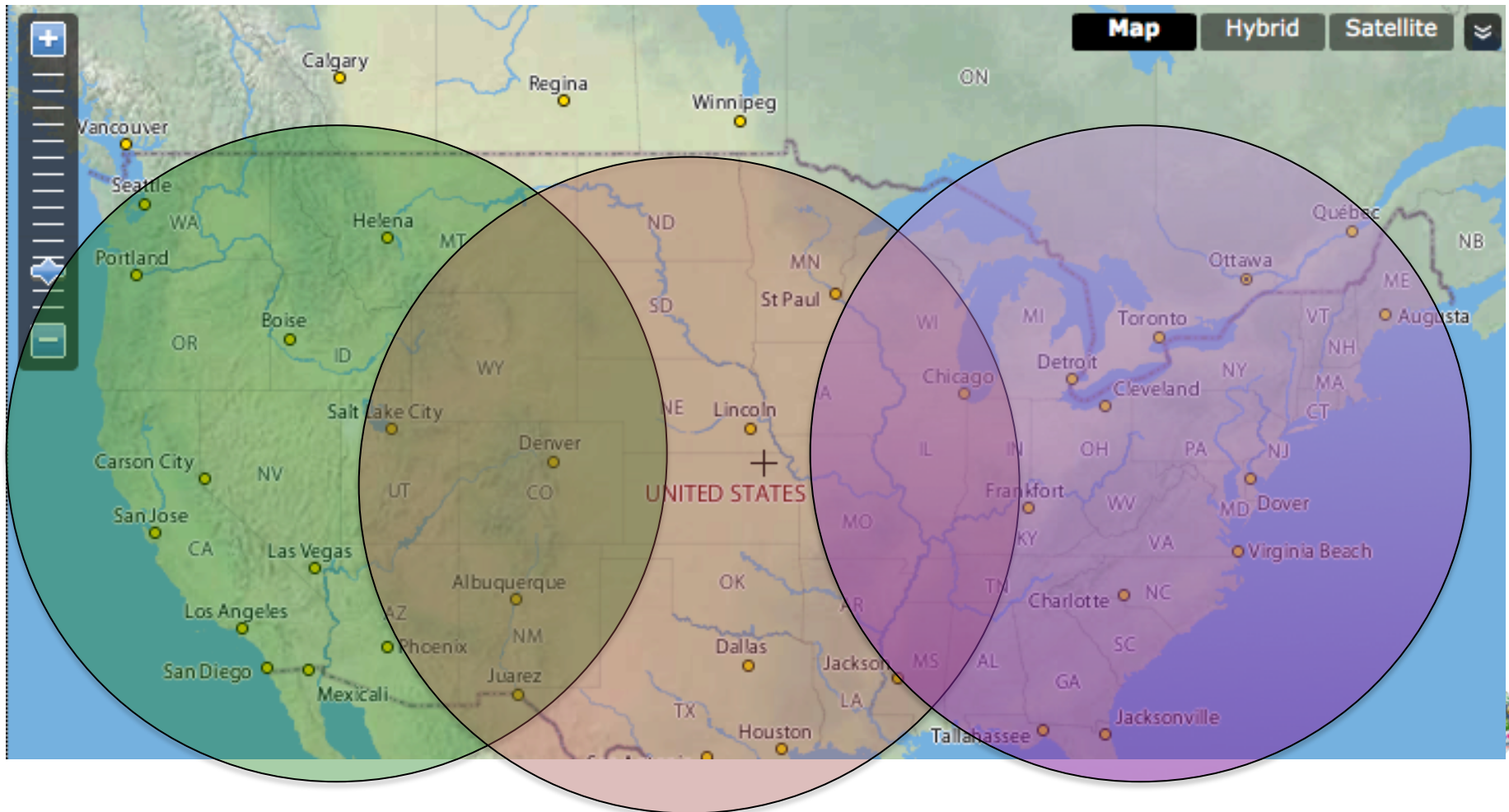
NAT IP to Location: Best Case

- Some access providers will aggregate around metropolitan areas



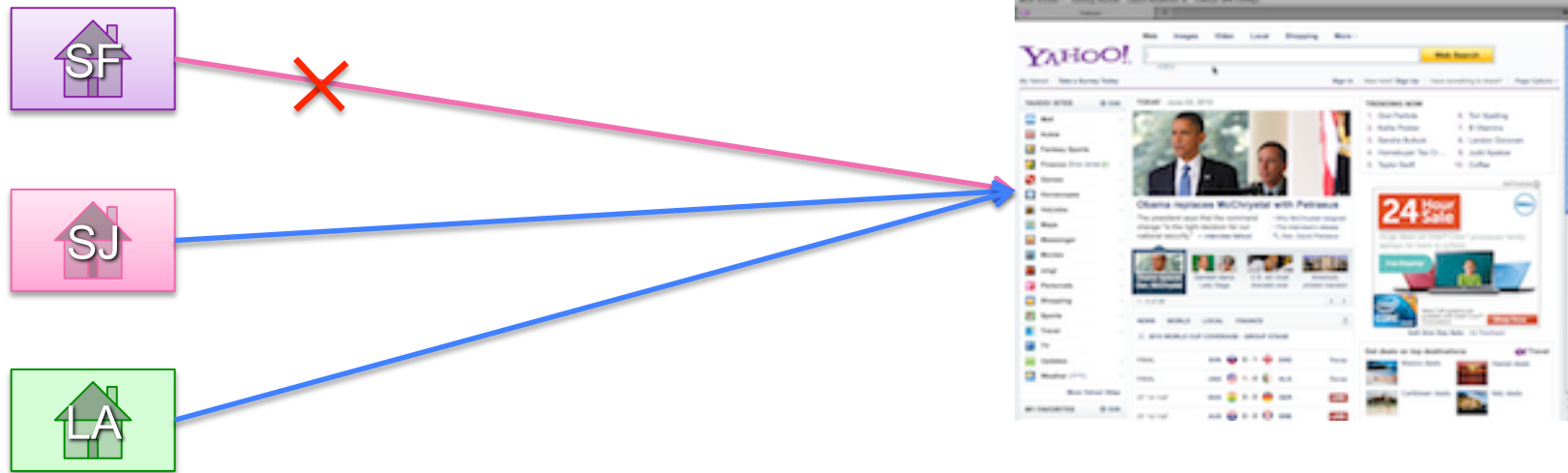
NAT IP to Location: Worst Case

- Some ISPs will not aggregate at all. No more IP based location.



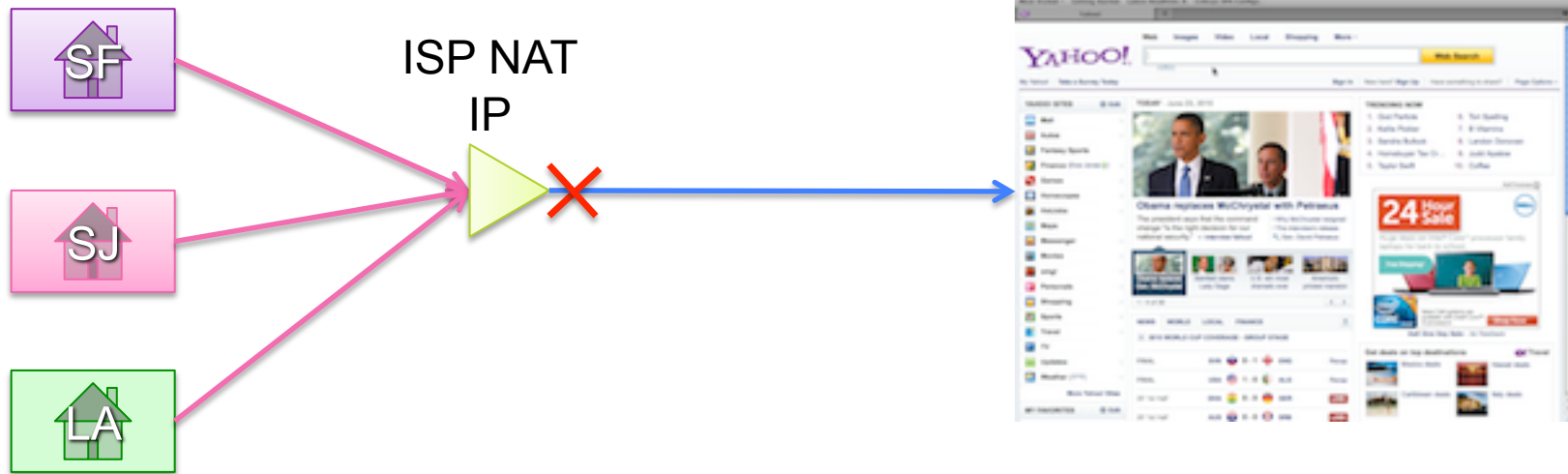
Handling Abuse Today

- If needed, we can block an IP address to block abuse.
- This will block just one house or one business.



