

World IPv6 Day Observations

www.WorldIPv6Day.org

Leslie Daigle

Internet Society

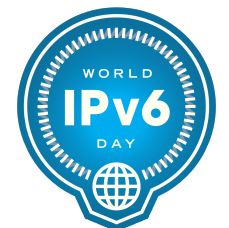
What was World IPv6 Day?

For 24 hours on 8 June 2011 (00h00-23h59 UTC) Facebook, Google, Yahoo! and more than 1000 other websites turned on IPv6 access on their “front door”

Goals:

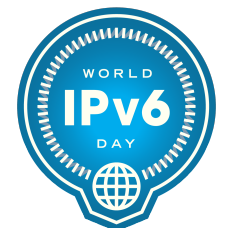
- **Motivate Internet service providers, hardware makers, operating system vendors, Web companies and others to prepare their services for IPv6**
- **Understand what issues still need to be addressed to ensure a successful transition to IPv6 as IPv4 addresses run out.**

While there have been similar notable efforts, World IPv6 Day was the first global, real-world “test-flight” of IPv6, and the largest ever.



Motivations for the World IPv6 Day Event – and impacts

- **Breaking the chicken-and-egg problem of IPv6 deployment – networks clearly see that content is getting there**
- **Improving IPv6 connectivity by understanding outstanding issues faced by a small percentage of users (but significant numbers for large content providers) – more fixes are in flight**
- **Providing a target date for already planned IPv6 rollouts – people definitely responded to having a date**
- **Spurring organizations to create a plan for rolling out IPv6 – being like Google, Facebook, and Yahoo! is important**
- **Catalyzing the kind of collaboration that the Internet has relied upon through its history – people noticed that the Internet industry came together to advance something that is important for the overall long term health of the Internet**



Global Response

Initial commitment from websites:

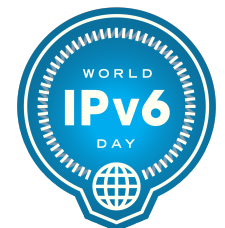
- Facebook
- Google
- Yahoo!

And content delivery networks:

- Akamai
- Limelight Networks

Interest from websites, ISPs, hosting companies, exchanges, vendors around the world

- More than 1000 organizations contacted us
- 1000s of websites turned on IPv6 for 24 hours



Who turned up IPv6 on June 8?

www.google.com

www.facebook.com

www.youtube.com

www.yahoo.com

www.yahoo.co.jp (#12)

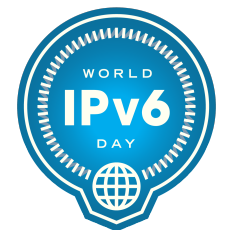
www.bing.com (#21)

www.microsoft.com (#25)

www.bbc.co.uk (#38)

www.cnn.com (#48)

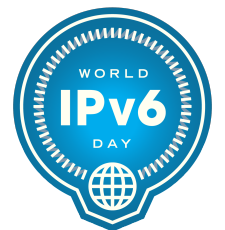
www.aol.com (#55)



If you were in Korea...

www.naver.com (#1)

www.daum.net (#4)



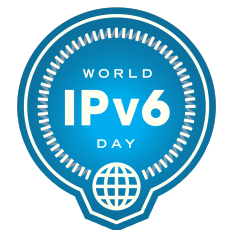
If you were in the Czech Republic....

www.novinky.cz (#6)

www.super.cz (#10)

www.firmy.cz (#21)

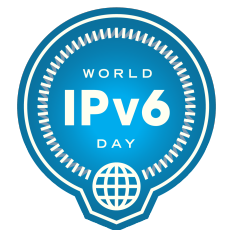
www.mapy.cz (#22)



If you were in Brazil....

www.terra.com.br (#12)

www.ig.com.br (#15)



Hosting companies added thousands of domains, addressing the long tail of websites

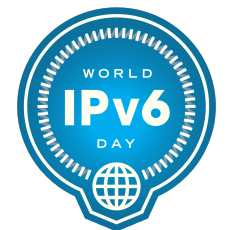
www.host.md (@4500 - permanent)

www.task.com.br (@7000 – left on)

www.df.eu (@700,000)

www.strato.de (@4,000,000 – left on)

... others with 1000s and 10000s of thousands



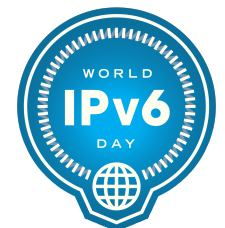
Broad observations

Participating sites

- Documented through an IPv6 reachability dashboard
 - <http://www.worldipv6day.org/participants-dashboard/index.html>
- Roughly 2/3rds of the participating sites who contacted us remained on

Traffic increased and remained higher

- Ripe Labs measured impact on IPv6 traffic
 - <http://labs.ripe.net/Members/emileaben/measuring-world-ipv6-day-long-term-effects>
- No large scale breakage
- DDOS fears did not pan out
- **SUCCESS!** *Moved the needle on IPv6 deployment*



