

IPv6 Adoption by the numbers

NAIPv6 Summit, April 2013

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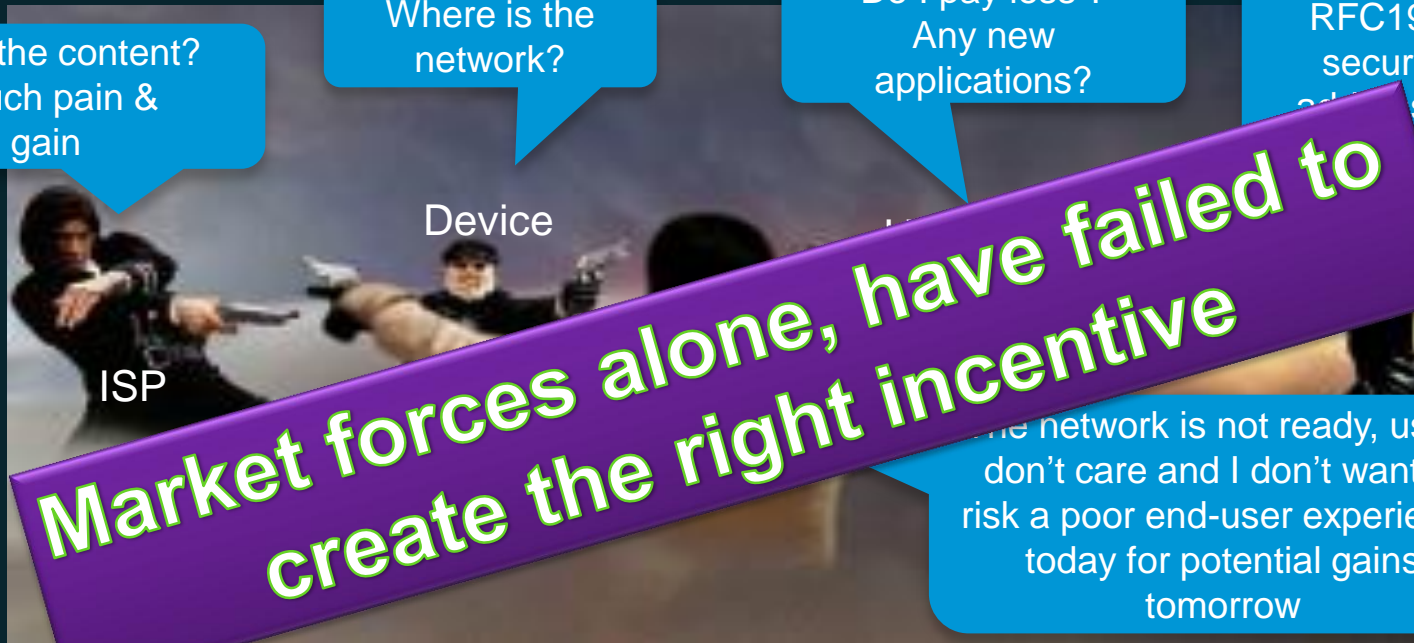
IPv6 migration: A Mexican Standoff

Where is the content?
Too much pain &
no gain

Where is the
network?

Do I pay less ?
Any new
applications?

NAT's are good.
RFC1918 gives me
security, and IPv4
address runout is my
big problem.