Future of Abuse with IPv4 NAT

- If we must block one NAT IP, we will block 100's or 1000's of users
- Heavy collateral damage, especially if we have to block several NATs



The IPv4 Well is Dry



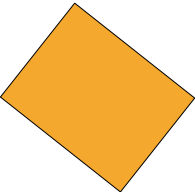
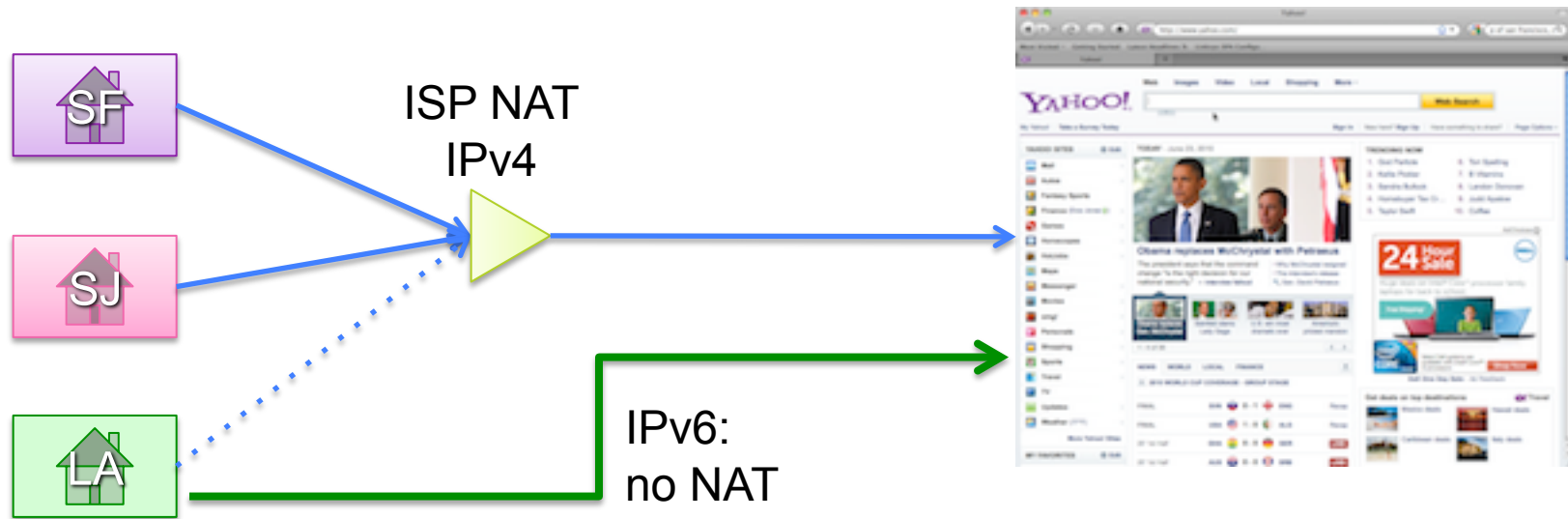
Photo by Torsten Ståhlberg via istockphoto.com

- IPv4 NAT **will** happen.
- We **must** prepare for coping with IPv4 NAT.
- We **must** promote IPv6!



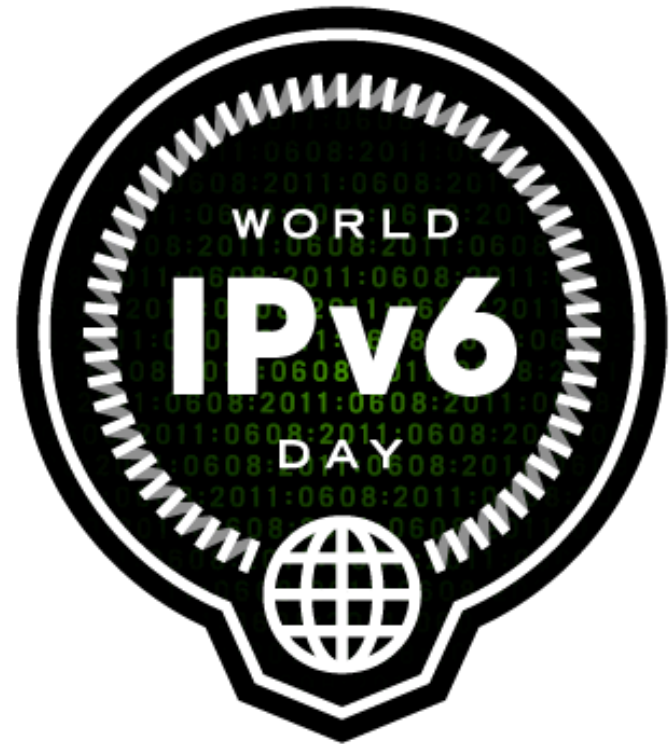
The Answer? Skip the NAT!

- IPv6 enabled users have a chance to bypass the NAT



World IPv6 Day – June 8th 2011

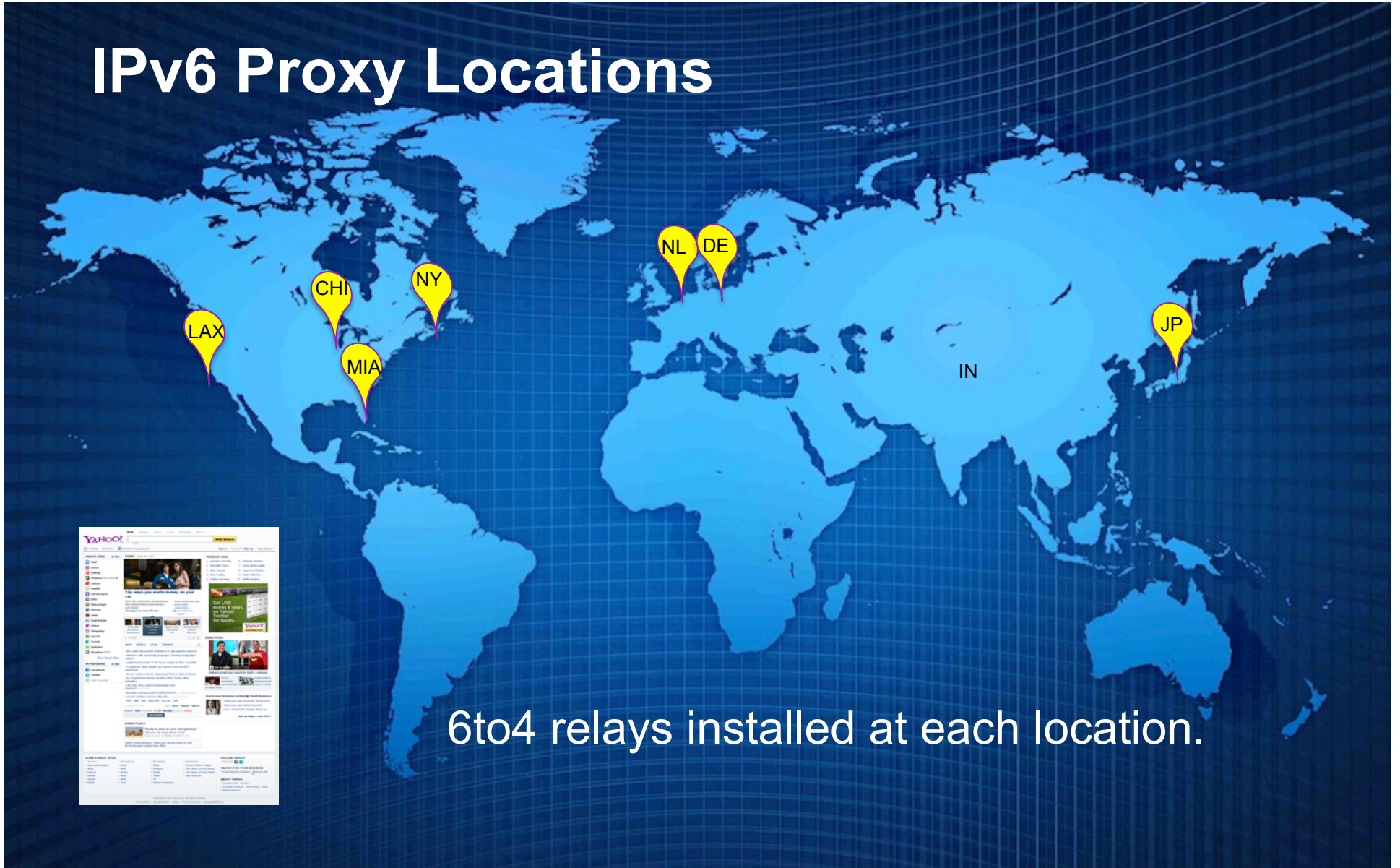
- Global event coordinated by the Internet Society
- Major content providers enable IPv6 access on their “front door” for 24 hours
 - › Sites accessible via IPv4 + IPv6
- “Test flight” for IPv6 on a broad basis
 - › Motivate industry to move forward – Break the chicken/egg cycle
 - › Real world smoke test – what you can’t do in a Lab
 - › Test included real end users



