IPv6 Deployment: Where are we now?

IPv6 Transition Strategies and Technologies Workshop

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APNIC

Agenda

- An overview of IPv6 readiness in the world
  - Review of several statistics
  - Some case studies
- Growth path of the Internet
- Conclusions

An Overview of Global IPv6 Readiness

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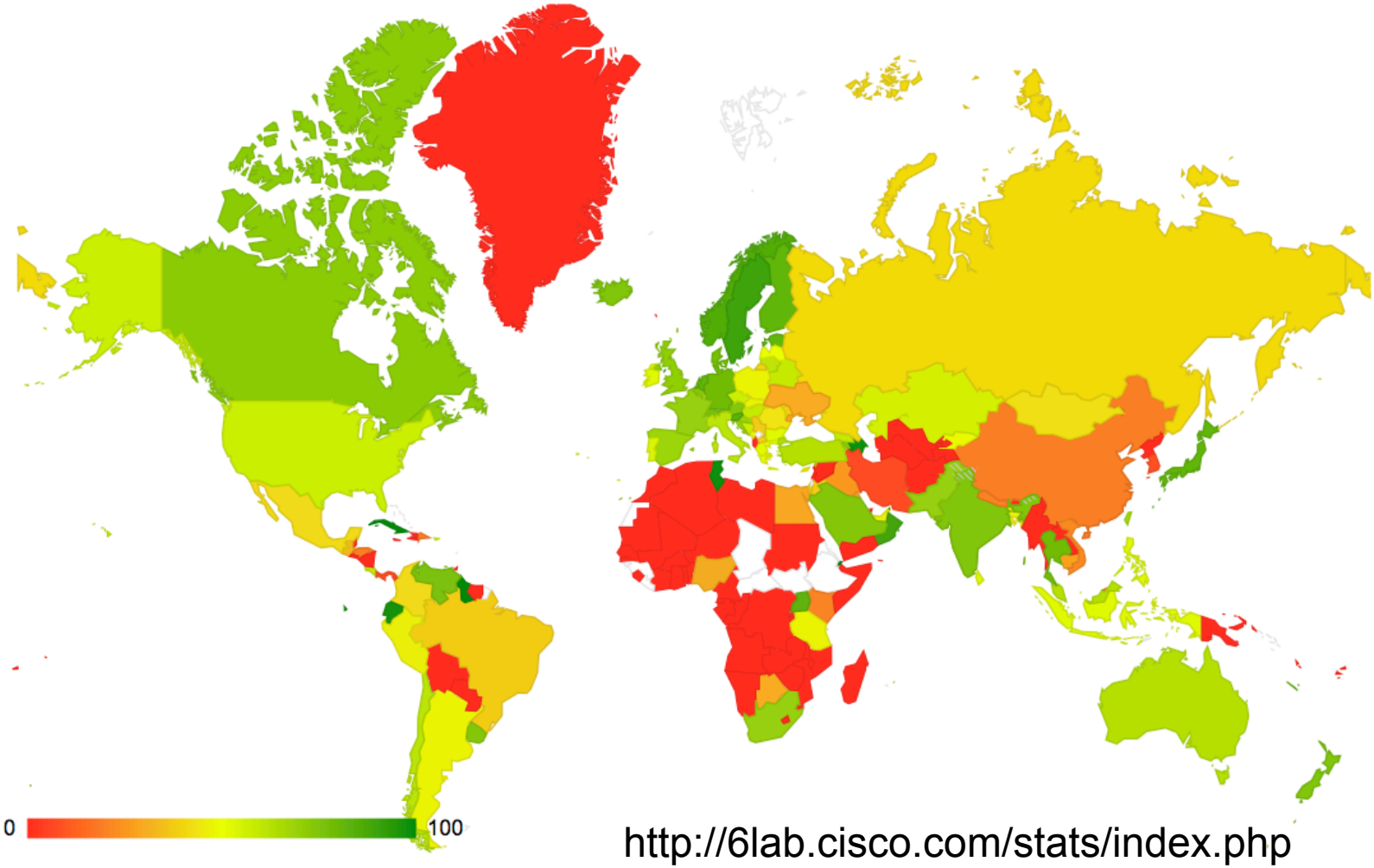
IPv6 transit AS
IPv6 readiness in Internet core