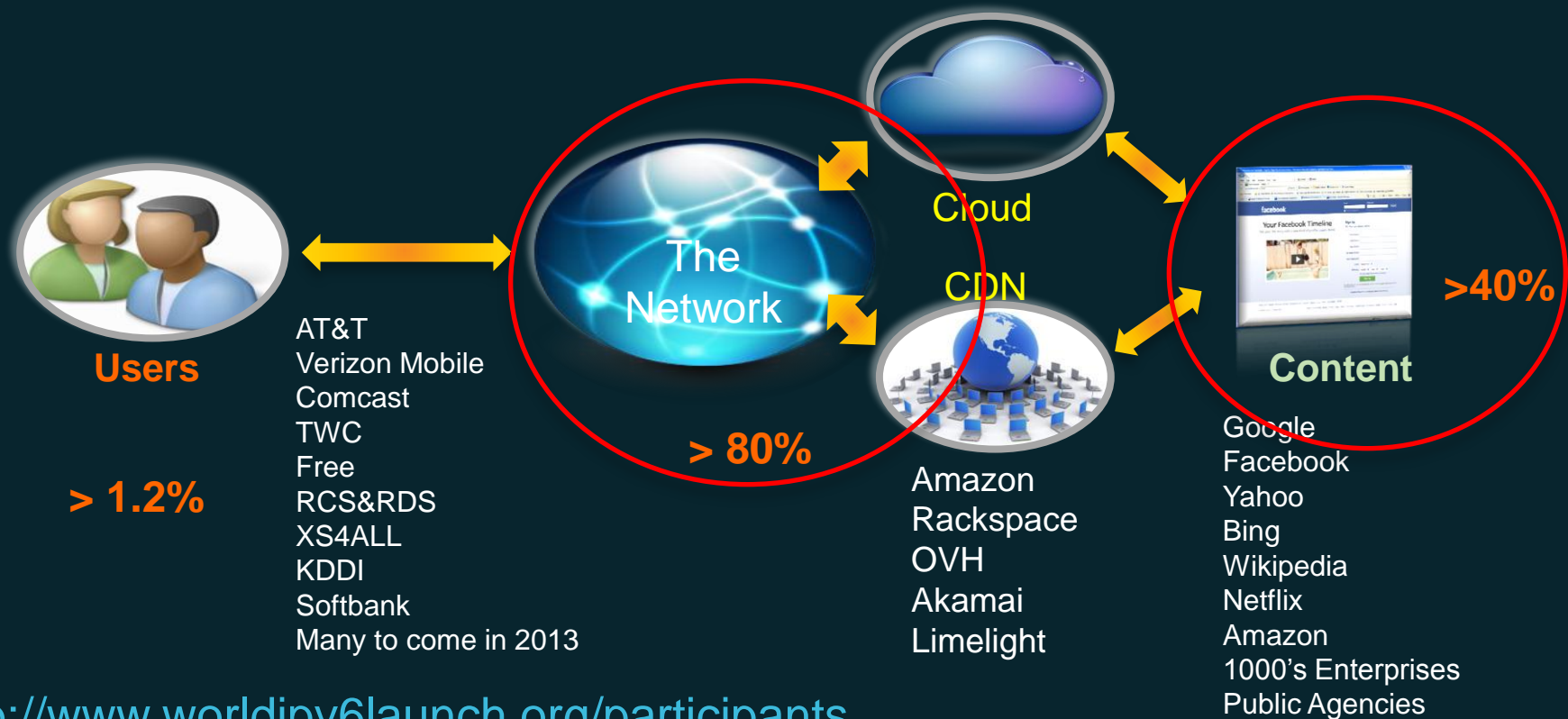
**Market forces alone, have failed to
create the right incentive**

The network is not ready, users
don't care and I don't want to
risk a poor end-user experience
today for potential gains
tomorrow

“A deadlock, stalemate, impasse; a roughly equal (frequently unsatisfactory) outcome to a conflict in which there is no clear winner or loser,”

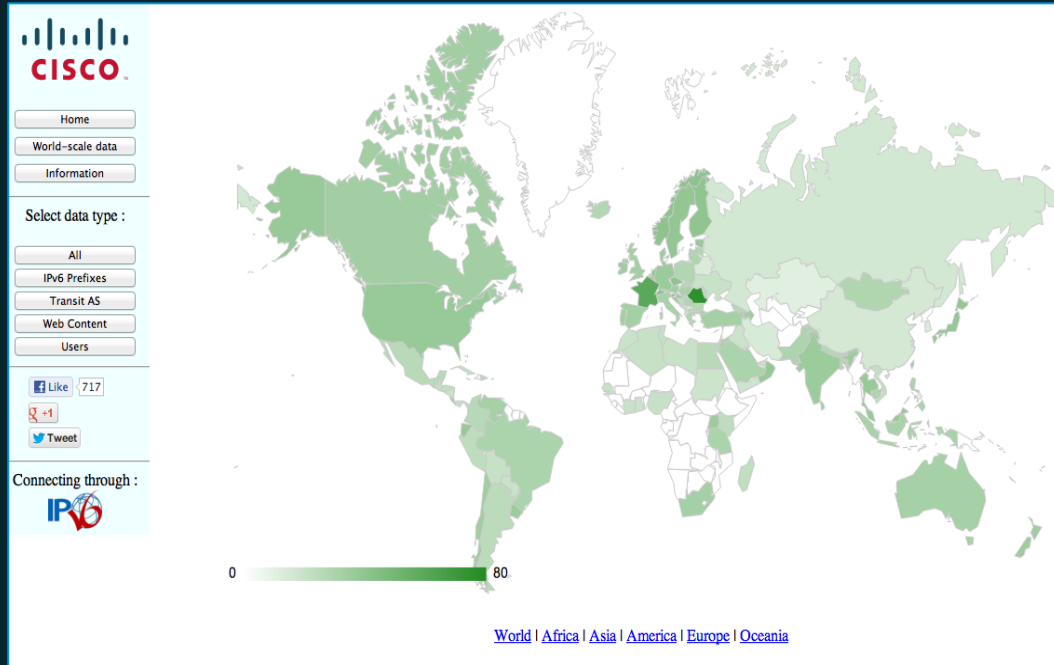
The Internet Ecosystem

the world has changed on June 6th 2012



<http://www.worldipv6launch.org/participants>

IPv6 Market adoption: 6lab.cisco.com/stats



*“If we have data,
let’s look at data.
If all we have, are
opinions, let’s go
with mine.”*