Participating Yahoo! Front Page Markets



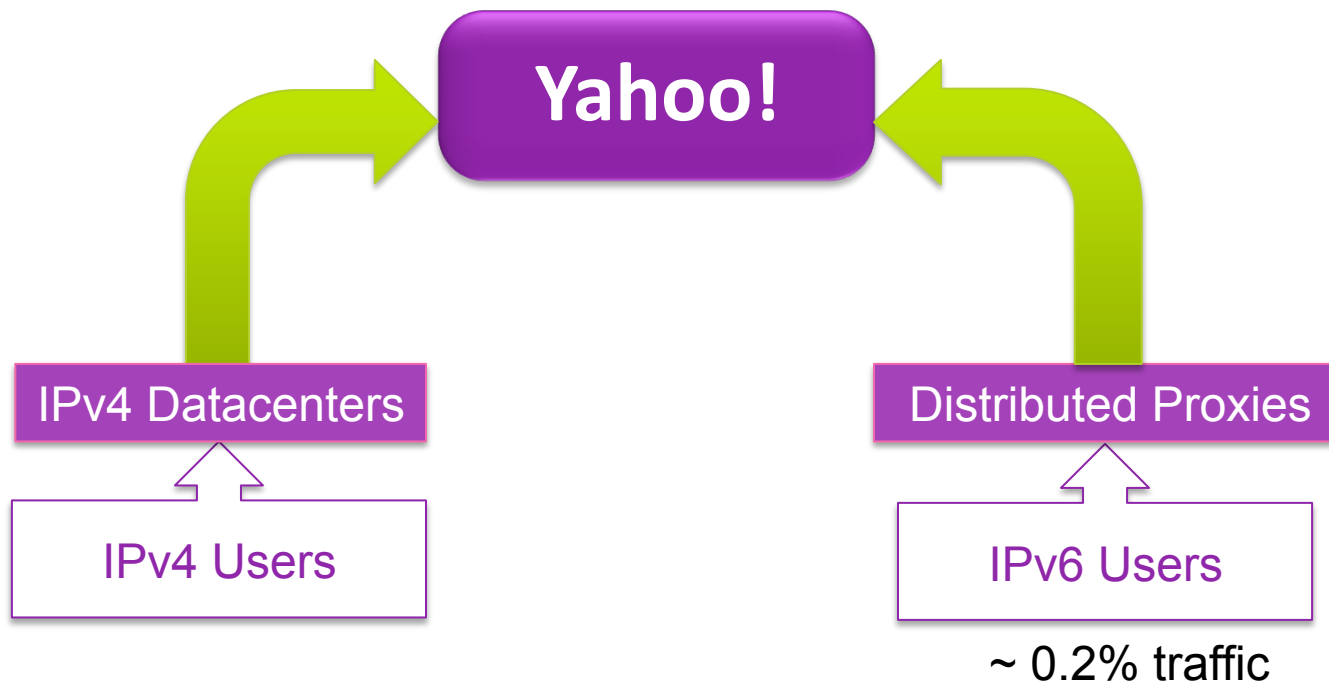
IPv6 Proxy Locations



6to4 relays installed at each location.

Traffic flows – World IPv6 Day 2011

- HTML: Served “Dual Stack”; IPv6 via Traffic Server
 - › CSS and Images are not part our test
 - › This is about enabling IPv6; not disabling IPv4.



Some risk involved.

Photo by The Fayj via Flickr
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The Broken Users Problem

22 out of these 100,000 users have IPv6 enabled and misconfigured. They can't reach dual-stack sites.



The grandstand of the Camp Nou
Photo by Jack Pollock; public domain
<http://en.wikipedia.org/wiki/File:Grandstandcampnou.jpg>

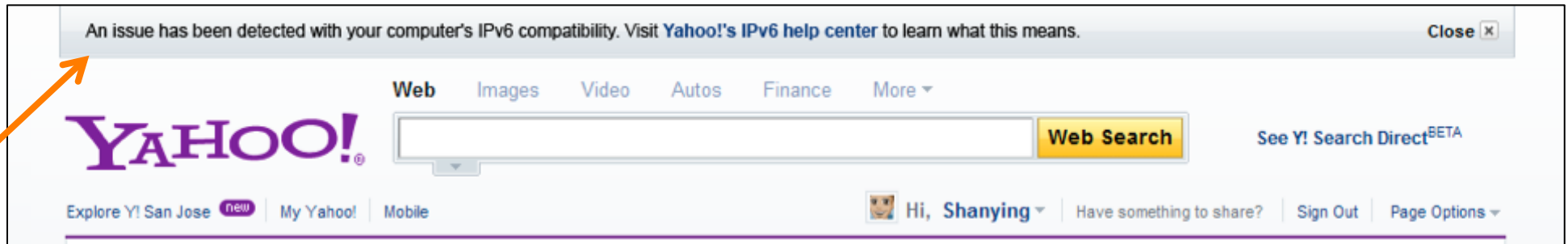
Timeouts until IPv4 fallback



- Windows:
21 seconds per AAAA
- Linux:
21 seconds per AAAA
- OS X:
75 seconds per AAAA
- iPhone, iPad:
No fallback



Customer Outreach



- Real time detection of “Broken” Users, with a “Window Shade”
- Search results advertising based on keywords
- Traditional PR
- Social channels, blogs





Help Page – with IPv6 test

New User? Register | Sign In | Help Make Y! Your Homepage Yahoo! Mail My Search Web Search

YAHOO! HELP

Home | IPv6 Help Topics | Community

 Learn more about IPv6 readiness



Hi there! Find your answer now.

Search Help

IPv6 Help Topics

- Are you ready for IPv6?

Top IPv6 Questions

- Start IPv6 Test
Press the button to start the test.
- What is IPv6 and why is it necessary?
- What is World IPv6 day?
- Will IPv6 become a permanent change on June 8, 2011?
- What other companies are participating in World IPv6 day?

My Help

[Sign In](#) [Forgot your ID or password?](#)

Sign in to see your account information saved articles and more.

[▶ RECENT SEARCHES \(0\)](#)

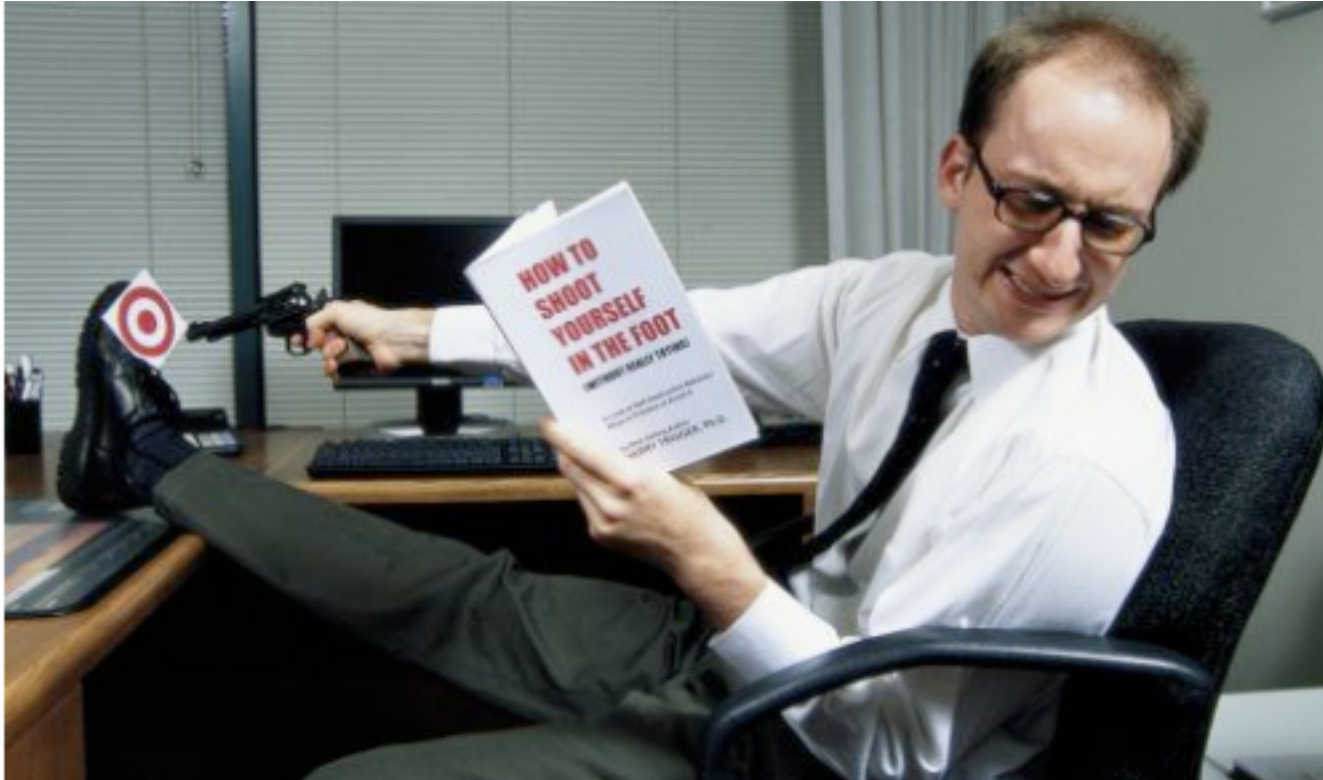
[▶ RECENTLY VIEWED \(0\)](#)