Don't take it from me... listen to our panelists

Anchor content providers

Google – Lorenzo Colitti

Facebook – Donn Lee

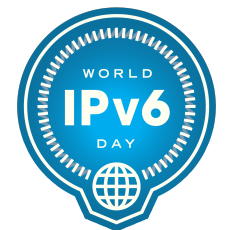
Yahoo! – Igor Gashinsky

ISP

Telefónica – Carlos Ralli Ucendo

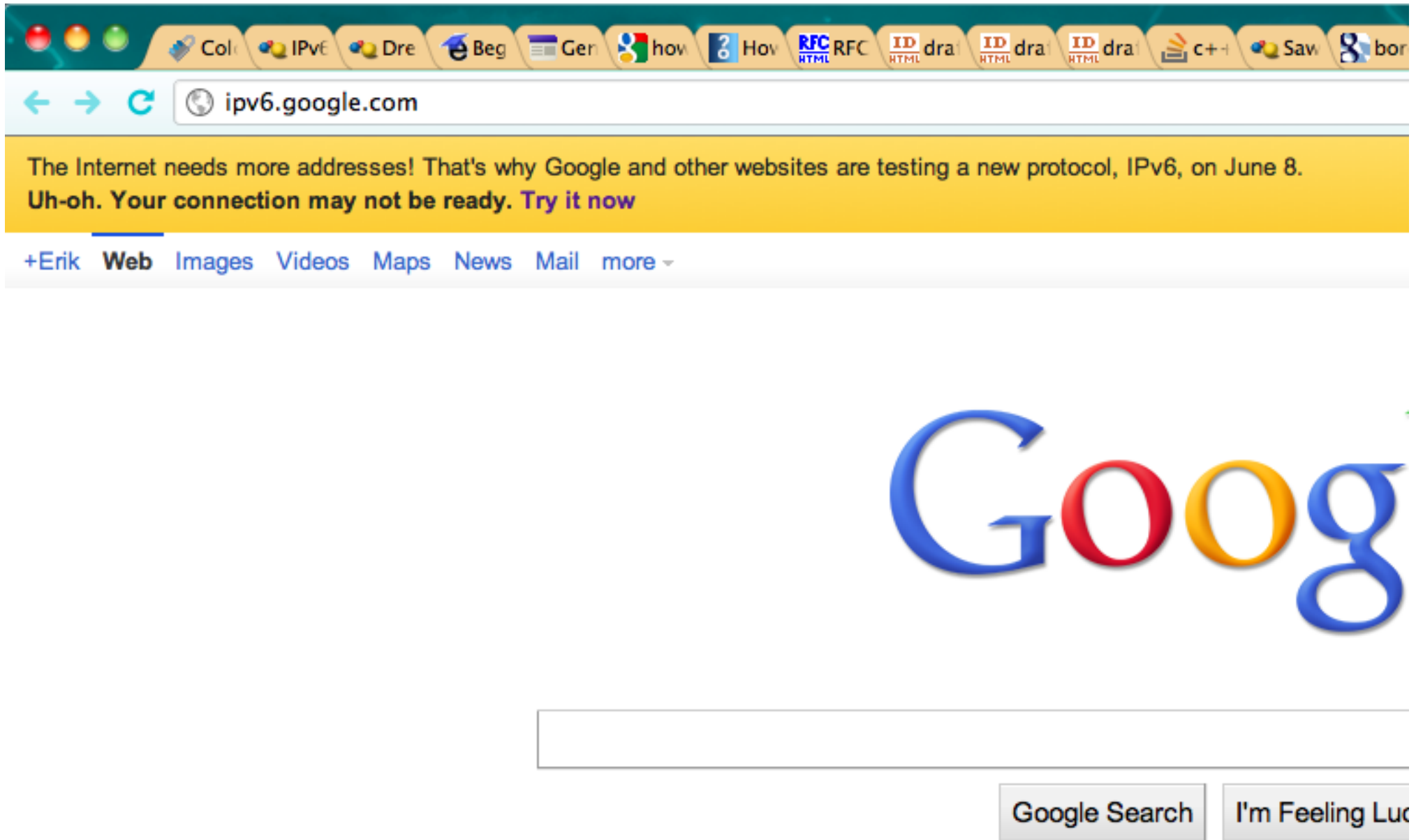
Enterprise

Cisco – Mark Townsley

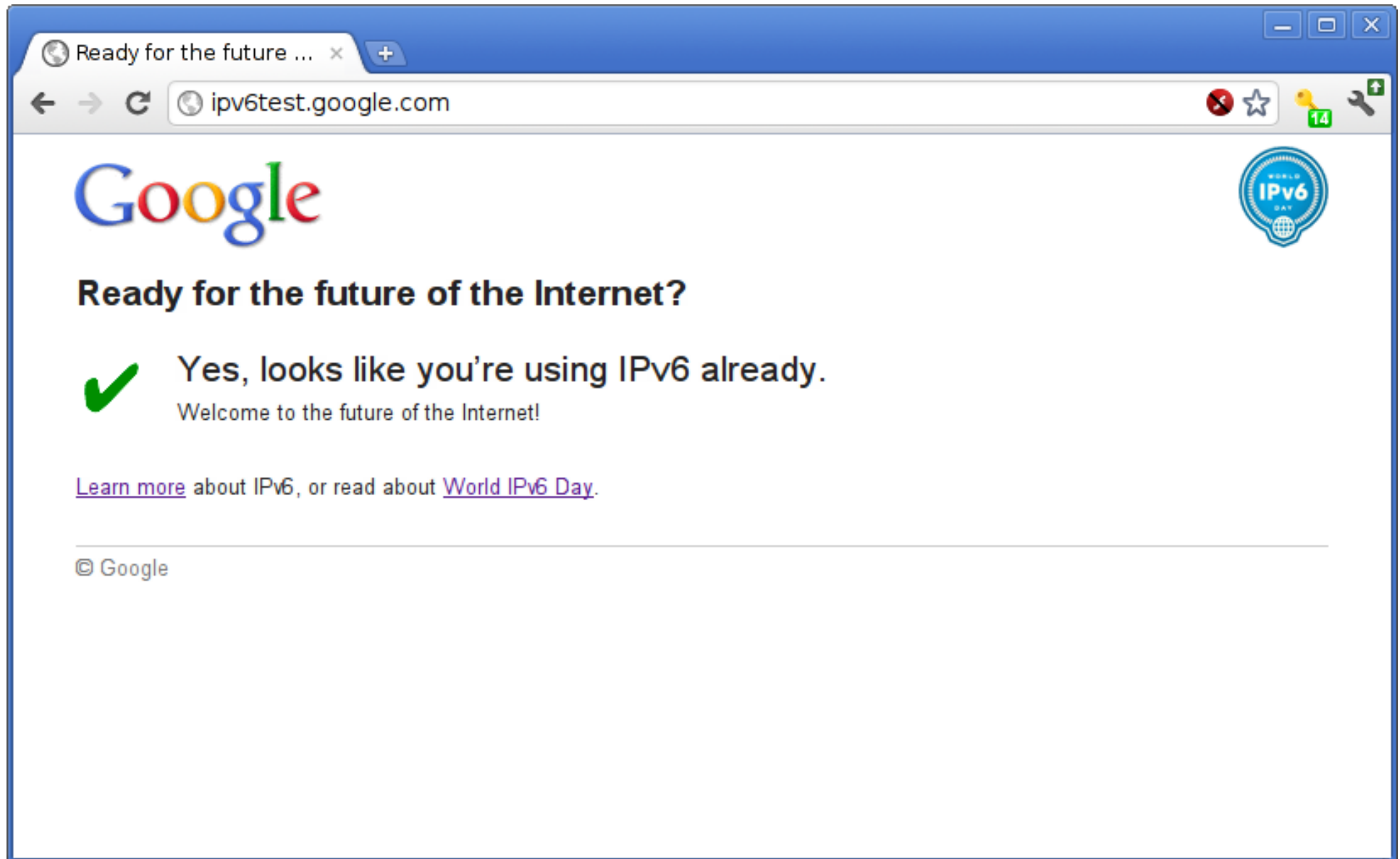


Google

Preparation: warning broken users



Preparation: ipv6test.google.com



The screenshot shows a web browser window with the address bar displaying "ipv6test.google.com". The page content includes the Google logo, a "World IPv6 Day" badge, and a message: "Ready for the future of the Internet? Yes, looks like you're using IPv6 already. Welcome to the future of the Internet!". A link to "Learn more about IPv6, or read about World IPv6 Day." is also present.

Ready for the future ... x +

← → ↻ ⌵ ⭐ 🔑 14 ⚙️

Google

World IPv6 Day

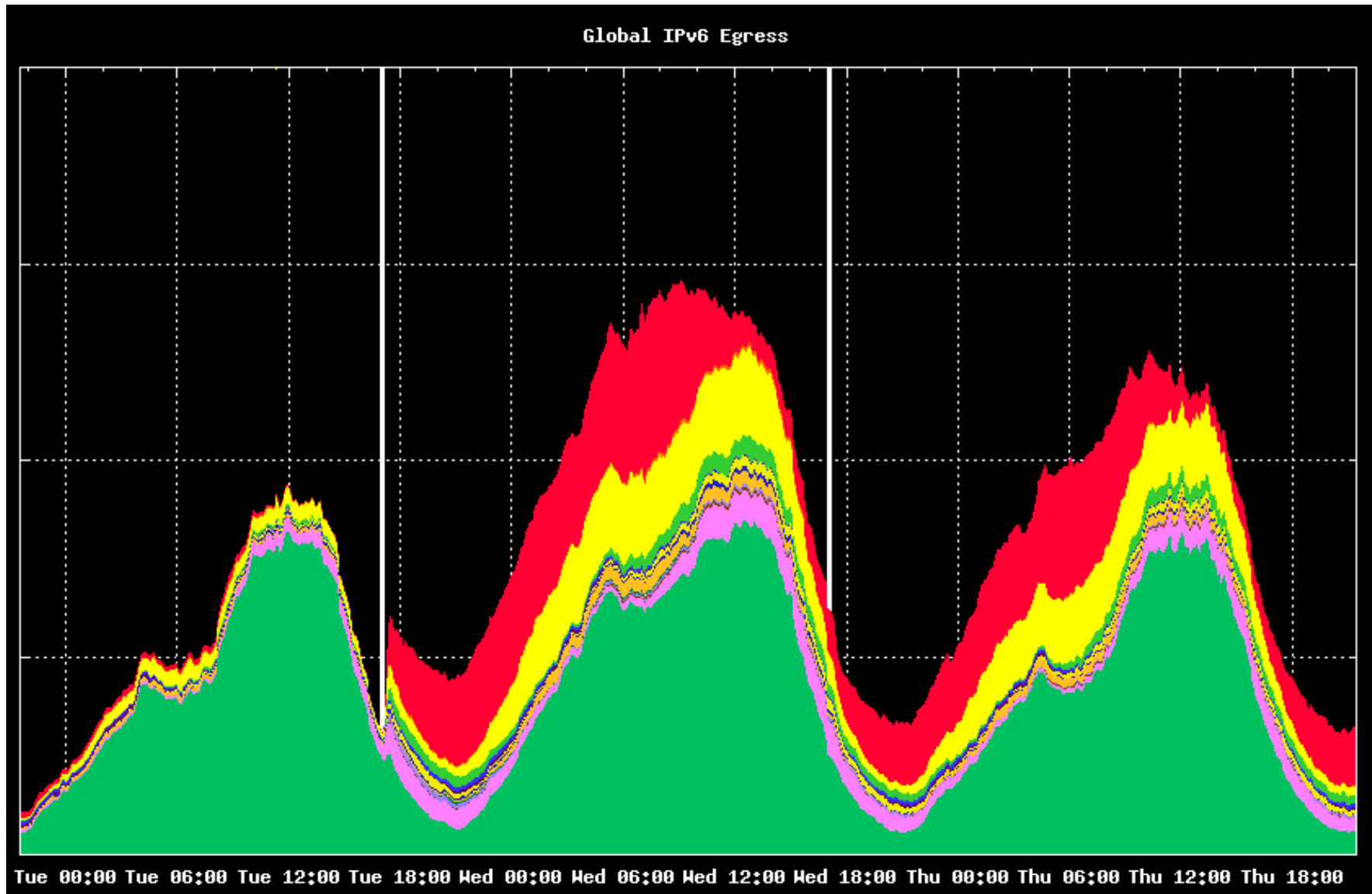
Ready for the future of the Internet?

✓ **Yes, looks like you're using IPv6 already.**
Welcome to the future of the Internet!

[Learn more](#) about IPv6, or read about [World IPv6 Day](#).