Jim Barksdale,
former Netscape CEO

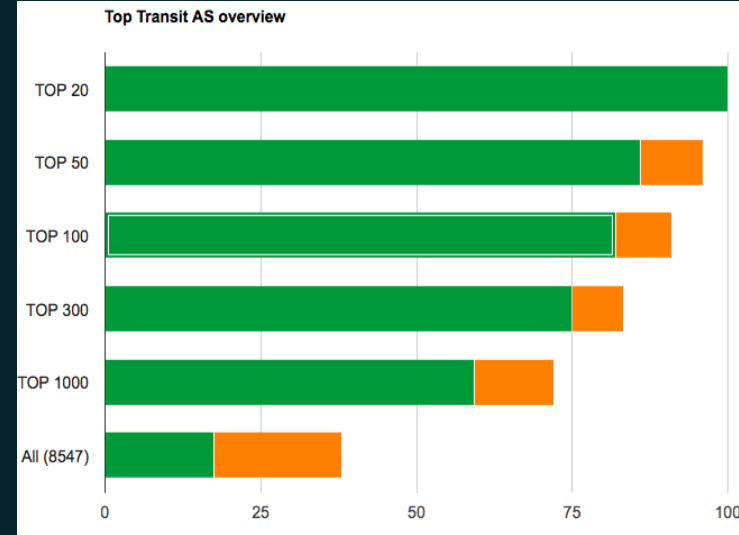
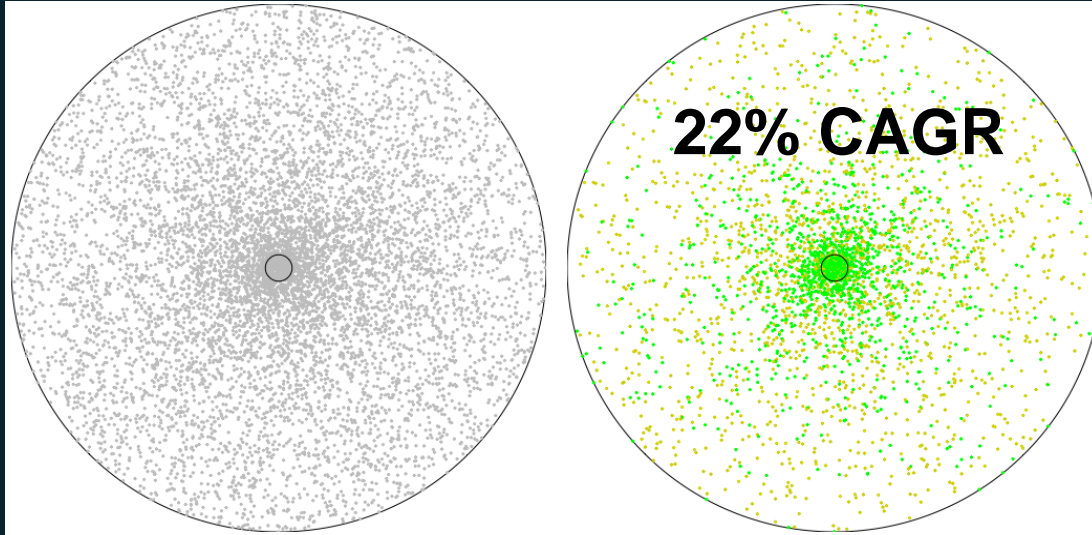
Based on data from RIR, routeviews, DNS roots, Alexa, Google, ITU and APnic

Measuring and Reporting

- Collect and report metrics that represent every phase of the IPv6 Deployment: Planning, Network, Content, Users.
- Collect and report on a per-Countries basis as local decision and local players, impact local adoption
- Reporting must be on-going, to measure progress
- 6lab.cisco.com/stats is a Cisco contribution to the industry.
- It is about to be significantly enhanced (stay tuned)
Mobile Apps, Forecast , Widget