Other IPv6 information sites

- [Internet Society \(ISOC\)](#)

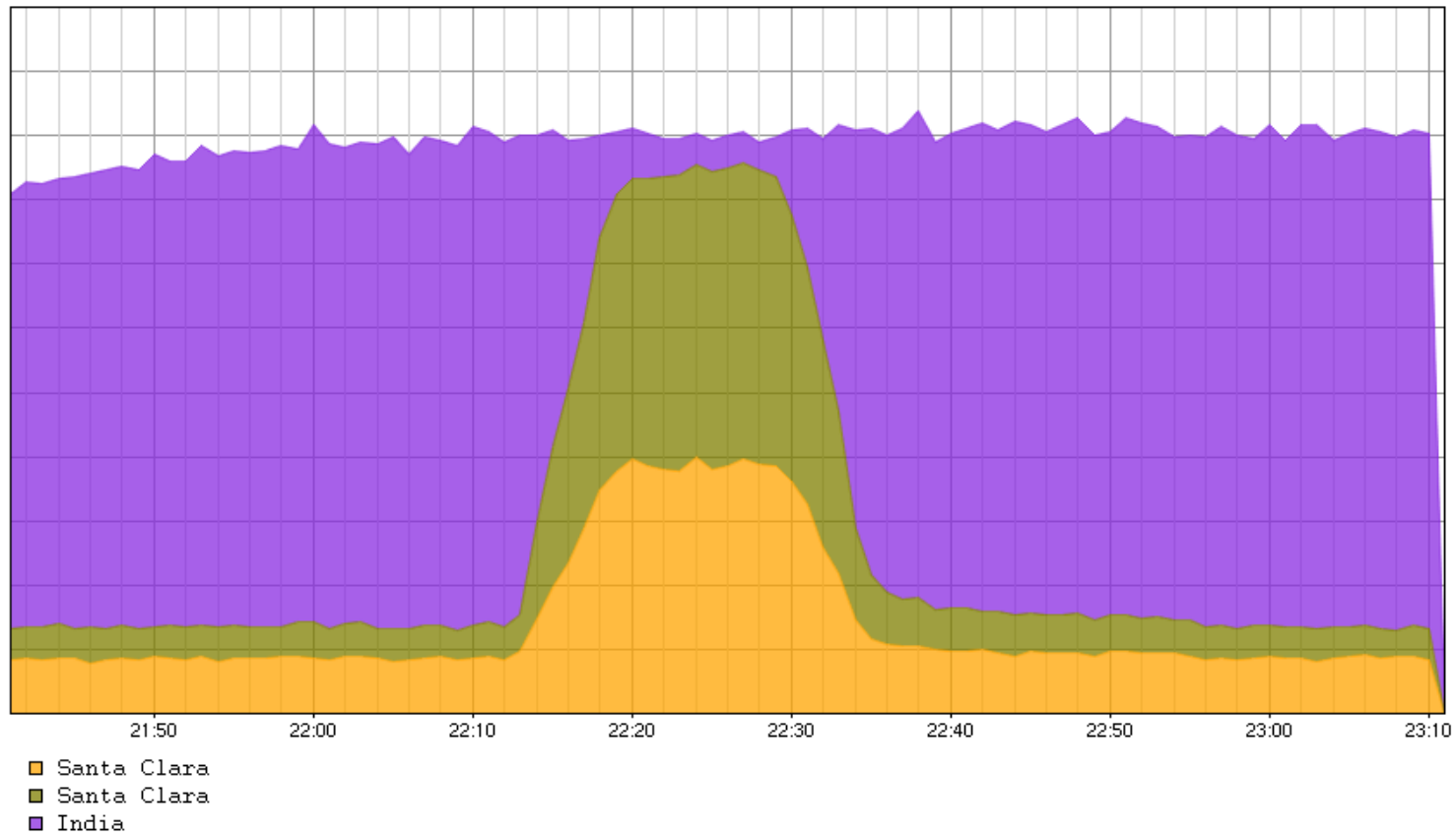


Trial Runs



Test Run #1: 5/31/11, 10:00 PM PDT

intl breakdown for in



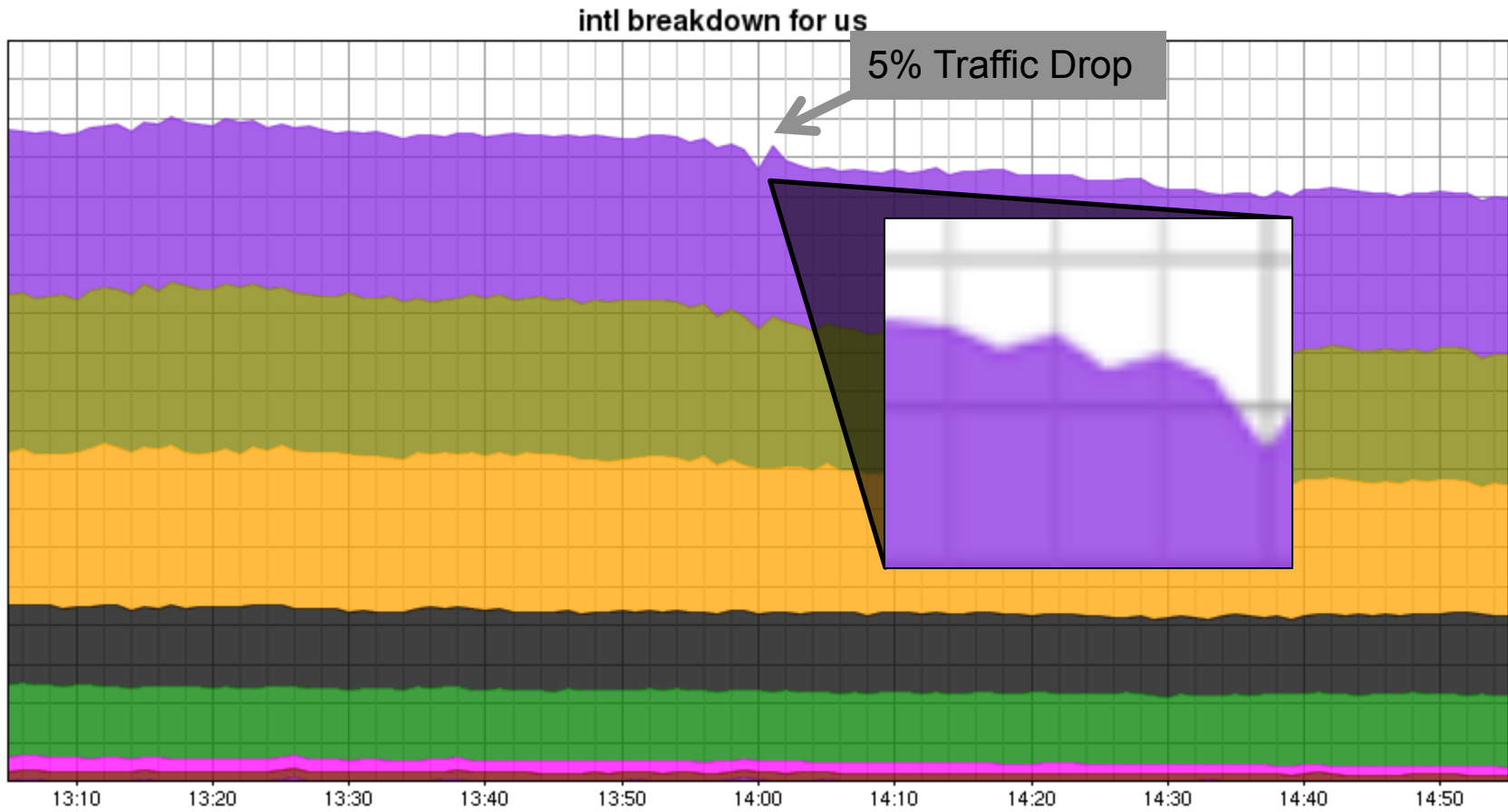
Root cause: Problematic health checks from our DNS infrastructure to the serving layer.