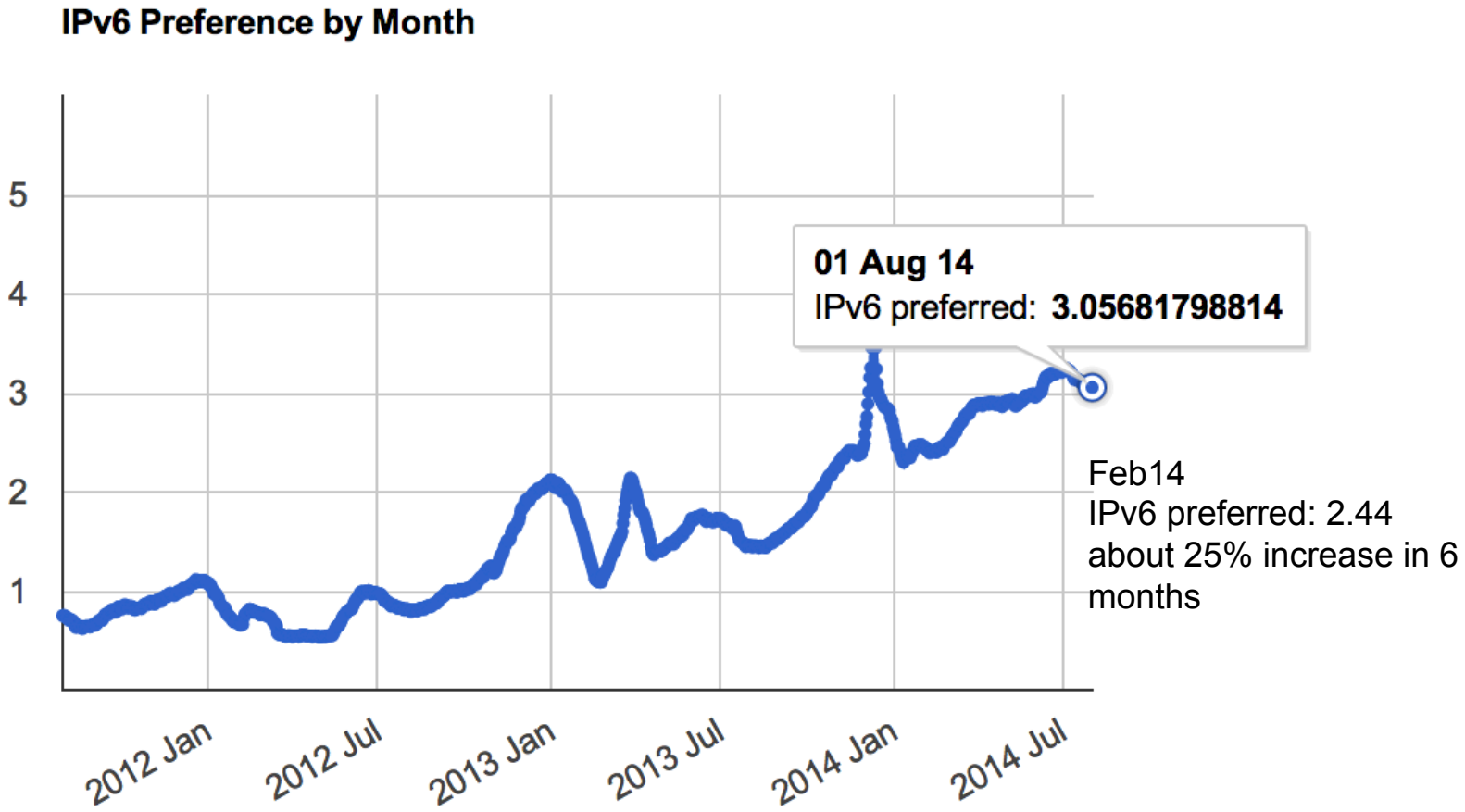
http://6lab.cisco.com/stats/index.php

World ranking: IPv6 ready websites

Rank	Country	Sample	Green
1	Czech Republic	50	38.0% (19)
2	Slovenia	50	32.0% (16)
3	Brazil	50	30.0% (15)
4	United States of America	50	22.0% (11)
5	Montenegro	50	22.0% (11)
6	Singapore	50	22.0% (11)
7	Switzerland	50	20.0% (10)
8	Reunion	50	20.0% (10)
9	Norway	50	16.0% (8)
10	Netherlands	50	14.0% (7)
11	Hong Kong	50	14.0% (7)
12	Luxembourg	50	14.0% (7)
13	Azerbaijan	50	14.0% (7)
14	Ukraine	50	14.0% (7)
15	Japan	50	12.0% (6)