IPv6 Transit System readiness

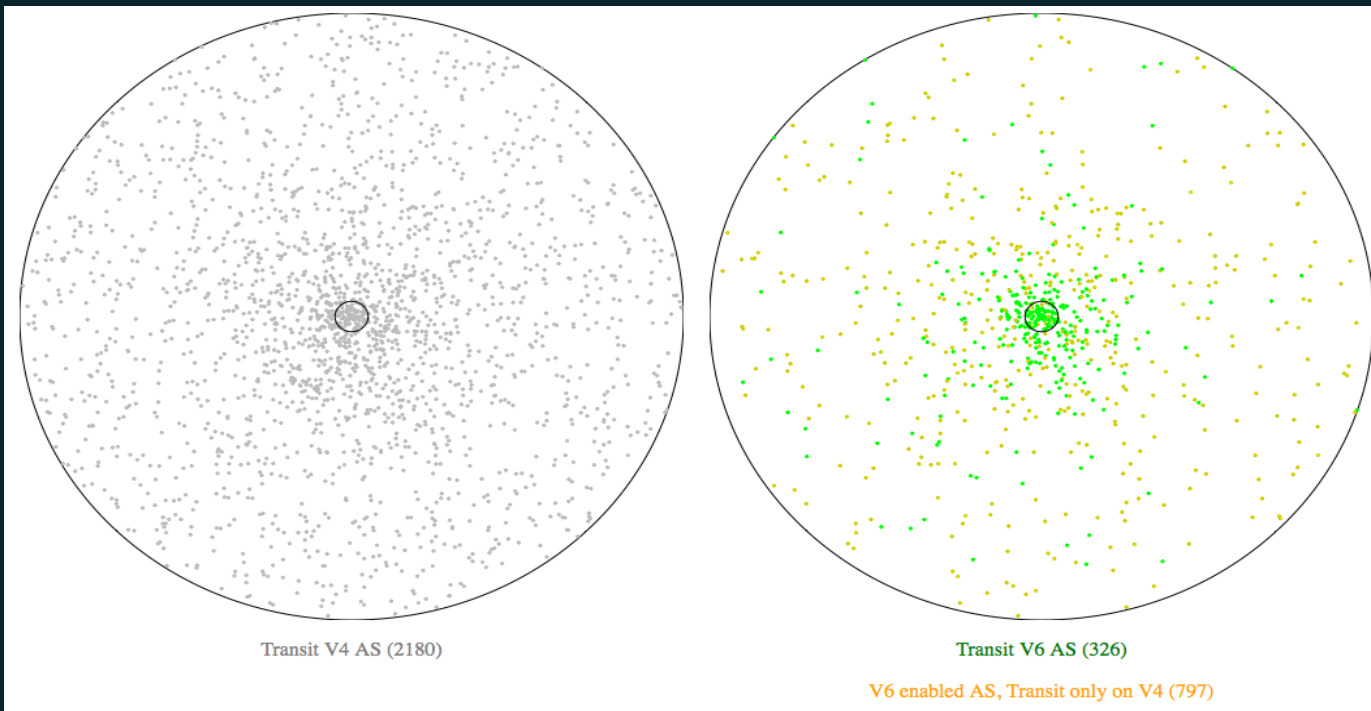


IPv4 transit AS's: 8645

IPv6 transit AS's: 1501*
IPv6 enabled AS's: 3249

→ Concentrated in TOP 300
(75% of AS's are IPv6 transit)