**Monitoring isn't the same in
a dual-stack environment.**



Test Run #2: 6/2/11, 2:00 PM PDT



Root cause: People leaving the office, 5pm Eastern USA time.

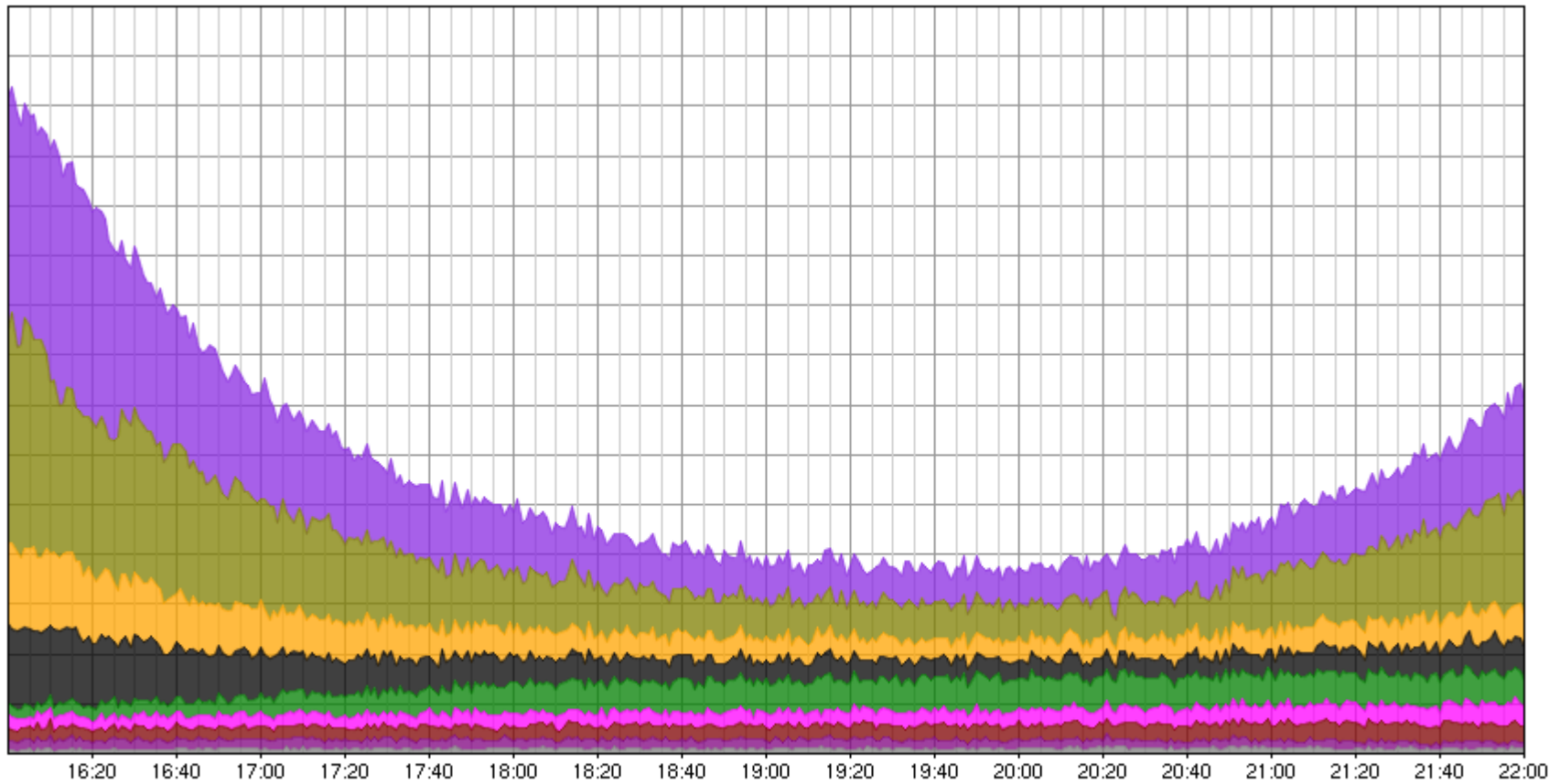


**Don't start something big and risky
at a traffic inflection point.**



UK: What we saw on June 8

intl breakdown for uk

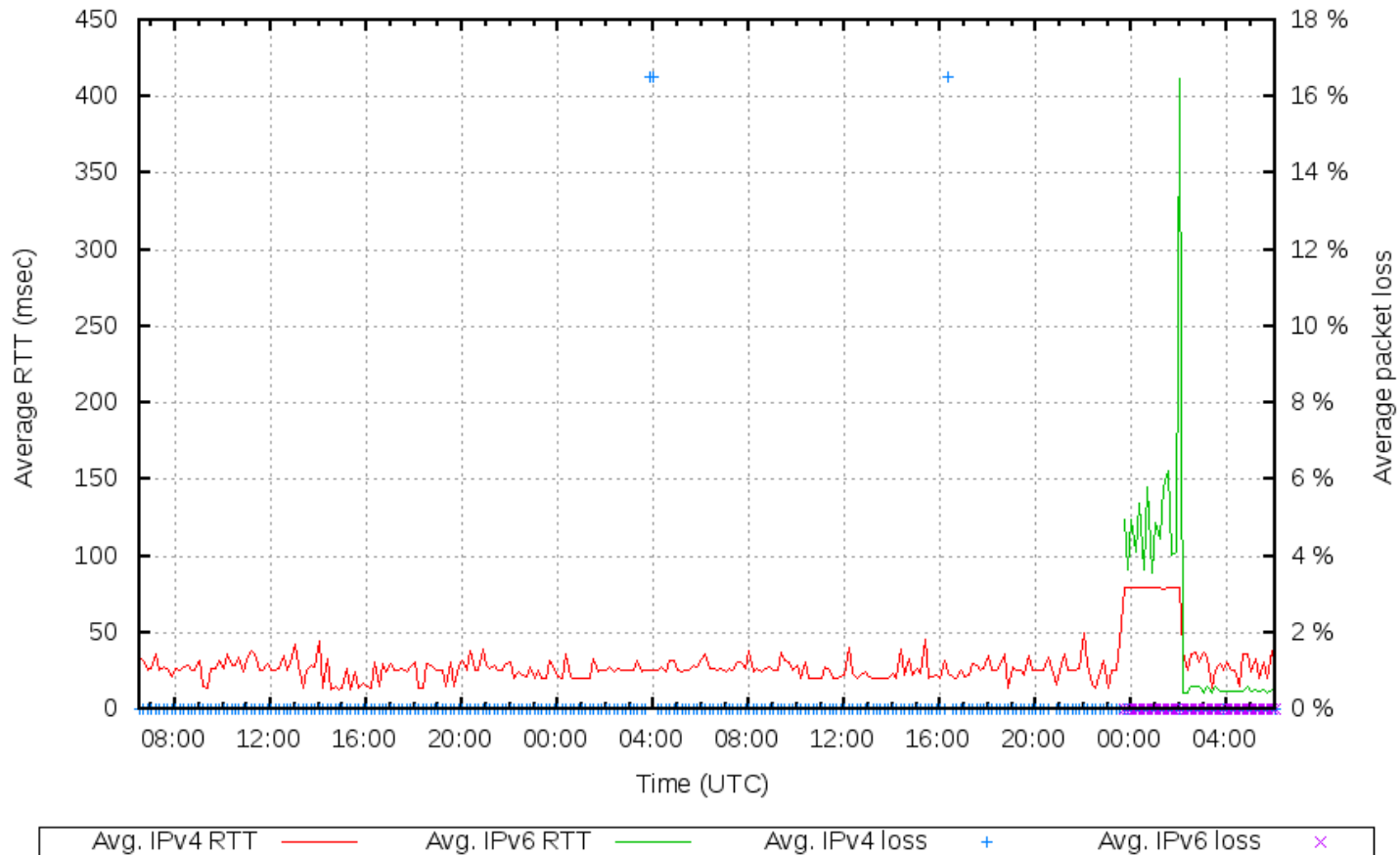


June 7 Pacific (Local)



UK: What RIPE saw on June 8

Ping (RTT) measurements in the last 48 hours, from 'tt120' to Yahoo
as of 2011-06-08 06:20:43 UTC, target: primary site



**Always have more than one
way to look at things.**



Practice makes perfect. For a major change, schedule one or more test runs.



World IPv6 Day Stats



What we feared.