© Google

On the day: business as usual

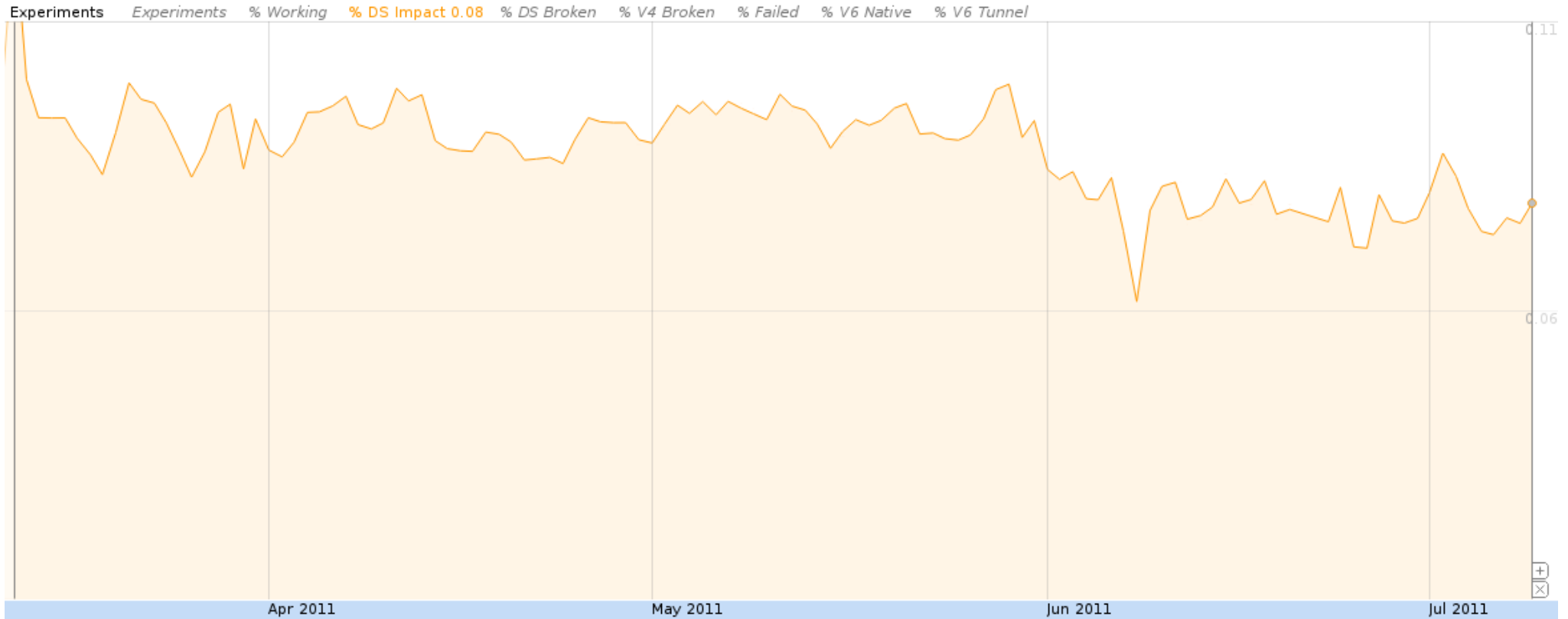


We were already serving 60% of the IPv6 Internet

Technical progress

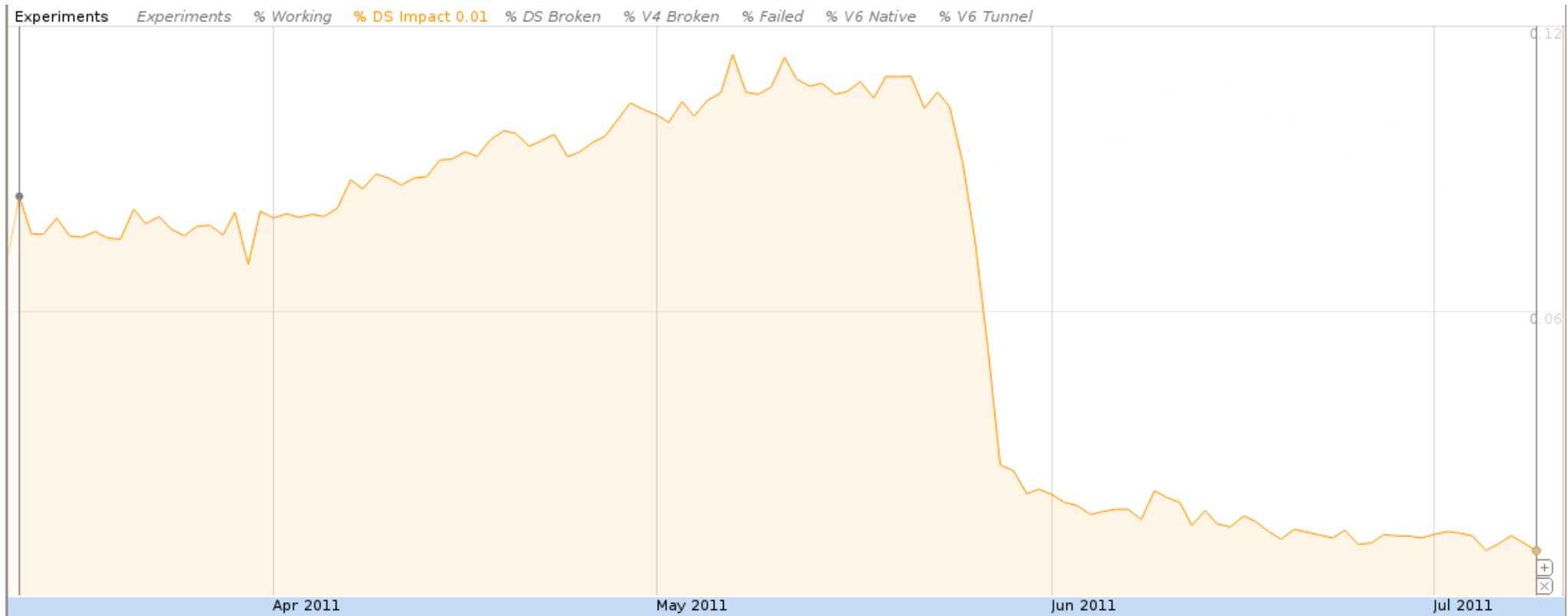
- A number of services became available over IPv6
 - Voice, talk, mobile talk, analytics, tools, ...
 - Google Public DNS - 2001:4860:4860::{8888,8844}
 - Adwords and IMAP/SMTP (soon after the day)
 - Almost all Google services now available over IPv6
- Some services left IPv6 on for everyone
 - YouTube videos, mobile gtalk
- Implemented fast fallback from IPv6 to IPv4 in Chrome

IPv6 brokenness (excluding Chrome)



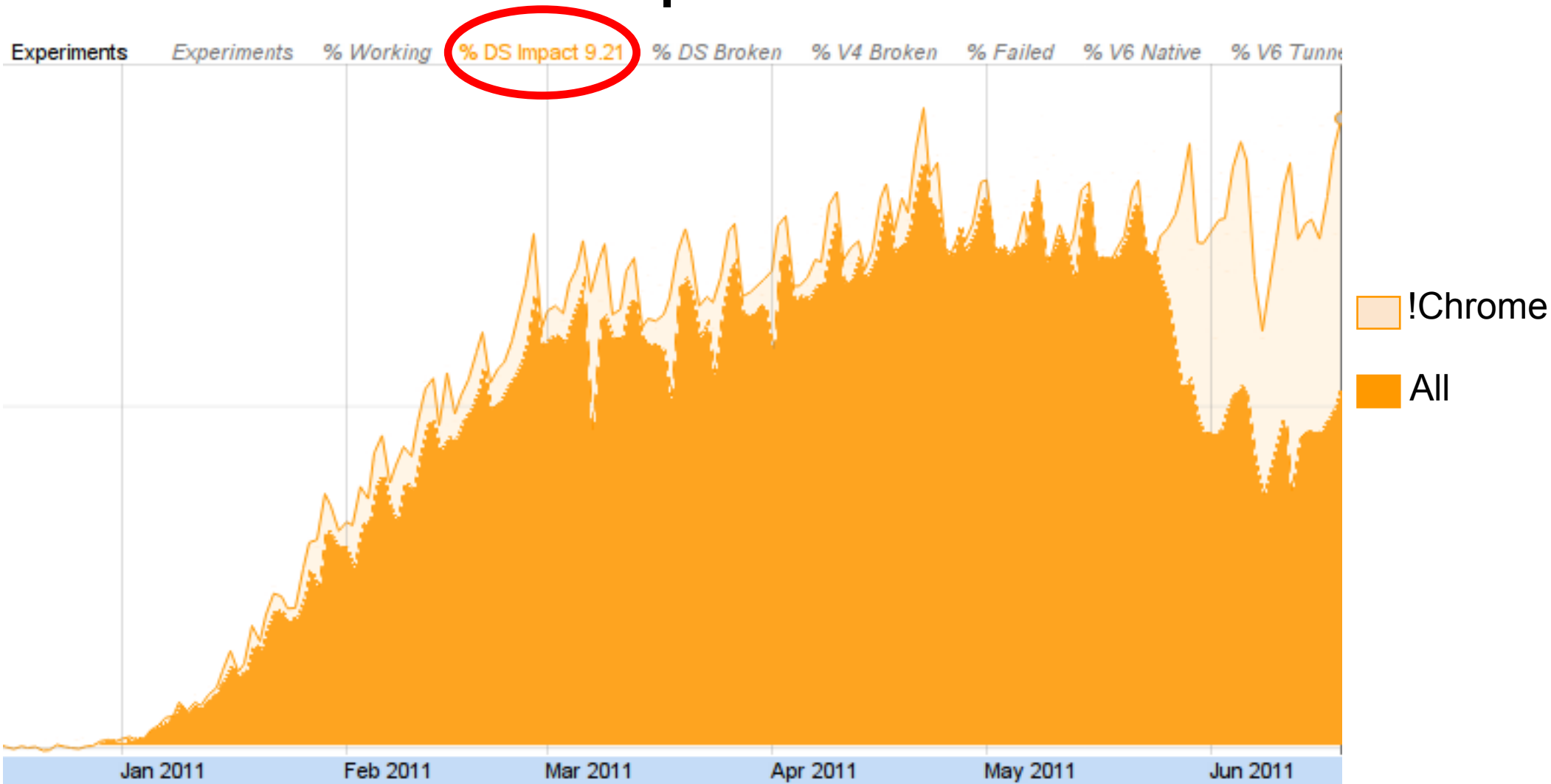
No change around World IPv6 Day

Chrome IPv6 Brokenness



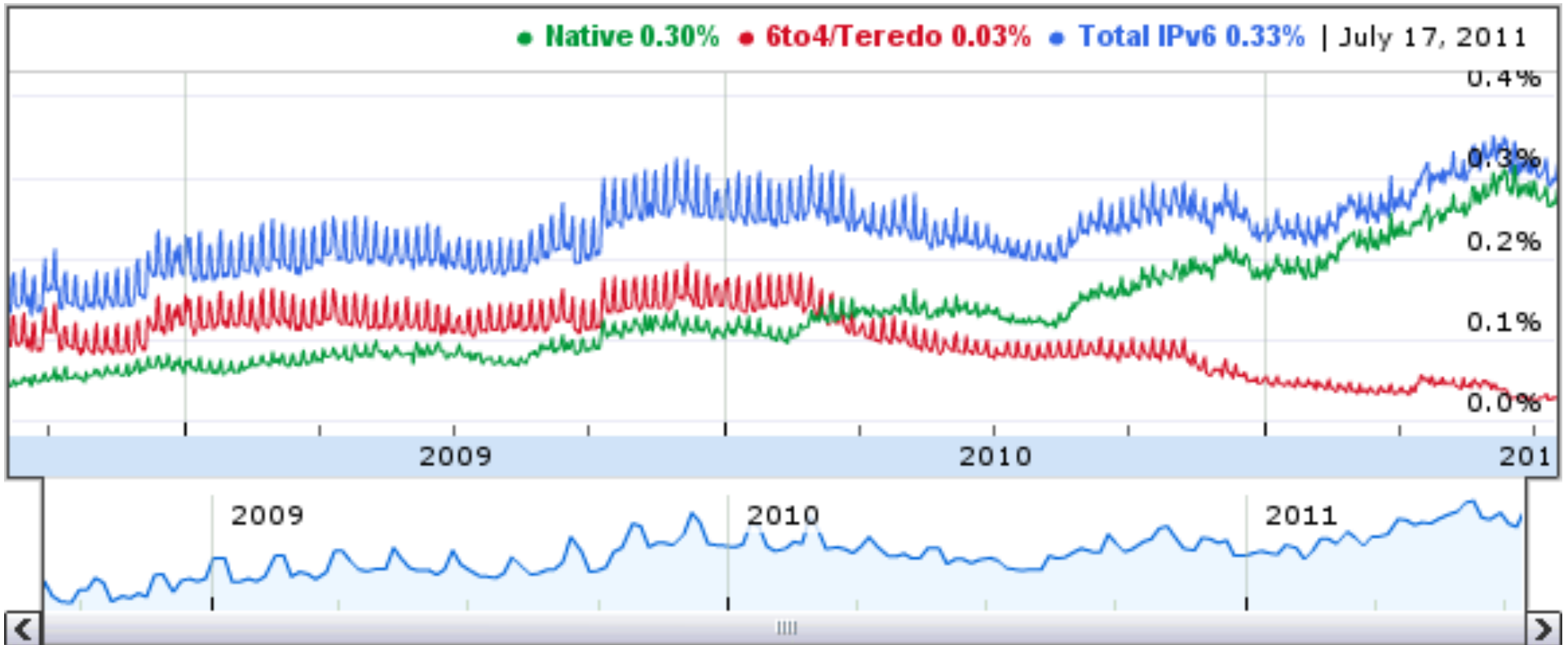
- 80-90% reduction in dual-stack brokenness
- Versions with fast-fallback 99.995% as reliable as IPv4
- Similar behaviour will be in Firefox 7
- Apple also added robustness in OS X Lion
- If IE follows suit, users with recent browsers should be OK