US Internet Transit



European Internet IPv6 Transit readiness

IPv6 transit – IPv6 enabled

SE: 88% - 93%

NO: 85% - 95%

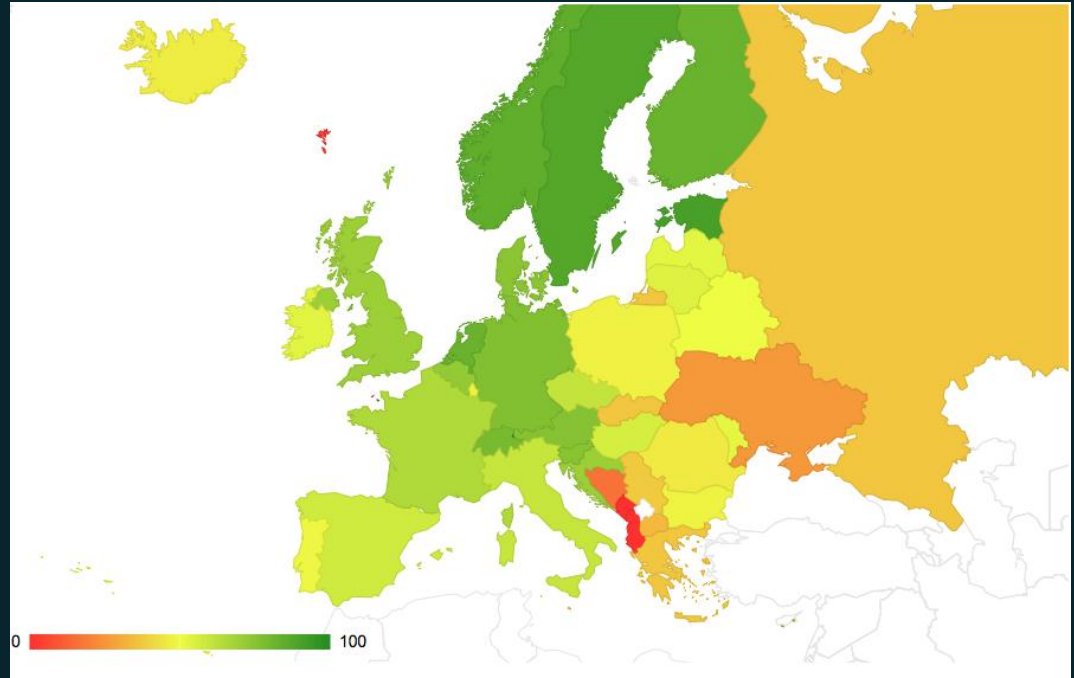
NL: 82% - 92%

DE: 74% - 90%

GB: 70% - 86%

FR: 66% - 82%

USA: 56% - 69%



Source: routeview

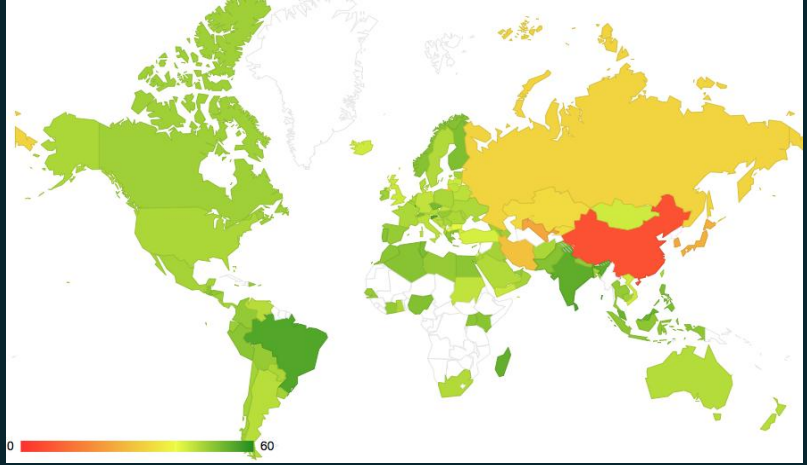
What is % of Content reachable over IPv6?



+




=>



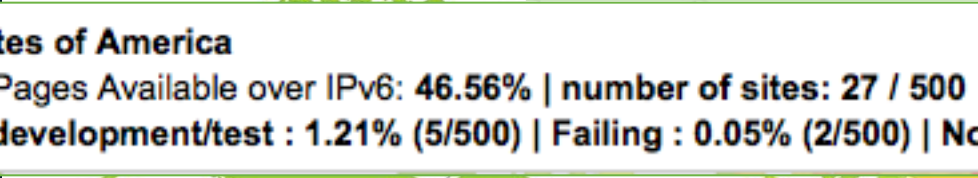
1. Test AAAA + httpget over IPv6 to top 500 Web sites for 125 countries (per alexa.com) and/or IPv6 shadow test domain (ex: ipv6.domain.com , www6.domain.com....etc...)
2. Based on their respective rank, apply the corresponding % of traffic they represent (Pareto function above)
3. Sum this up => estimated available IPv6 content for 125 countries

Content reachable over IPv6




Czech Republic

% of WEB Pages Available over IPv6: **51.6%** | number of sites: **73 / 500**
Others: In development/test : **0.63%** (9/500) | Failing : **6.74%** (2/500) | No



United States of America

% of WEB Pages Available over IPv6: **46.56%** | number of sites: **27 / 500**
Others: In development/test : **1.21%** (5/500) | Failing : **0.05%** (2/500) | No



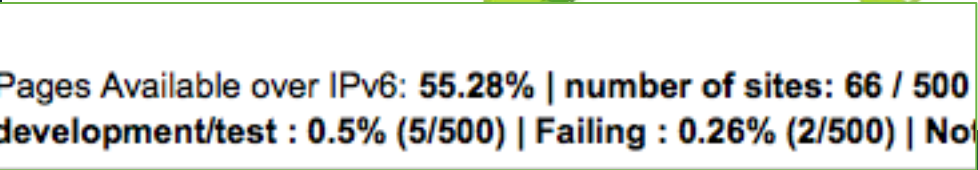
China

% of WEB Pages Available over IPv6: **6.59%** | number of sites: **11 / 500**
Others: In development/test : **23.91%** (5/500) | Failing : **10.82%** (2/500)