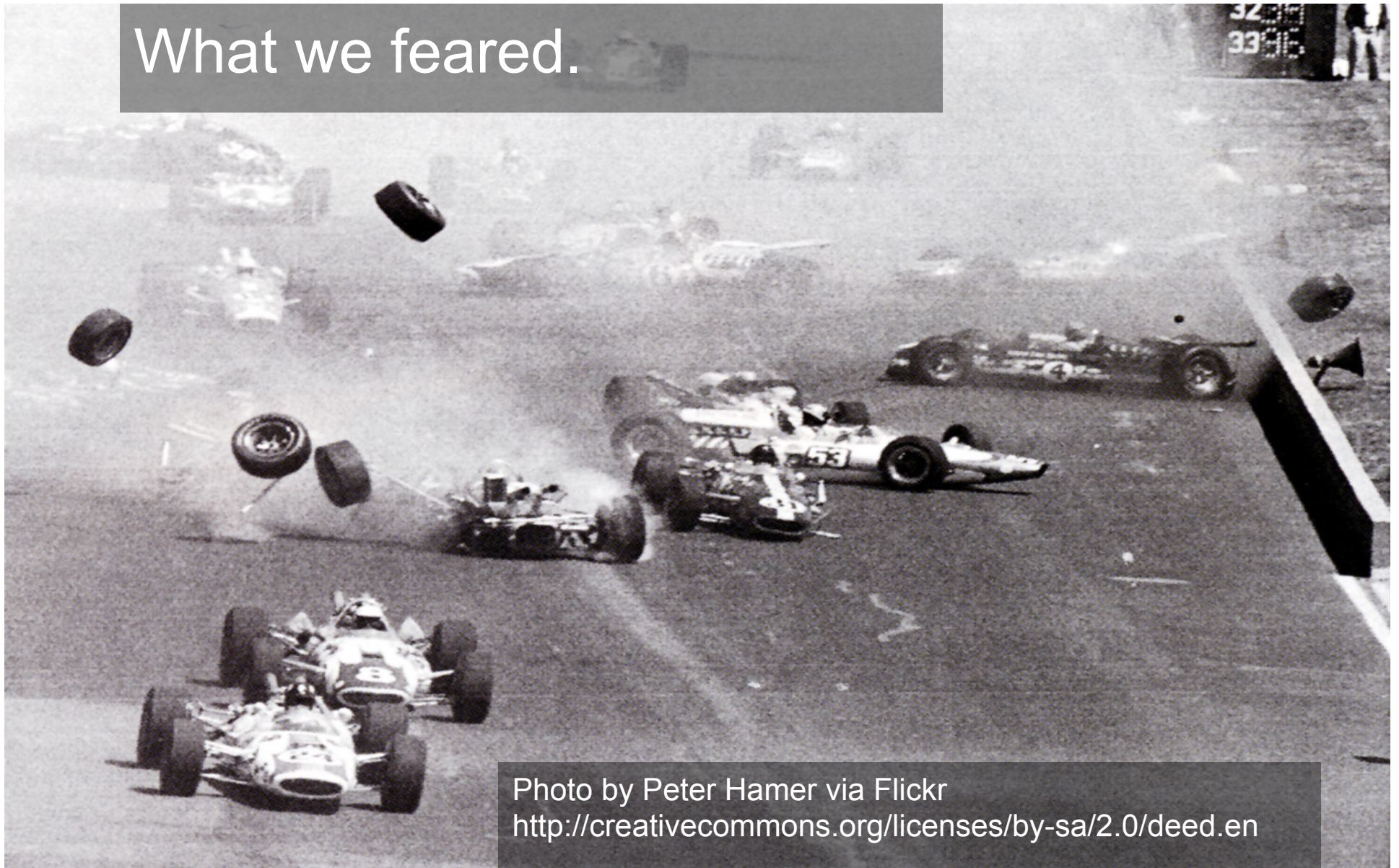


Photo by Peter Hamer via Flickr
<http://creativecommons.org/licenses/by-sa/2.0/deed.en>

Reality.



Photo by CountryLemonade (Garrett) via Flickr
<http://creativecommons.org/licenses/by/2.0/deed.en>



Few support calls

- About 10 calls to Yahoo! Support
- Some ISPs reported no calls
- Some ISPs reported “A few” calls

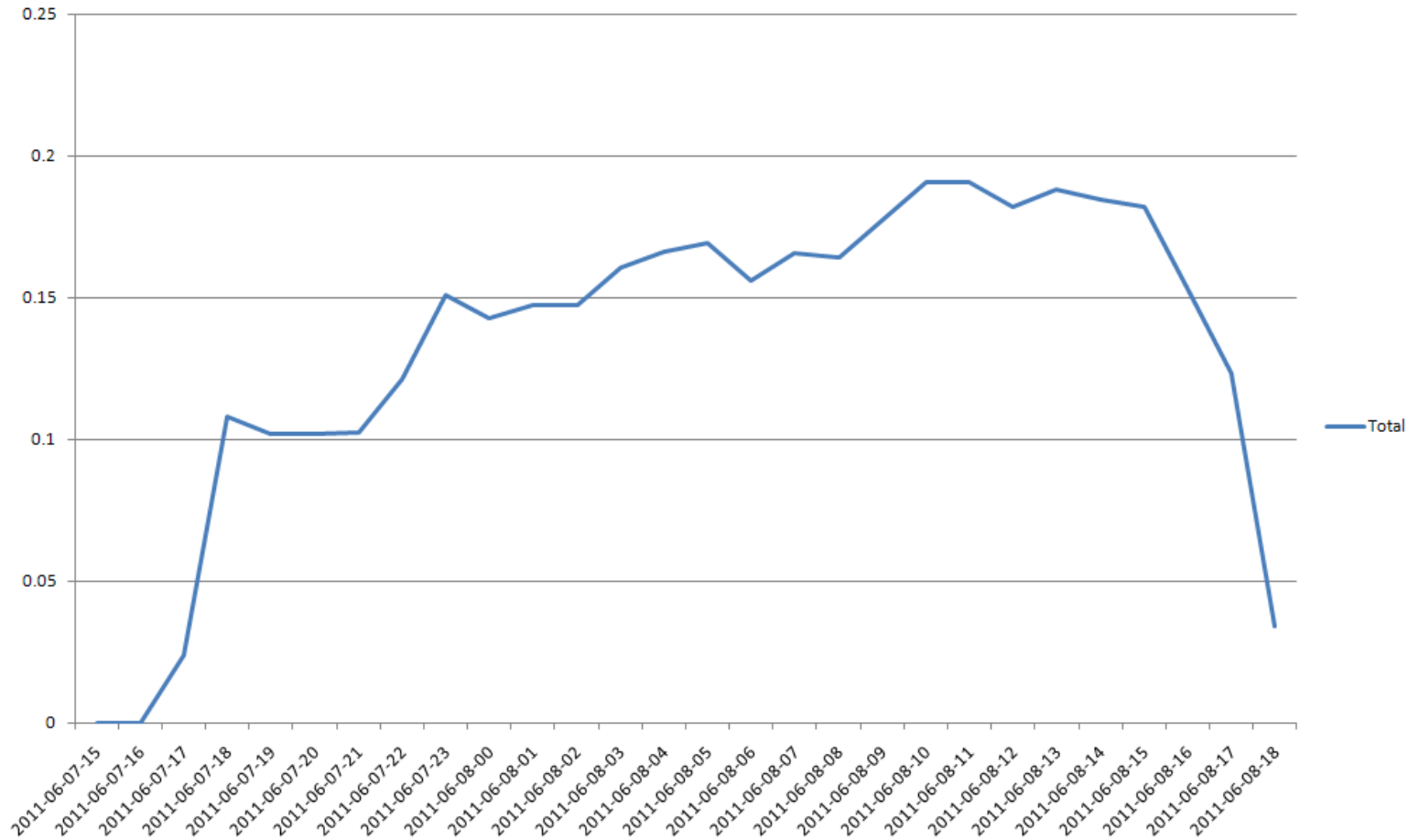


Photo by Seattle Municipal Archives via Flickr
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Per-hour Breakdown (IPv6 pageviews)