Brokenness hotspots



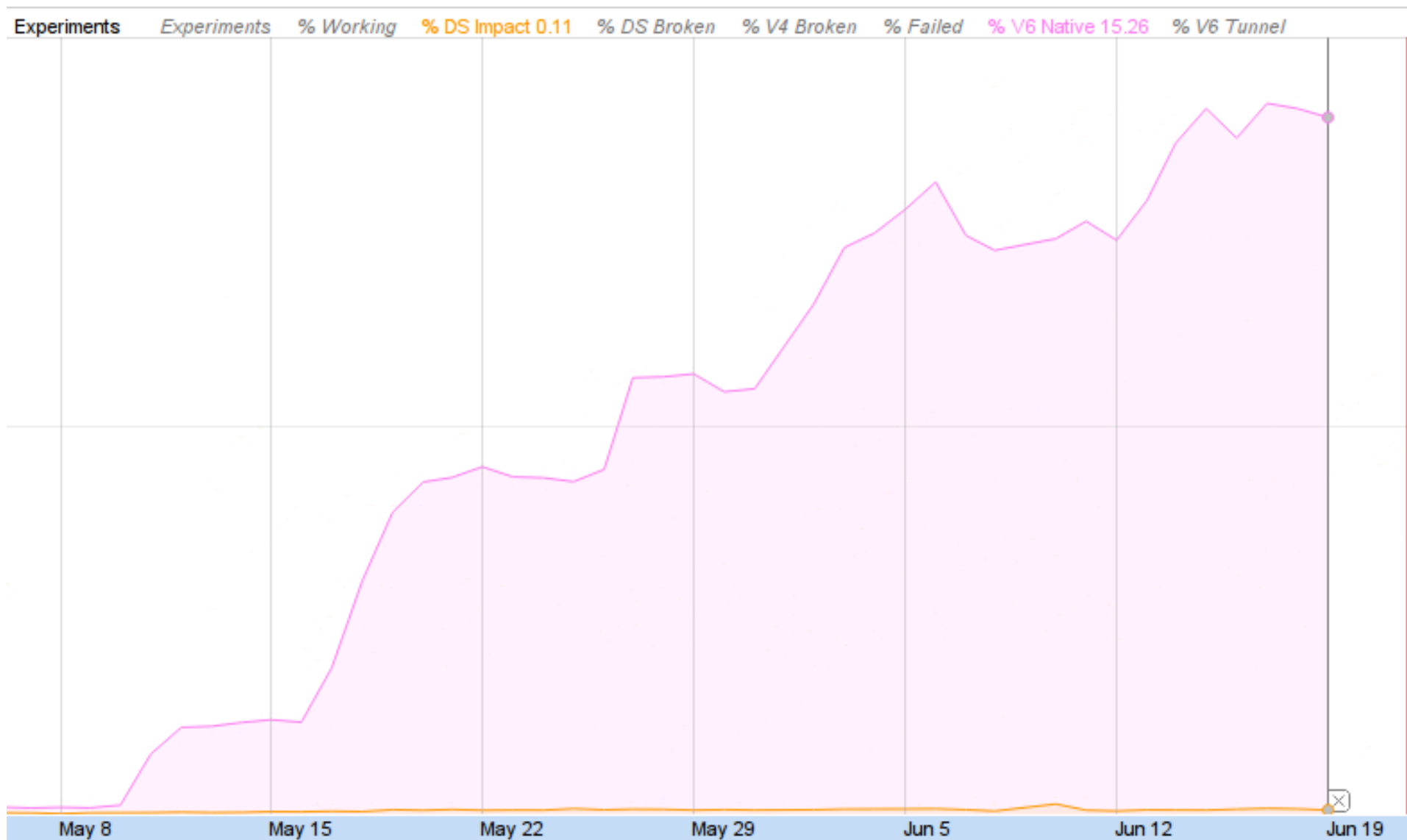
- Top AS has 9% dual-stack failure rate
- Top 5 ASes responsible for almost 50% of brokenness

Adoption



- Still 0.3%
 - France 3.4%, Japan 1.4% (since May)
 - Without France and Japan, 0.1%
 - Japan only joined the game recently

KDDI



- IPv6 to 15% of their users in 5 weeks!
- Just in time for World IPv6 Day

Facebook

facebook

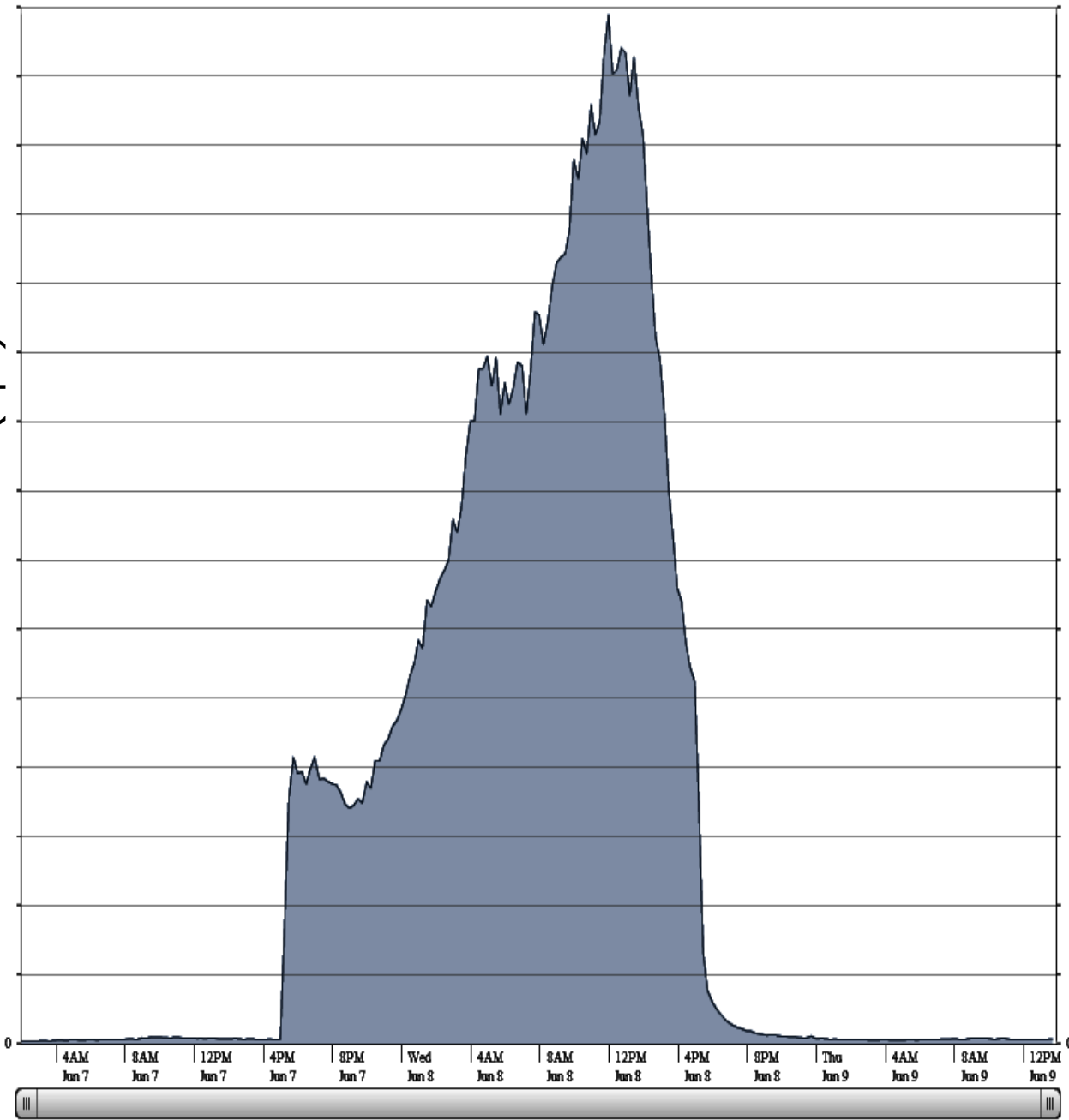
World IPv6 Day at Facebook

Donn Lee
Network Engineering Team
25 July 2011
IETF 81, Quebec City

Why IPv6 matters to us

- Standard model
- Open, direct access
- Innovation
 - Inclusion, Low barriers to entry
 - Creativity, creation
- Avoids brittleness, complexity of alternate solutions
- Scale for future generations

IPv6 traffic (bps)



Stats

- IPv6 capable users: 0.20%
 - IPv6: 0.16%
 - 6to4: 0.04%
 - Teredo: Nearly zero
- DS brokenness: ~0.02% of users
 - Down from 0.03% pre-W6D
- Via non-intrusive browser testing

W6D 24-hour period: >1 million IPv6 users

Message to broken users

The image shows a screenshot of the Facebook homepage from around 2011. At the top, the Facebook logo is on the left, and a search bar is on the right. Below the logo, the user's profile information for 'Donn Lee' is visible, including a profile picture and a link to 'Edit My Profile'. A notification banner is prominently displayed, stating 'Avoid Slow Load Times on June 8th' and explaining that Facebook is participating in 'World IPv6 Day' and that users' computers might not be ready. A 'Configure My Computer' button is provided. The left sidebar contains navigation links for 'News Feed', 'Messages' (90), 'Events' (1), 'Friends' (79), and various groups like 'RC @ Facebook', 'FB Neteng', 'Facebook Ha' (7), 'Social' (44), and 'More' (8). Below these are 'Game Requests' (38) and 'App Requests' (39). The main content area shows the 'News Feed' with a 'Share:' menu (Status, Photo, Link, Video, Question) and a text input field 'What's on your mind?'. The first post is from 'Maggie Ma', who added 24 new photos to an album titled 'Malaysia Kota Kinabalu recovering last day - 6th of June 2011'. The album contains three photos: a group of people sitting around a table, a display of various bottles, and a close-up of a bottle with a price tag of 'RM56.00++'. The album title is repeated at the bottom of the post.

Developers site permanently dual-stacked

```
;; ANSWER SECTION:  
developers.facebook.com. 30      IN      AAAA    2620:0:1c00:0:face:b00c:0:4
```

DS to everyone via Facebook Connect (2.5M websites)

The image shows a screenshot of the CNN U.S. website. The top navigation bar is red with the CNN U.S. logo and a search bar. Below the navigation bar, the main headline reads "Tears, congratulations as Atlantis lands, shuttle program ends". To the right of the headline, there are social sharing buttons for Twitter, Share, Email, Save, and Print. Below these buttons is a Facebook "Recommend" button, which is highlighted by a yellow arrow. To the right of the "Recommend" button, it says "1,474 people recommend this. Be the first of your friends." Below the main headline, there is a section for "Full cast and crew" with names like Cindy Katz and Brian Anthony Wilson. To the right of the cast list, there is a "Connect with IMDb" widget. The widget features the IMDb logo, the text "IMDb on Facebook", a "Like" button, and a list of people who like IMDb, including Thomas, Joel, Dave, Mark, and David. A yellow arrow points to the IMDb widget. Below the cast list, there is a "Storyline" section with a paragraph of text.

Set edition preference

CNN U.S.