India

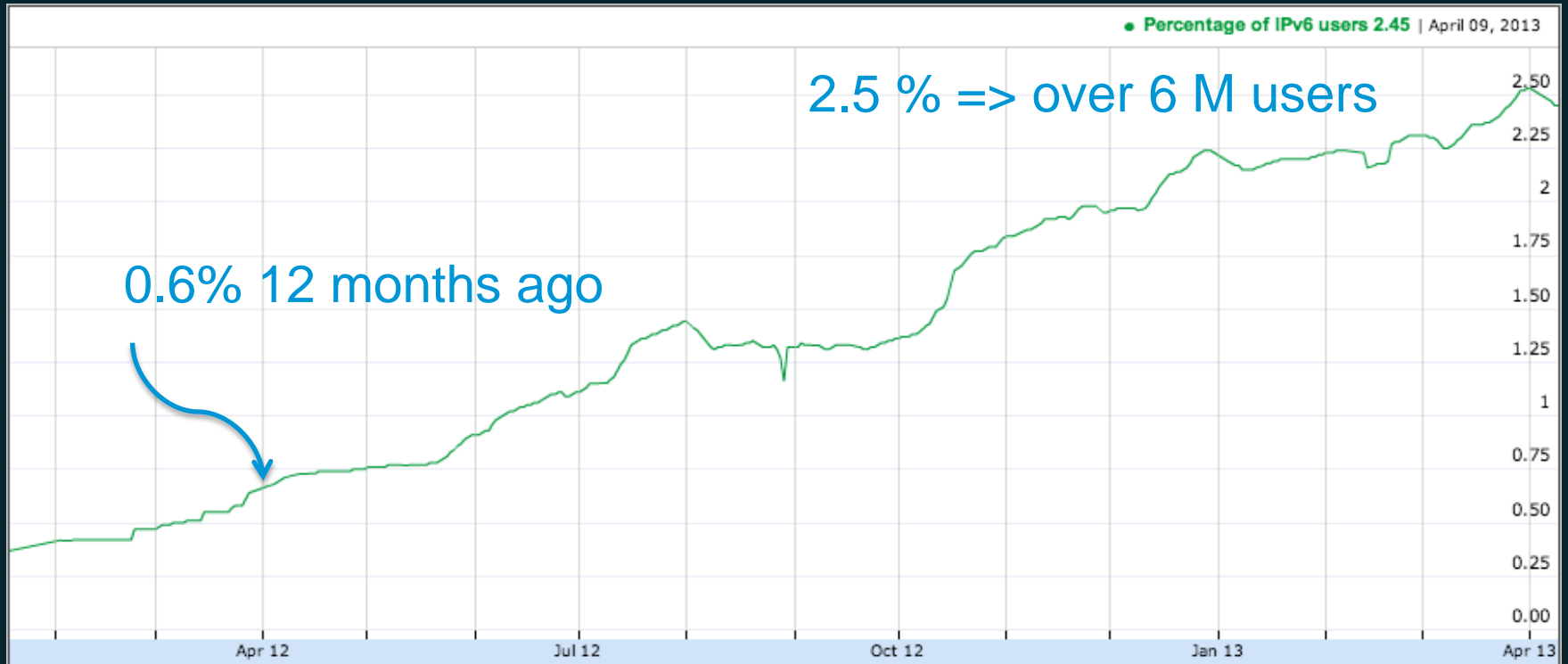
% of WEB Pages Available over IPv6: **53.96%** | number of sites: **33 / 500**
Others: In development/test : **0.24%** (4/500) | Failing : **0.15%** (4/500) | No



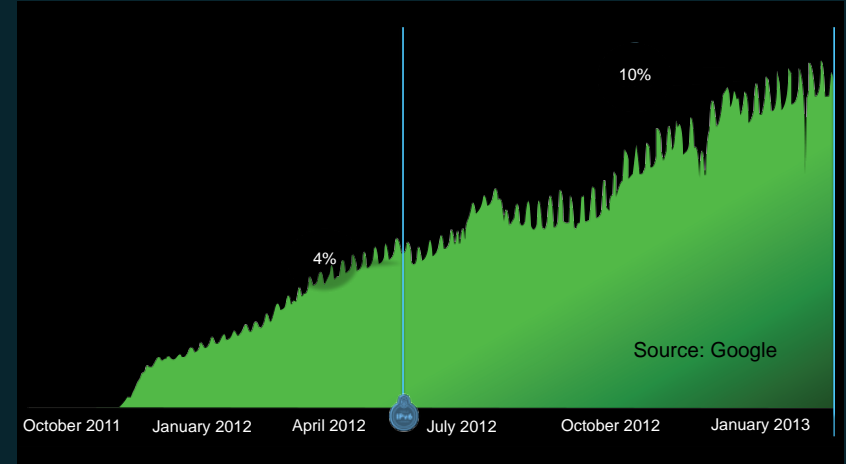
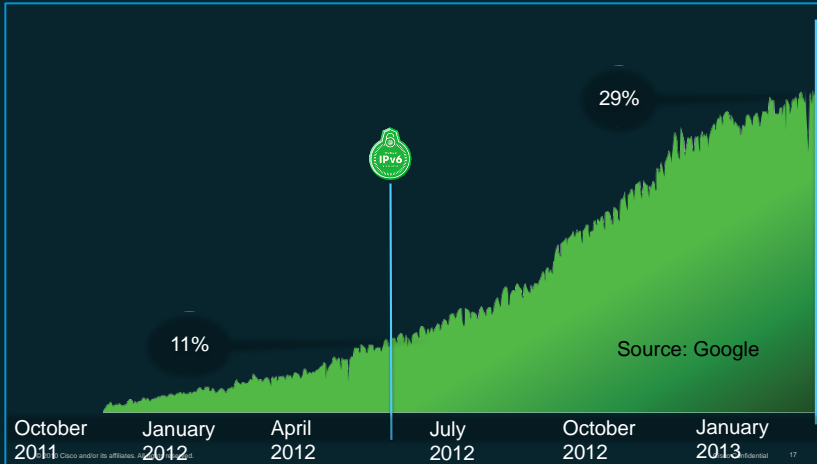
Brazil