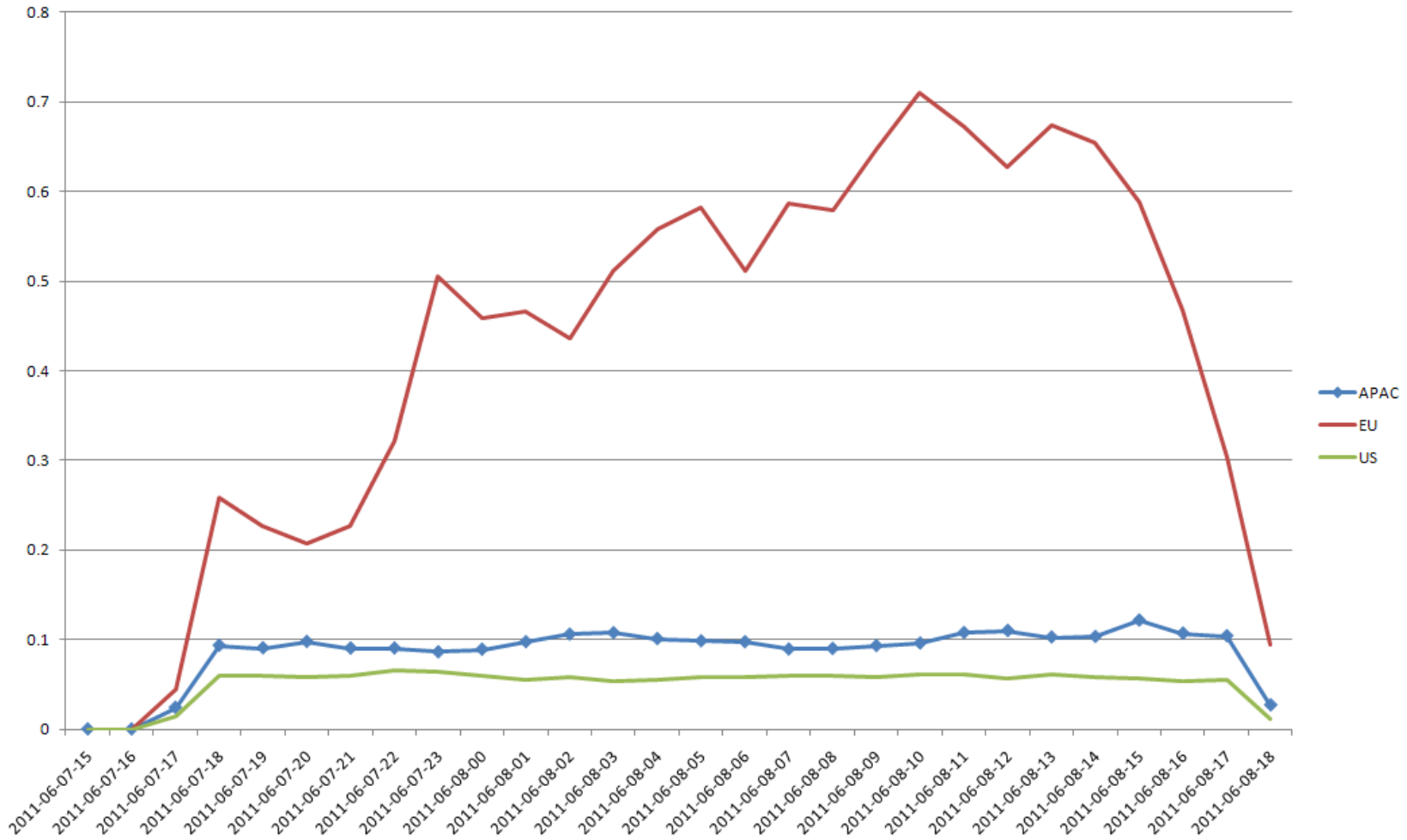
Total



Note: Excludes Y!JP, Y!CN



Per-hour Region Breakdown

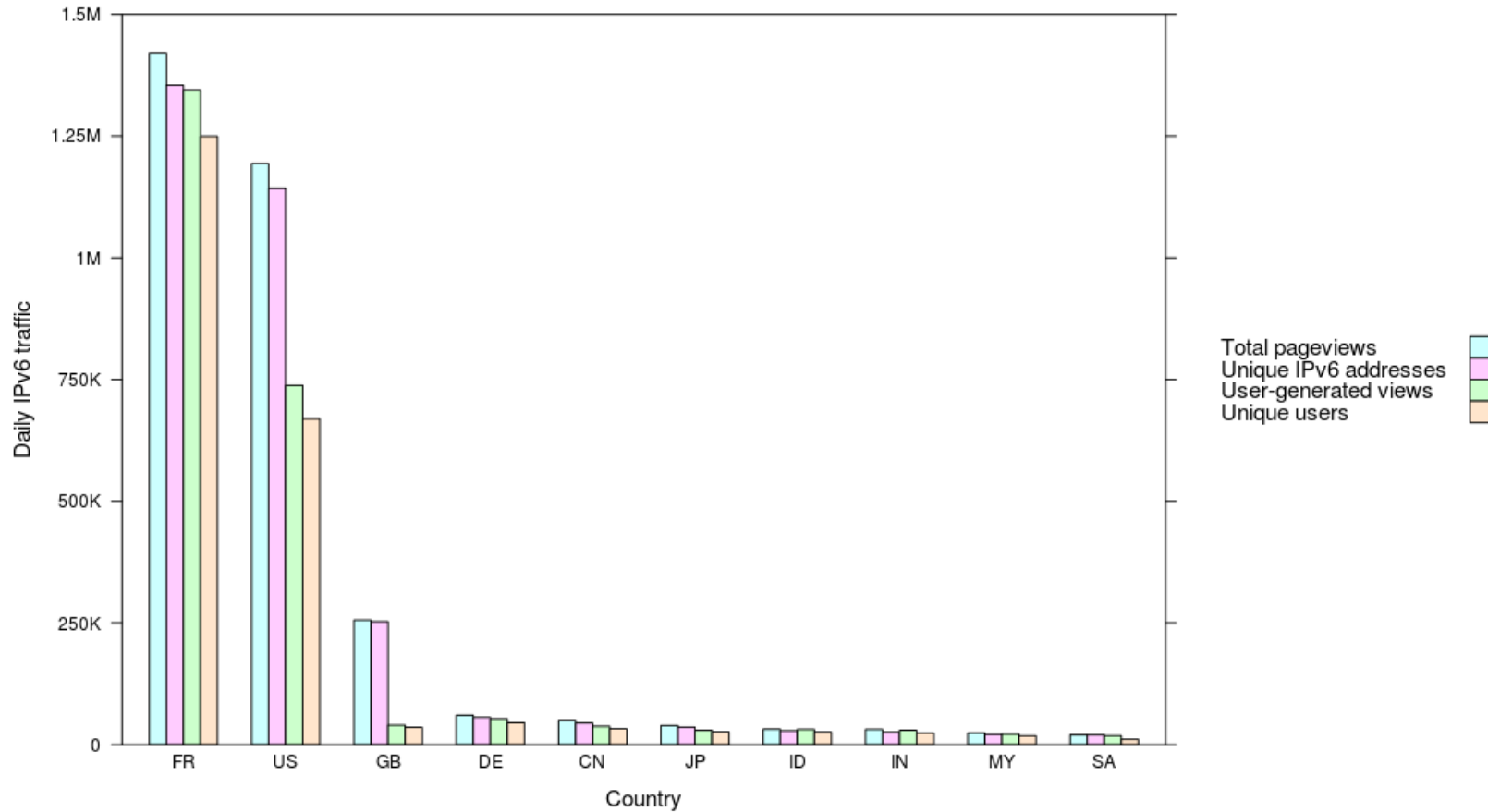


Note: Excludes Y!JP, Y!CN



IPv6 Users by Country

Top 10 countries by IPv6 traffic



Note: Excludes Y!JP, Y!CN



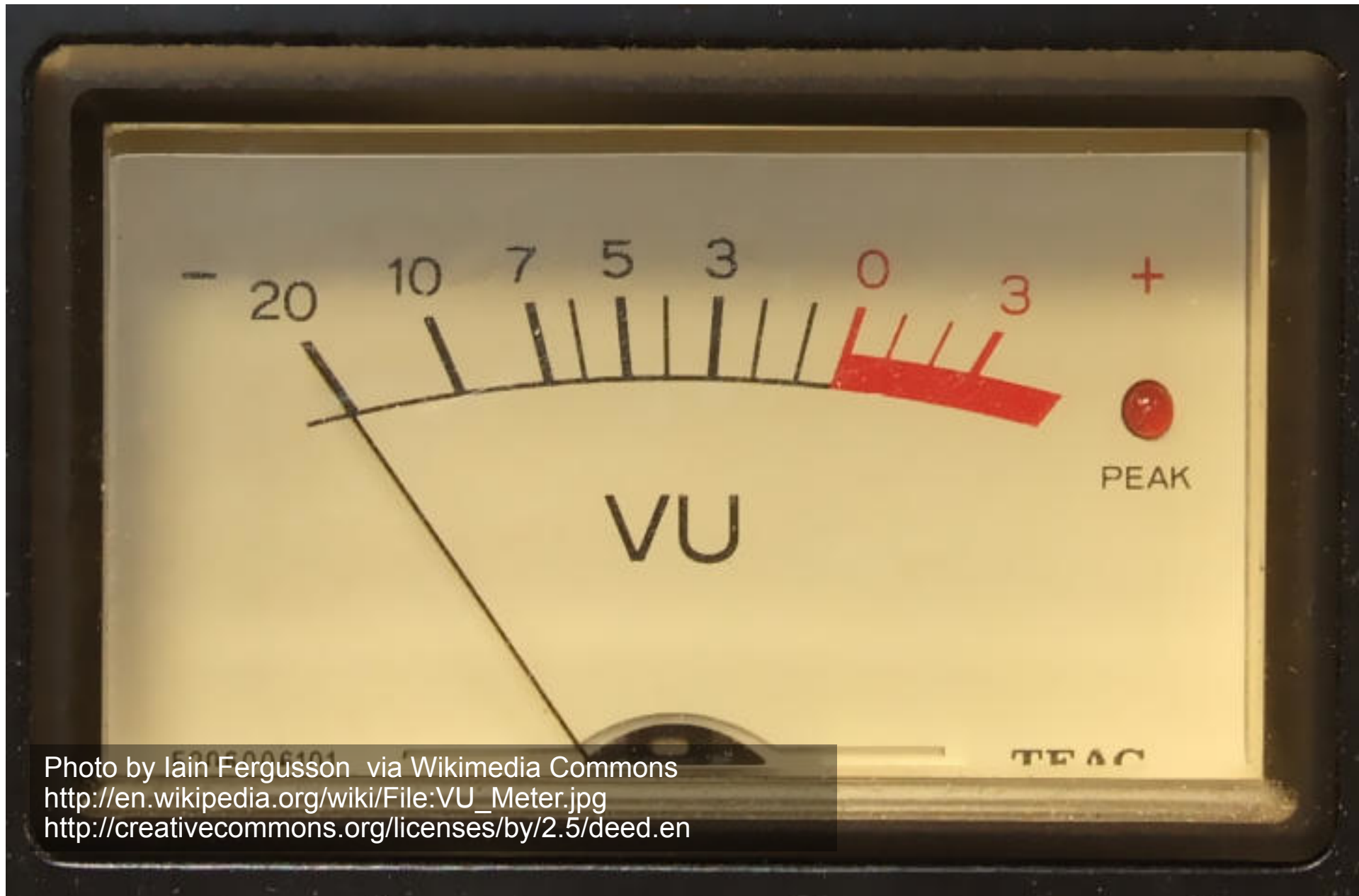


Photo by Iain Fergusson via Wikimedia Commons
http://en.wikipedia.org/wiki/File:VU_Meter.jpg
<http://creativecommons.org/licenses/by/2.5/deed.en>

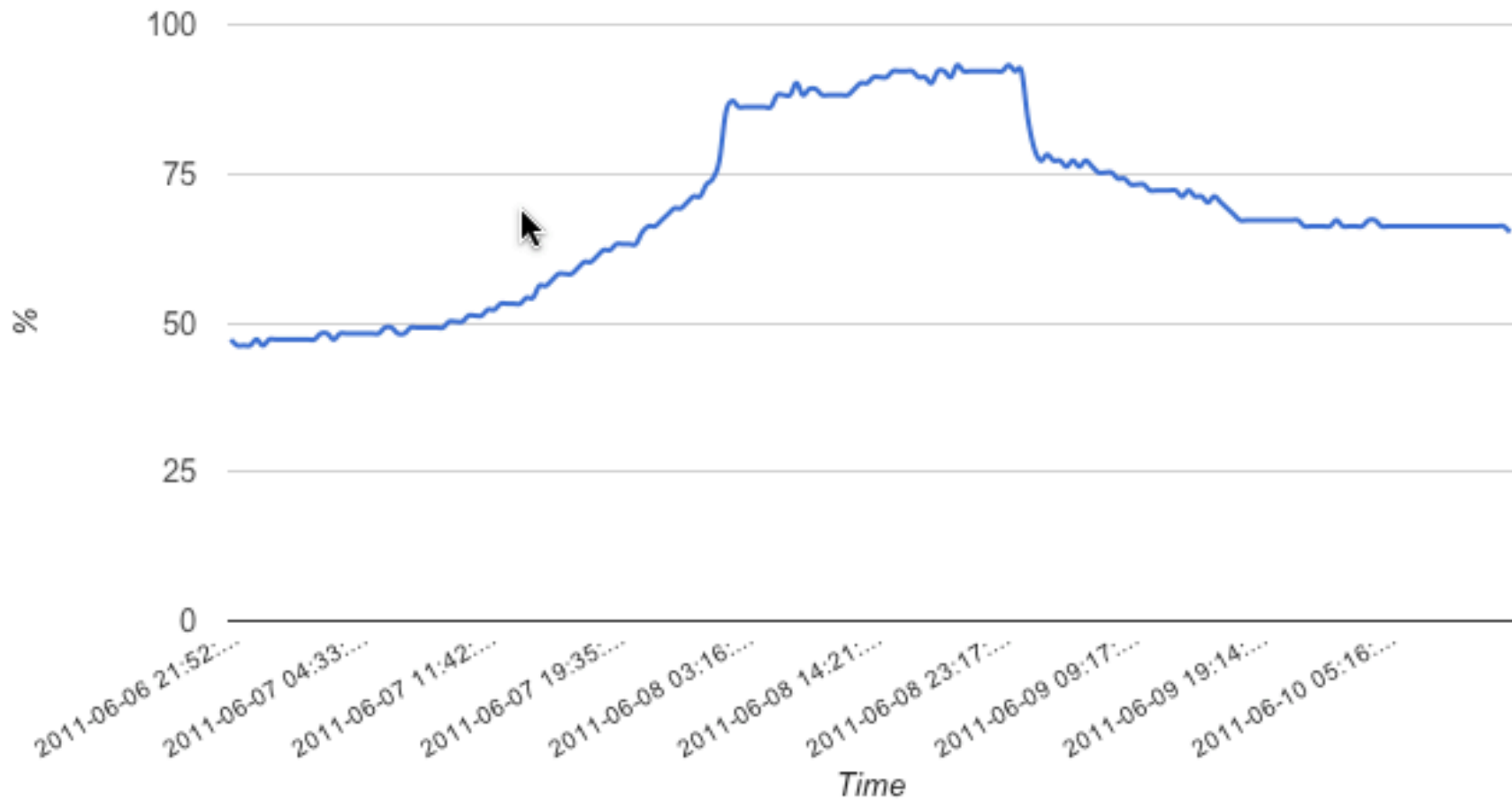
Industry changes



Mac OS X



Percentage of IPv6-reachable Participants



<http://gigondas.dh.bytemark.co.uk/3days.html>



Even the politicians are paying attention.



Photo by USG via Wikimedia Commons
<http://tinyurl.com/3whv8jl>
Public Domain

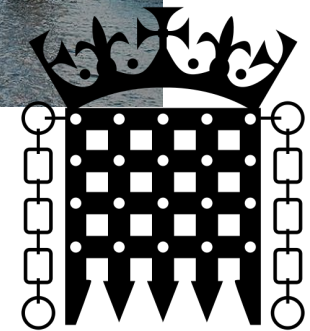


Photo by Mgemelfarb via Wikimedia Commons
http://en.wikipedia.org/wiki/File:Parliament_at_Sunset.JPG
Public Domain



What's next?

- Informal discussions under way
- Should be bigger
- Should be longer
- Access providers more prominent
- Content providers with more content
- More global participation

For Yahoo!

- More locations, closer connectivity
- More Yahoo! Sites
- All page assets, not just HTML



Thank you, Internet Society

- For the tireless evangelism of IPv6
- For bringing everybody together