SEARCH

POWERED BY Google

Home Video NewsPulse U.S. World Politics Justice Entertainment Tech Health Living Travel iReport Money Sports

Tears, congratulations as Atlantis lands, shuttle program ends

See show times »

Twitter Share Email Save Print

Recommend 1,474 people recommend this. Be the first of your friends.

Cindy Katz ... Marla Sutton

Brian Anthony Wilson ... Detective (as Brian A. Wilson)

Full cast and crew »

Storyline

An action-thriller about a writer who takes an experimental drug that allows him to use 100 percent of his mind. As one man evolves into the perfect version of himself, forces more corrupt than he can imagine mark him for assassination. Out-of-work writer Eddie Morra's (Cooper) rejection by girlfriend Lindy (Abbie Cornish) confirms his belief that he has zero future. That all vanishes the day an old friend introduces Eddie to NZT, a designer pharmaceutical that makes him laser focused and more confident than any man alive. Now

Connect with IMDb

IMDb on Facebook

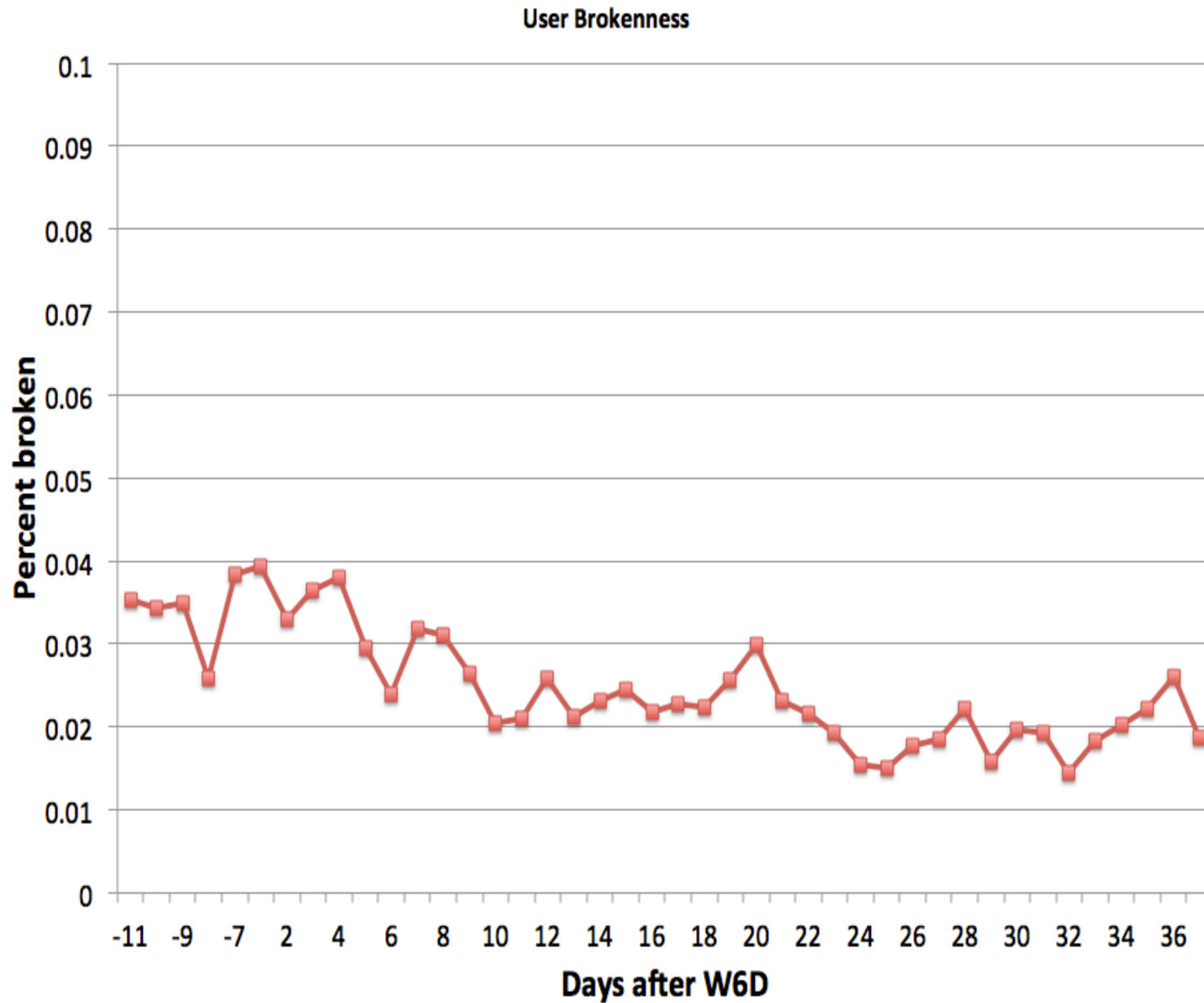
Like

1,130,969 people like IMDb.

Thomas Joel Dave Mark David

Follow @imdb · 257K followers

Surprisingly, brokenness seems to be declining



Learnings

- Date on calendar = strong motivator
- 1-hour test boosted confidence
- Adapting tools for v6 is largest effort
- Passionate users
- Nothing to fear
- Difficult for public to understand

Broken user gets fixed



LMsseyImages

I'll soon be throwing this macbook out the window! Work you fool. Twitter is good so is FlickR but I want other websites too!

5 hours ago



LMsseyImages

[@paulbrown1982](#) Ah just read about it. So that's why FB and google etc won't properly work for me. I hope anyhow!

5 hours ago



LMsseyImages

[@saeedhossain](#) Thinks it is due to International IPv6 day. Dunno why i'm the only one affected but it makes sense with the sites not working.

4 hours ago



donnlee donnlee

[@LMsseyImages](#) test your connection: test-ipv6.com

1 hour ago



LMsseyImages

Woohey I have defeated this IPV6 thing!

1 hour ago

Yahoo!

World IPv6 Day Debrief



*Igor Gashinsky
Principal Architect
Yahoo!
July 25th, 2011*

Why did we do it?

- Promoting IPv6 adoption
 - Breaking chicken/egg paradigm
- Last-ditch effort to help with “broken users” problem
 - Current “breakage stats” are ~ 0.022%
 - 21 months ago this was 0.078%!

Participating Yahoo! Front Page Markets



10 Front Page Serving Sites



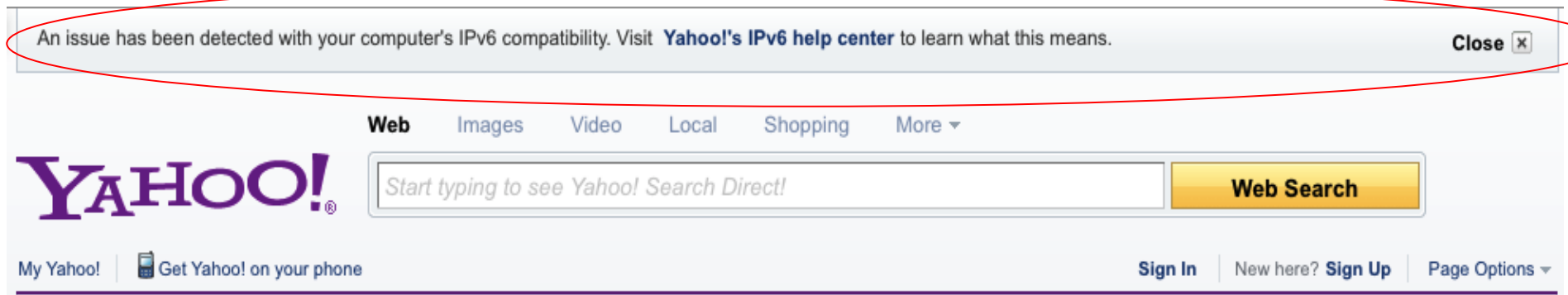
Seven IPv6 Proxy Locations



Preparing the Infrastructure

- Turned up 6to4 return tunnel infrastructure in all backbone/serving locations
 - Saw about 140ms performance improvement to 6to4 users as a result
- Dual-stacked our front-end proxy infrastructure
- Modified a *lot* of code (abuse, geo, ad-targeting, etc)
- IPv6 serving capacity over-provisioned x1000
 - All that was actually the easy part...
- Ran 2x 15 minute live tests ahead of time
 - Learned some interesting lessons along the way
 - 5PM is a really bad time to start a test ☐
 - Just because you are monitoring something, doesn't mean that you are monitoring it via IPv6!

Preparing the Users



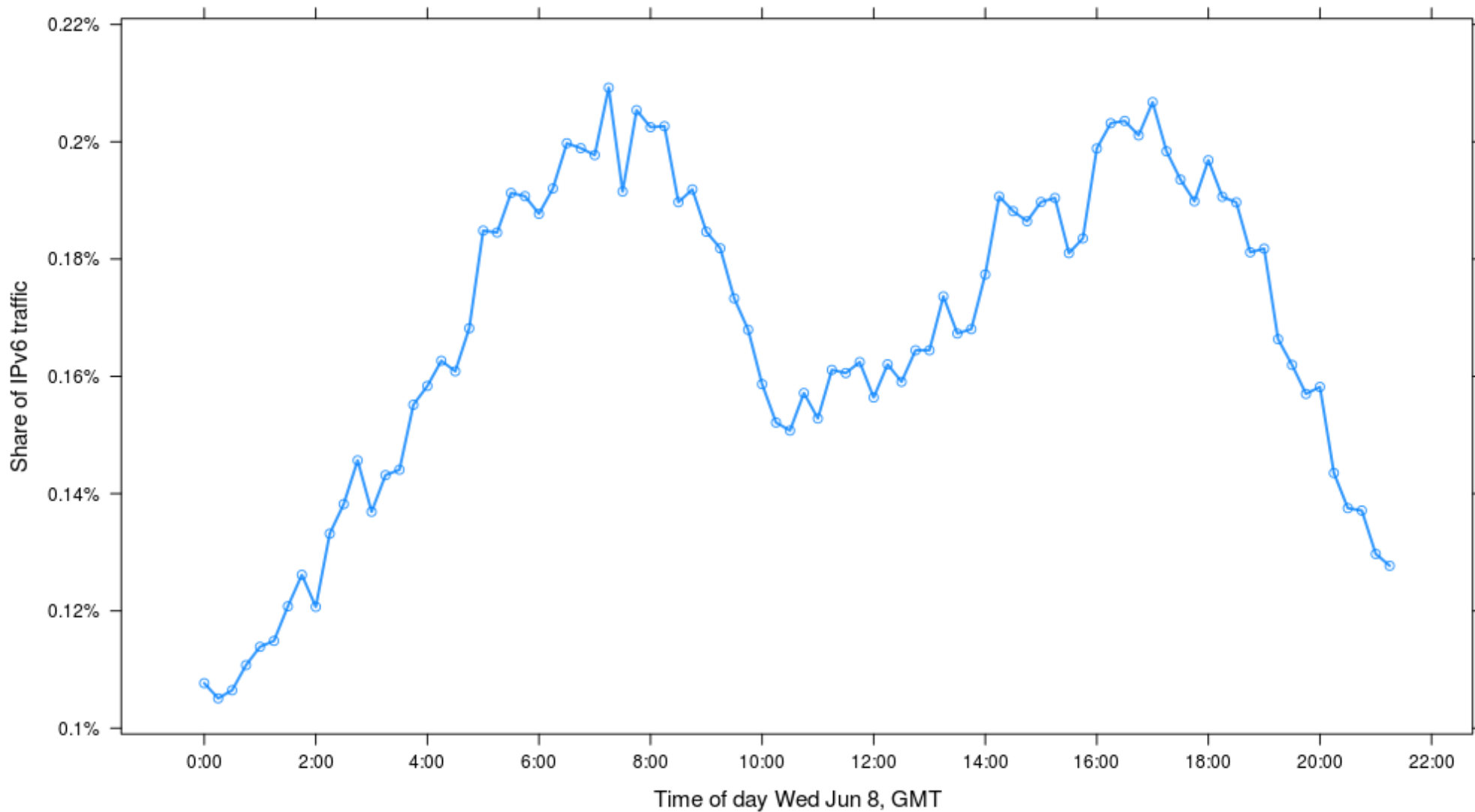
- User education and outreach
 - Beaconing system in place to detect “broken” users
 - Window shade alert on the Y! front page notifying them
 - IPv6 help pages in 38 languages
 - IPv6 test tool
 - Lots and lots of PR