% of WEB Pages Available over IPv6: **55.28%** | number of sites: **66 / 500**
Others: In development/test : **0.5%** (5/500) | Failing : **0.26%** (2/500) | No

IPv6 Users : USA



Where are IPv6 users coming from ?

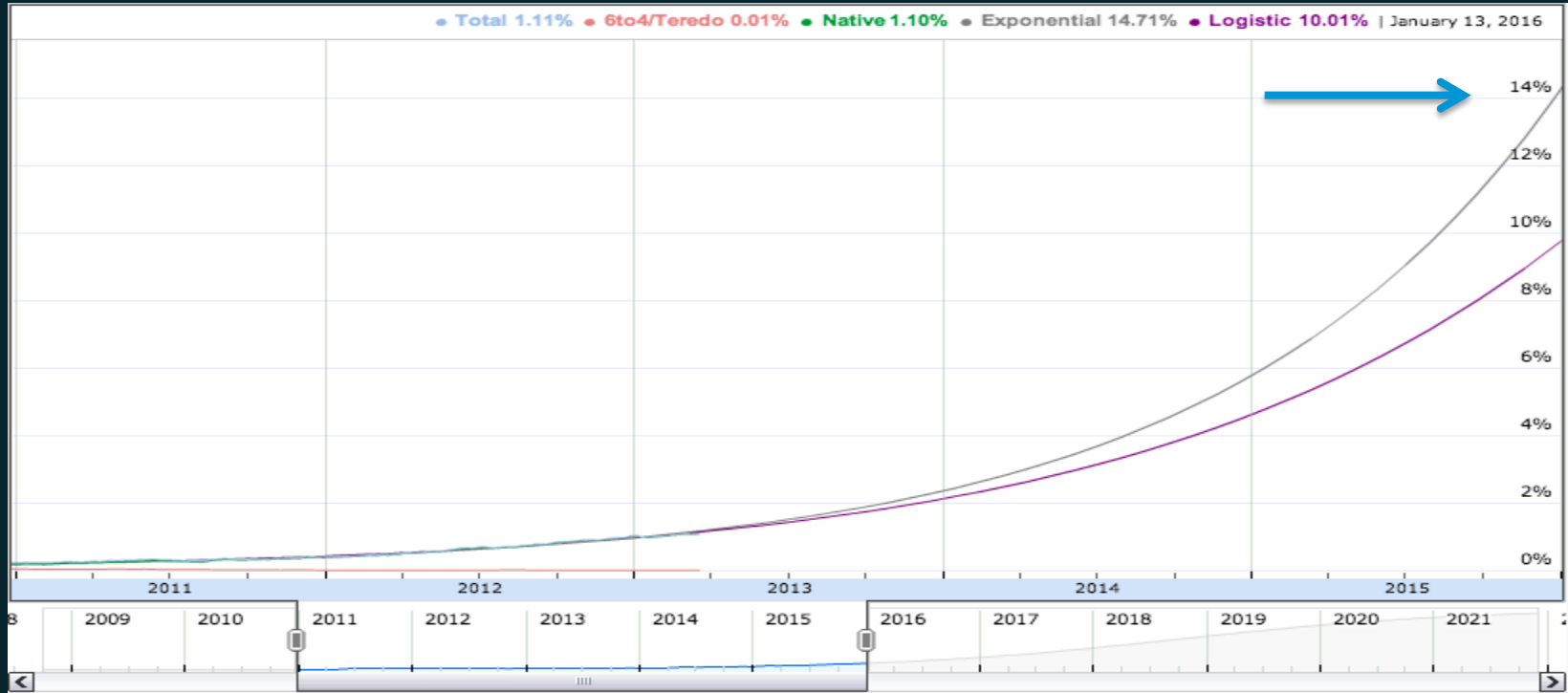


www.worldipv6launch.org/measurements

15th April 2013 (notes)

Participating Network	ASN(s)	IPv6 traffic
ATT	6389, 7018, 7132	8.26%
KDDI	2516	8.85%
Free	12322	17.21%
RCS & RDS	8708	16.10%
Verizon Wireless	6167, 22394	26.25%
Comcast	7015, 7016, 7725, 7922, 11025, 13367, 13385, 20214, 21508, 22258, 33287, 33489, 33490, 33491, 33650, 33651, 33652, 33653, 33654, 33655, 33656, 33657, 33659, 33660, 33661, 33662, 33664, 33665, 33666, 33667, 33668, 36733	1.72%
Deutsche Telekom AG	3320	2.75%
SoftBank BB	17676	0.78%
Chubu Telecommunications	18126	13.54%

IPv6 Adoption Predictions



c.f. IPv4 exhaustion: <http://www.potaroo.net/tools/ipv4/plotvar.png>

Let's do some Math

- As a ISP in US (ex: Cable or DSL SP).