- For acting as an umbrella for competitors to work under
- For being excellent hosts

And most of all:

- **Thank you for helping give our industry a date.**



Questions?

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Appendix



Example Causes of Broken Users

- Rogue router RA's
- Routers with Private IPv6 (ULA, RFC4193) announcing default IPv6 gateway. Example: Fritz AVM (ie: fc00::/7)
- Routers with bogons configured (ie, 2001:db8::/32)
- Windows Internet Connection Sharing (ICS) announcing default IPv6 gateway, especially 6to4
- Routers advertising RA's – then disappearing
- 6to4 enabled, but performing badly (ie, 2001:0::/32)
- 6to4 or 6over4 (tunnelbroker), IP proto 41 blocked by firewall
- IPv6 enabled, but customer firewall blocking IPv6
- Failed Path MTU Discovery due to filtered ICMPv6
- Walled Gardens



Walled Gardens

- In some locations, IPv6 has been deployed a long time.
- Television, voice, and internet combined
- Customers have IPv6 default route visible to their PC
- But limited to the ISP network – not the public network.

- Example: NTT Japan
 - › Will send TCP RST to fail IPv6 connections faster
 - › Windows will ignore this
 - › Concerned about World IPV6 Day and TCP RST capacity
 - › Some Japanese ISPs are considering filtering AAAA records ☹