World IPv6 Day, by the numbers

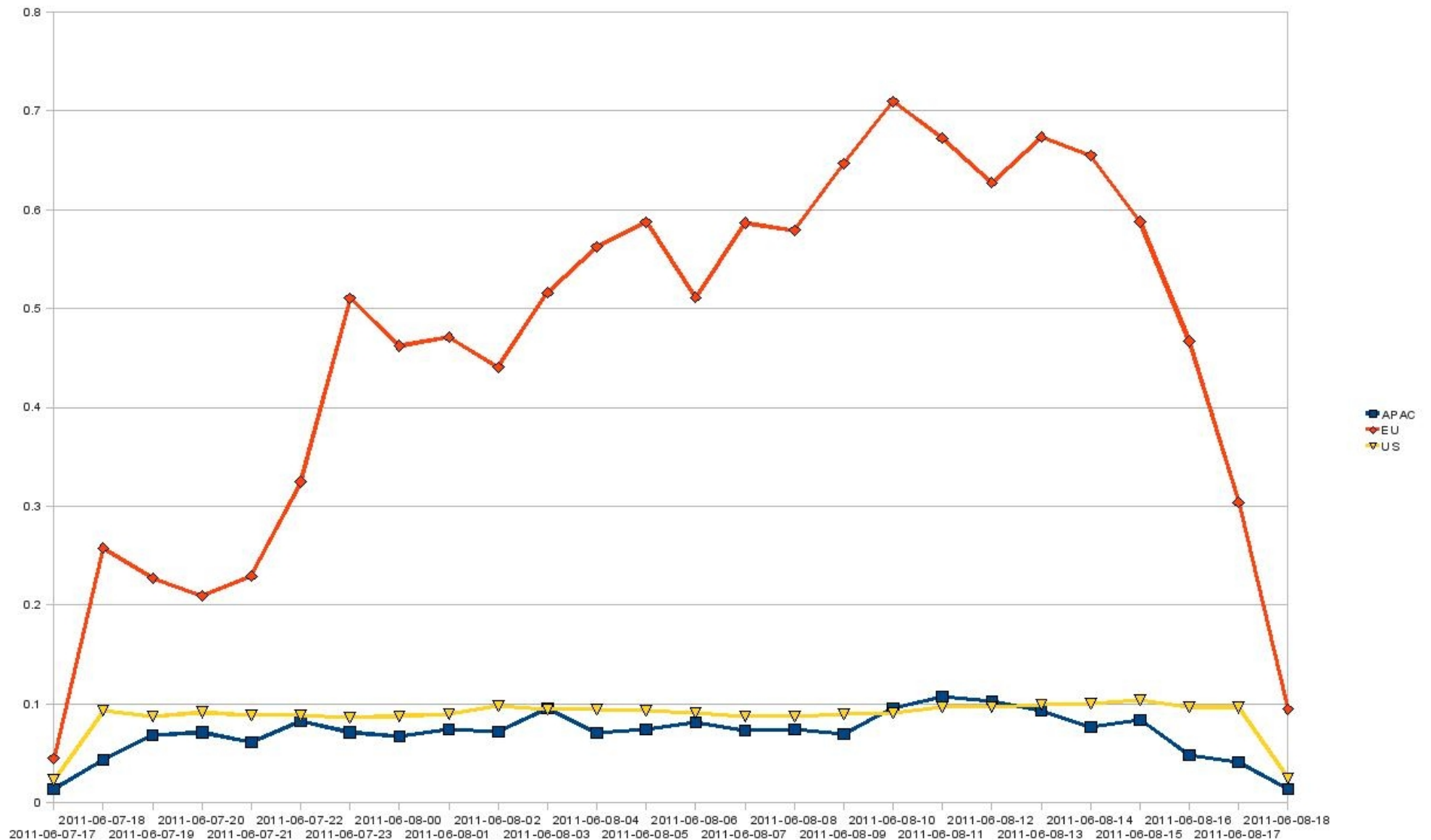
- Over 2.2 Million users served via IPv6
- Over 1 Million visits to Y! IPv6 help pages
- Ratio of users served via IPv6:
 - Peak = 0.229%
 - Average = 0.168%
- France led the pack with over 3% IPv6-enabled users!
- Thank you Free.fr!
- US was at 0.35%
- Breakage stats remained the same (0.022%) □