Asses how much content is available in the market I'm operating (ex:US).

<http://6lab.cisco.com/stats>

United States of America

% of WEB Pages Available over IPv6: **46.56%** | number of sites: **27 / 500**

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~ approximation of the % of traffic (http sessions) that an average IPv6 users will be able to fetch over IPv6 * the nb of IPv6 users ... over time

⇒ Estimate of IPv6 capacity (ex: BNG, 6rd BR, Peering...)

⇒ Estimate how much traffic will OFFLOAD my CGN (NAT44)

Let's do some Math

- As a B2C site (ex: online banking)
 - Assess where my customers are coming from (Geolocation and/or ISP/ASN)
 - Or look at market share of ISP's in your market
 - Look at % of users coming from these markets or ISP, that are IPv6 enabled (Google stats - <http://6lab.cisco.com/stats>)...monitor over time



- ⇒ Estimate IPv6 capacity at your WEB Servers (DMZ, SLB, Security ...etc...).
- ⇒ Decide when it makes sense to enable IPv6

Cisco IPv6 Strategy, June 2010

Google IPv6 developers conference

“If we don’t overcome the challenges of IPv4 (...) we will slow down the growth of the Internet and loose momentum as an industry

IPv6 is important to all of us (...) to everyone around the world, It is crucial to our ability to tie together everyone and every device.



At Cisco we are committed architecturally to IPv6 across the board: All of our devices, all of our applications and all of our services”.

John Chambers, Cisco President and CEO

Led to creation of “IPv6 High Impact Project”

All of our devices, applications and services...



UC 9.0
CUCM 9.0
CUBE/IOS 15.3



AnyConnect 3.x
(Android, iOS)
Windows, MacOS



Webex Mobile
Client



Webex
Meeting EFT

Prime Infra



IOS 15.3
IOS-XE 3.8



WLC 7.3



ASA 9.1 (incl IPS)
ASA-Cx



Prime Infra



CNR/CAR



NXOS 6.2



IOS-XR 4.3
IOS-XE 3.8
StarOS 14.0

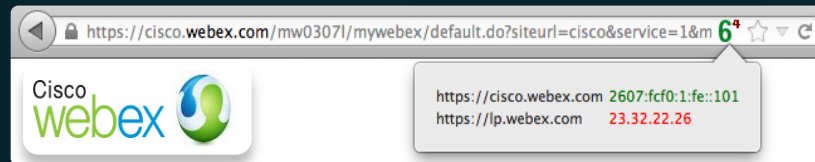
100s of IPv6 features

Engineering Process changes – Test and Hardening - USGv6 certified Portfolio

Cisco on Cisco ...



- Most WEB properties
~2% of cisco.com users
- 100% of Core WAN/MAN
- All DMZ
- 7 DC by Summer 2013
- 50 Buildings & Sale Branch offices
Ethernet and Wifi
100 by Summer 2013
- ~12000 users/devices
- 14.37% of traffic fm AS109
- Webex Meeting (just deployed)
 - Cisco and beta testers



IPv6 to fuel main Internet Growth Engines

Cloud/MSDC

- Scale
- Virtualization
- # VM's growth
- Automation
- VM mobility
- Simplification

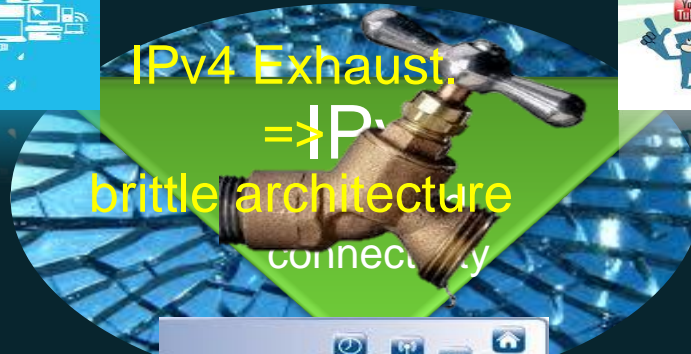


IPv4 Exhaust

=> IPv6

brittle architecture

connectivity



Mobile Internet

- Scale: 10 Billions
- 4G-LTE / VoLTE
- Stateless – E2E
- Network Mobility
- Simplification

Internet of Things

- Scale: 50 Billions
- Global connectivity => horizontal integration
- Automation-Self Networked
- IoT Protocols are IPv6 only



<http://www.cisco.com/go/vni>

Thank You



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