Per-hour IPv6 Statistics

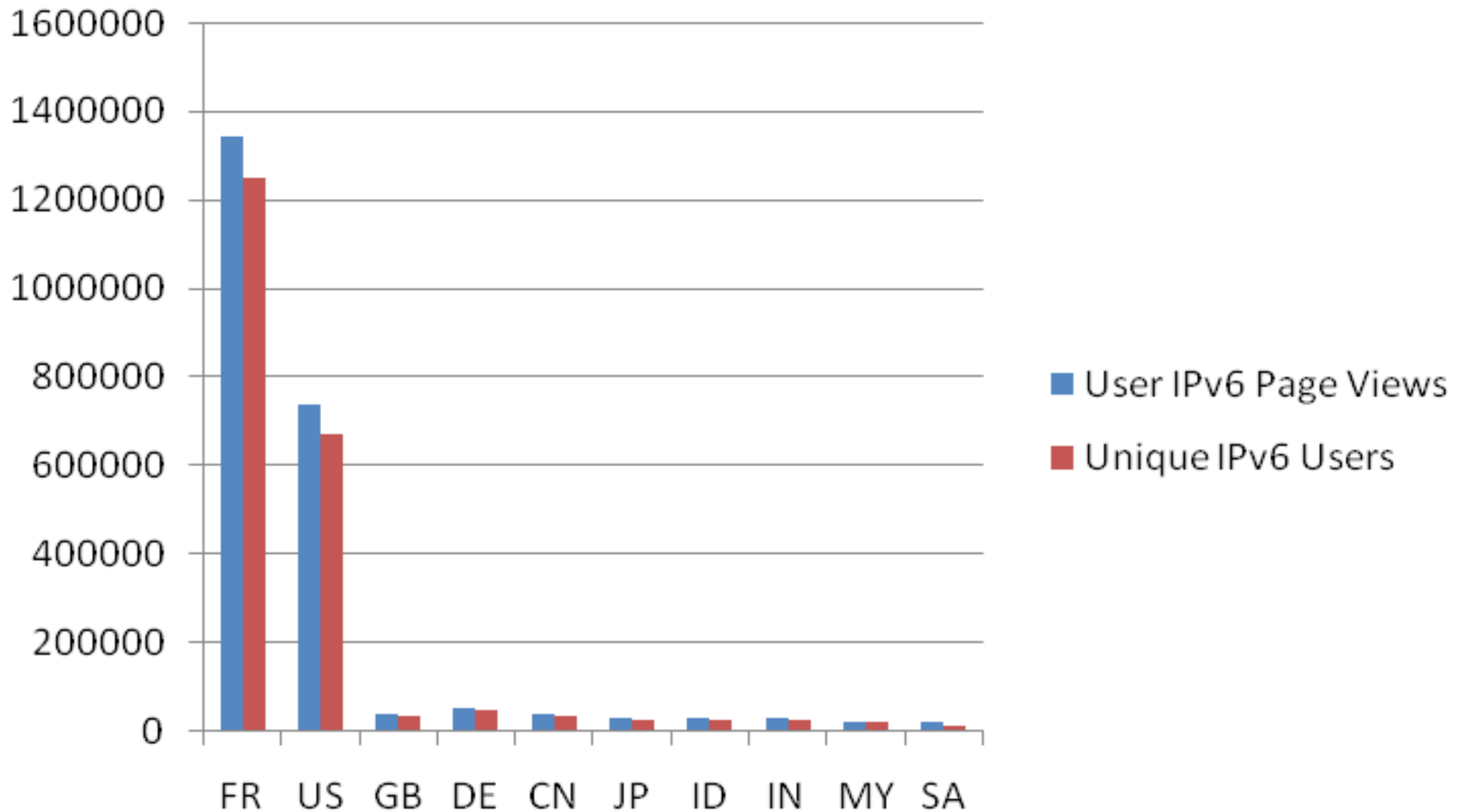
World share of IPv6 traffic



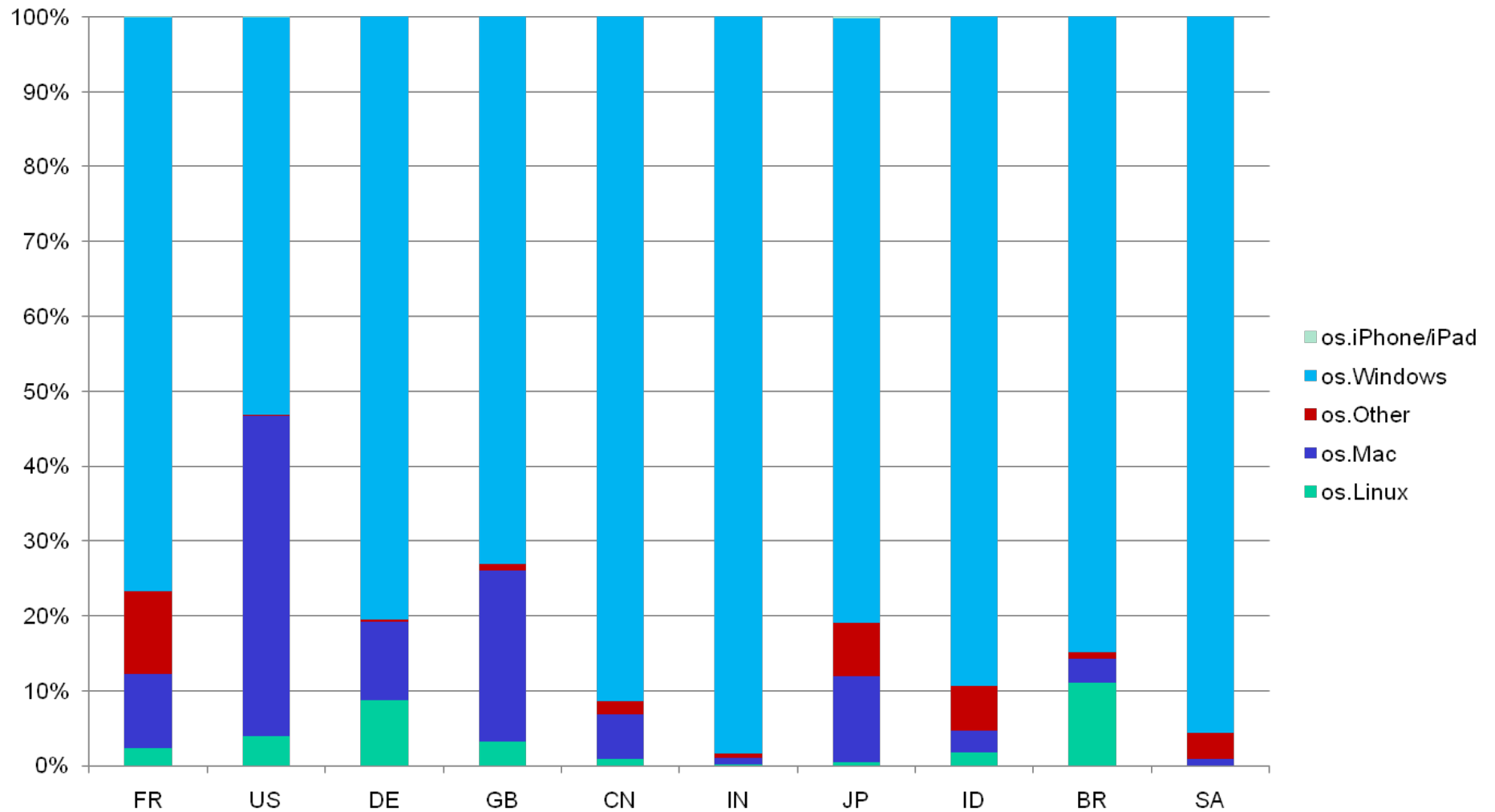
Per-hour Region Breakdown



IPv6 users by Country



IPv6 users by Country/OS



That was a lot of work for
0.229%!



Telefónica

World IPv6 Day

ISP Insight

July 25th, 2011
IETF#81, Quebec City

Carlos Ralli (@carlosralli)
Telefónica R&D

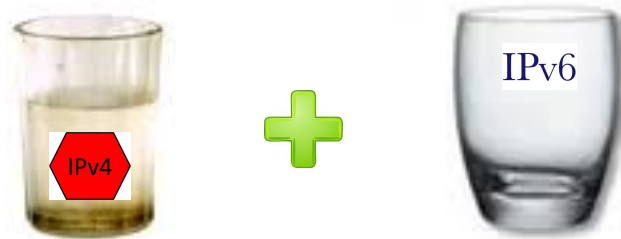


W6D: ISP motivation to join

! Our Customers are thirsty of Contents/Services ...

... v4-glass getting like cloudy water due to saturation & complexity ...

... v6-Internet glass is empty of mainstream contents and services ...



+✓ W6D - A step on the right way. Jump altogether to fill v6 space.



W6D: Our contribution to fill v6 Space

Enabled sites in 2 key countries within our footprint

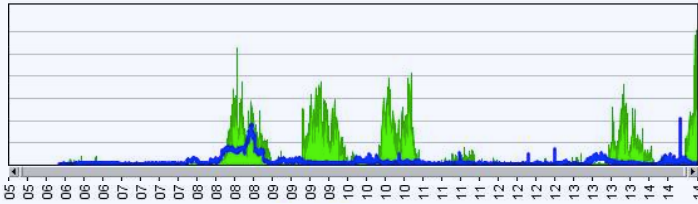
Brokenness < 0,04%
No related CallCenter activity



www.terra.com.br
mail.terra.com.br
noticias.terra.com.br
esportes.terra.com.br
tecnologia.terra.com.br
vidaeestilo.terra.com.br



W6D: ISPs key areas to focus



INT'L Traffic x20 , still very low
Later, some other days peaks back

DNS
ROUTING
SECURITY
MEASURING

OPERATIONS

- Corp. Trial (IPv6 to employees):
Got IPv6 Enabled?



Employees didn't notice

CORPORATE/EVENTS

WEBSITES/HOSTING

LONG TAIL / ENTERPRISE

TRIALS

AWARENESS

Cinco Días
Página 1 de Sección Empresas
viernes, 13 de mayo de 2011

Telefónica acelera la migración hacia el IPv6
El 8 de junio habrá una gran prueba global del nuevo protocolo

TECNOLOGÍA DE REDES
Movistar iniciará pruebas piloto de IPv6 a partir del 8 de junio

12 de mayo de 2011 | 17:04

ME GUSTA 21 | Me gusta 10

COMENTARIOS 3

MOVIMIENTOS

Telefónica HD analiza los cambios en Intert

<http://bit.ly/lSy1UE>

<http://bit.ly/nvJtPA>

340 sextillones de direcciones online

EXPLAIN W6D IN OUR COUNTRIES

INVOLVE PARTNERS, SUPPLIERS

CALL for v6 in BIZ PLANS
<http://bit.ly/pssJLi>

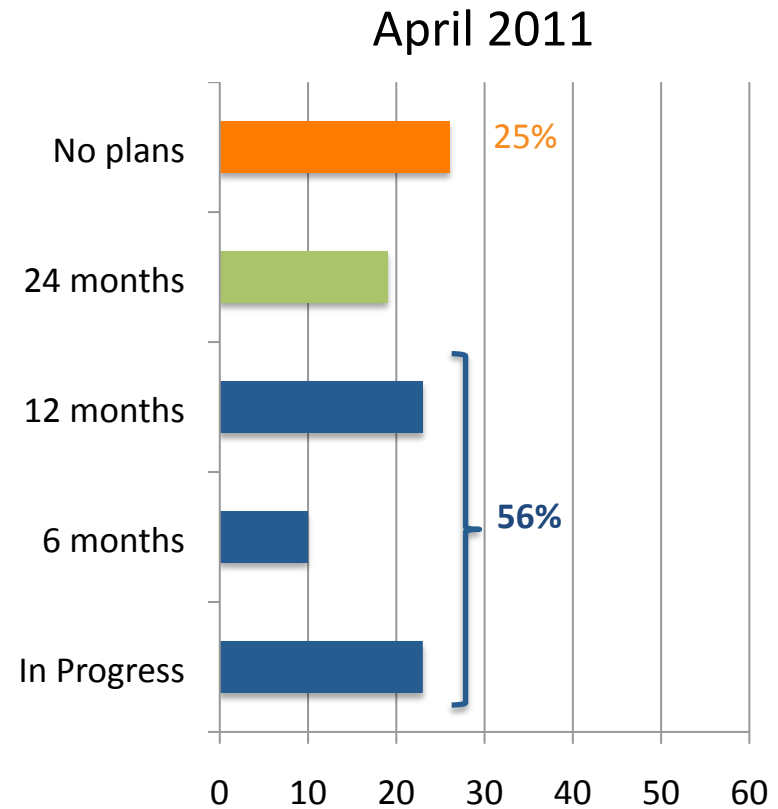
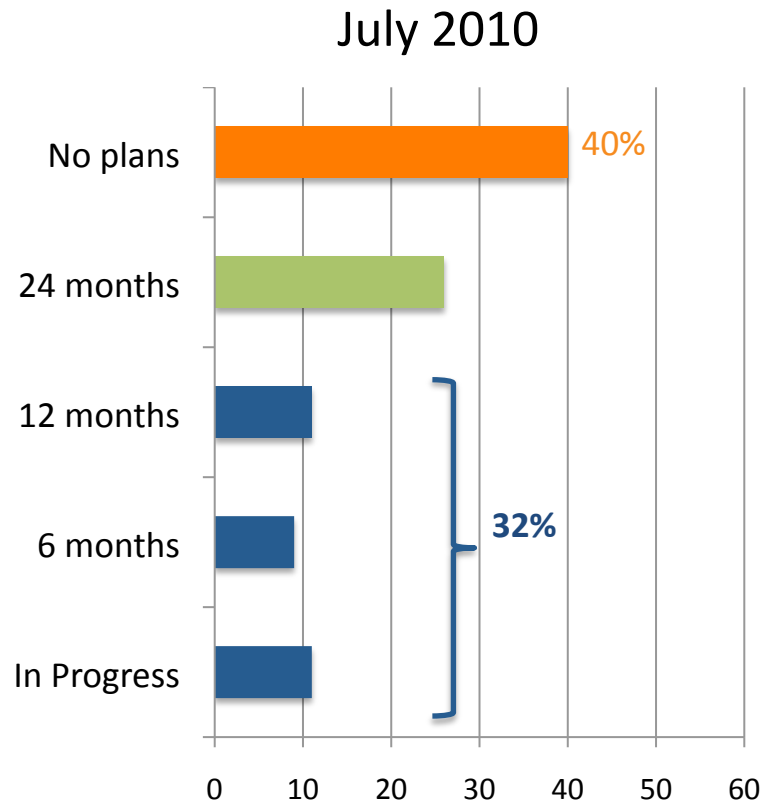
W6D Heroes



Cisco

Cisco Enterprise Technical Advisory Board Survey

“When are you planning to deploy IPv6 in production?”



Primary driver cited is “Internet evolution”: 65%

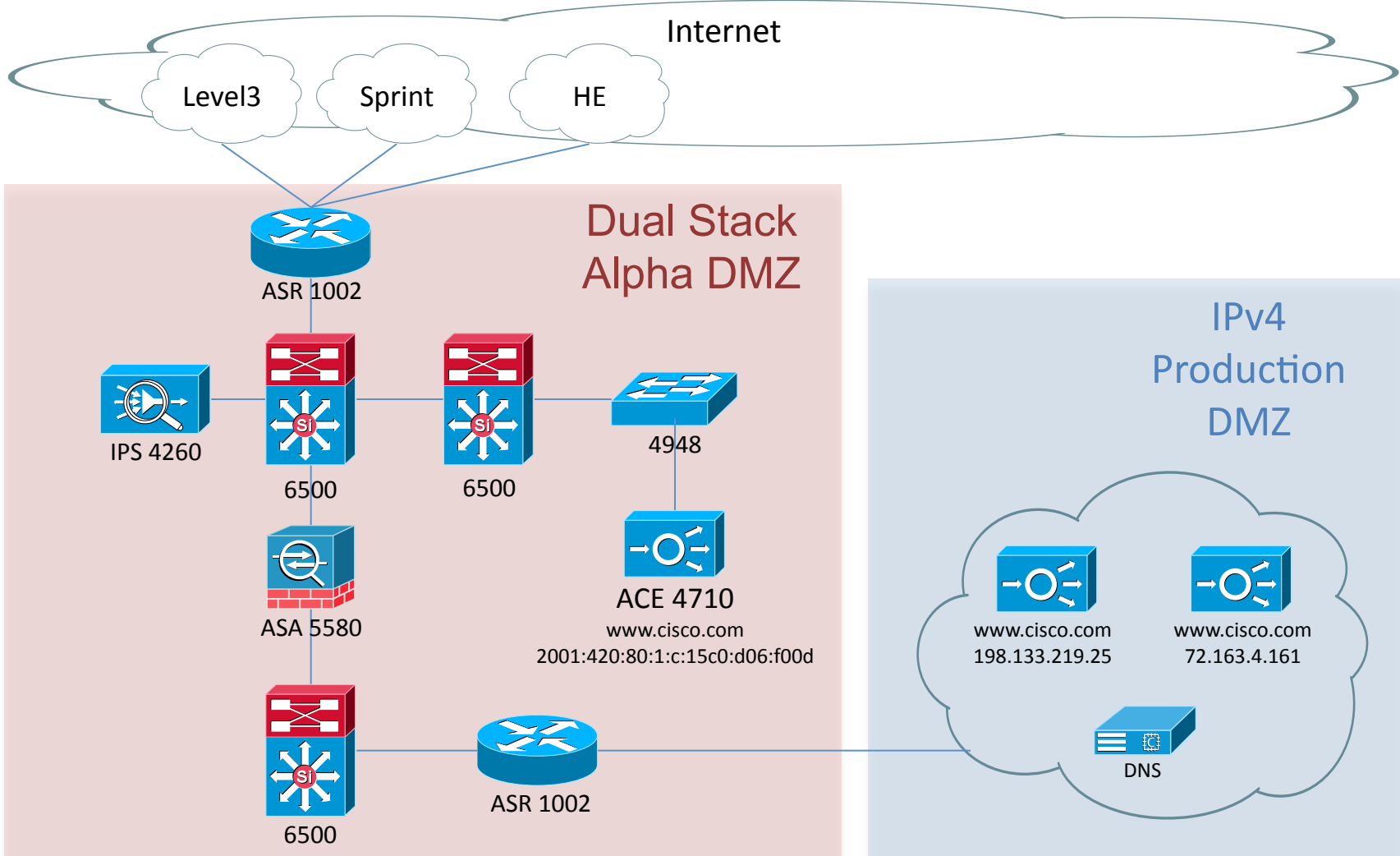
via <http://www.cisco.com>

- Product info, downloads, documentation, etc.
- 80% of support cases resolved
- 67% of new contracts, 84% of renewals
- 80% of event registrations (Cisco Live, etc)
- 95% of product orders (over \$30 Billion USD)

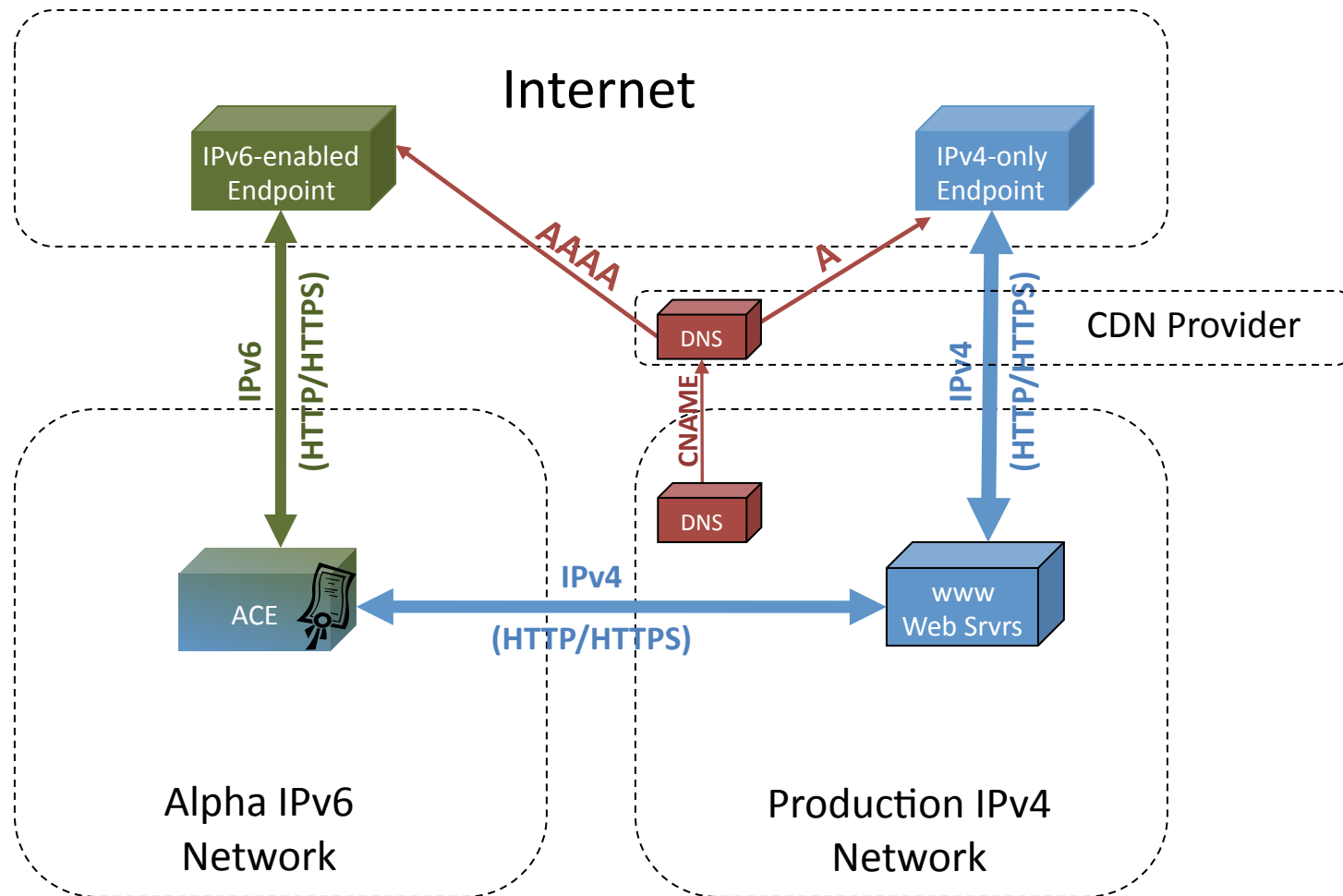
Convincing our CIO...

- IPv6 Leadership and Preparedness
“dog food”
- IT Implementation Team Confidence
“we know how to do it”
- Acceptable risk evaluation
“just 24 hours, and we’ll watch it like a hawk”
- Unique opportunity for safe experimentation
“everyone else is doing it”

World IPv6 Day Network Design

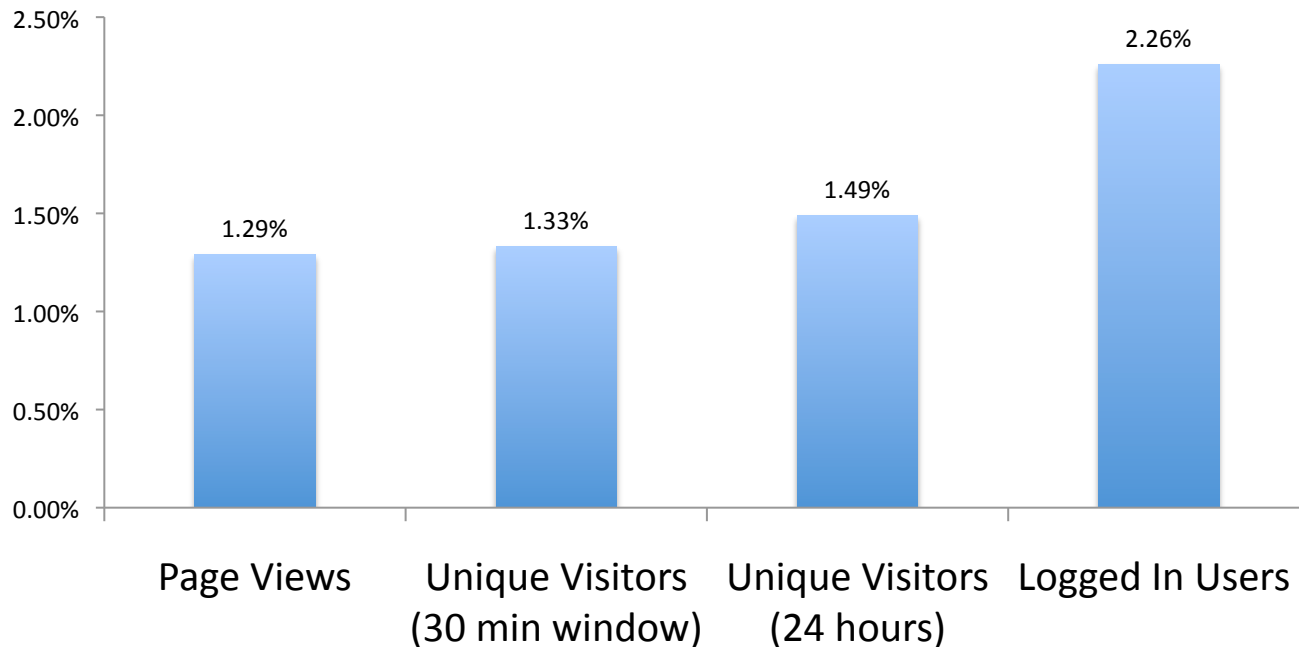


```
$ dig +short AAAA www.cisco.com
2001:420:80:1:c:15c0:d06:f00d
```



What we saw...

- 1.11% of all traffic to/from www.cisco.com was IPv6
- Zero www.cisco.com support cases attributed to World Day



PS: www.scansafe.com is Cisco too, and we kept AAAAs up after June 8

Get your Free Dog Food T-Shirts!
(careful of the wombats though!)