http://www.vyncke.org/ipv6status/ 17/07/2014

IPv6 measurement - End user readiness: World



Feb14
IPv6 preferred: 2.44
about 25% increase in 6 months

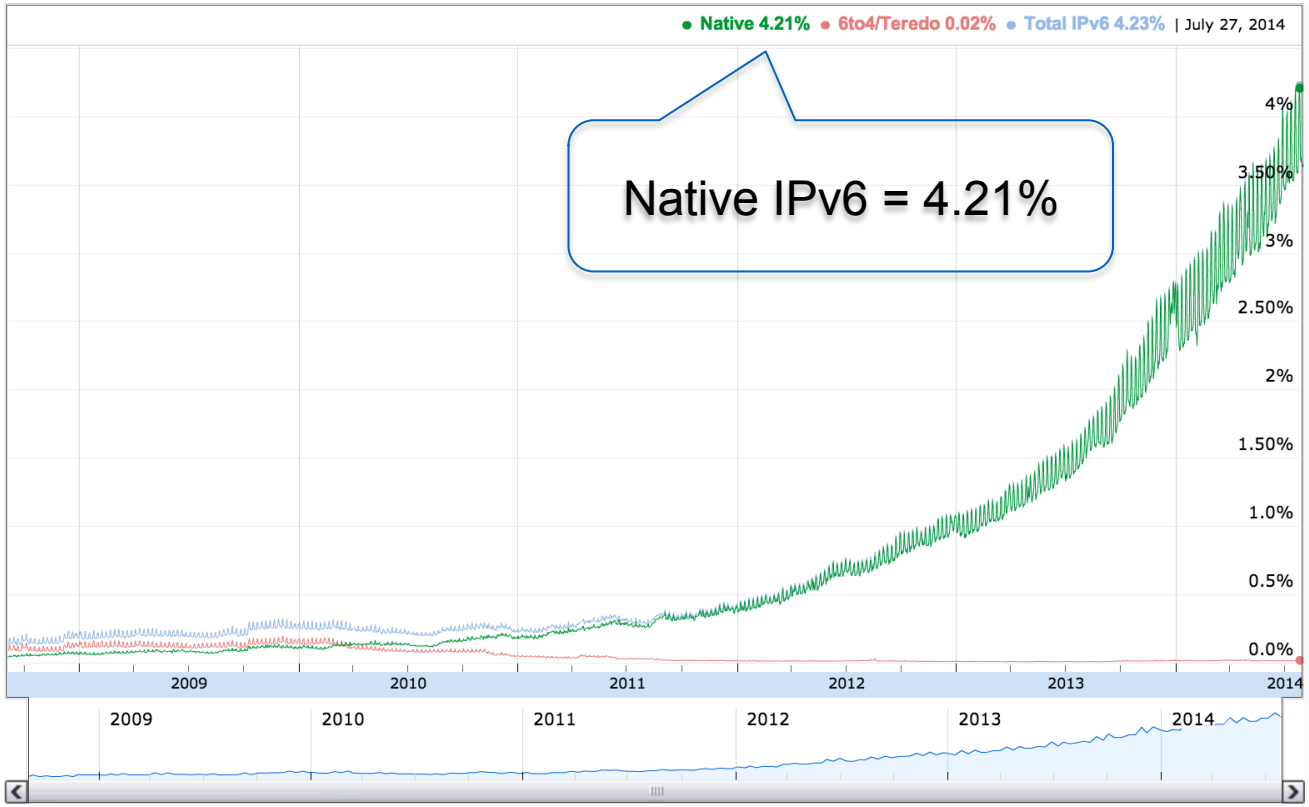
Data source from “flash” and “JavaScript” and including viewers from mobile devices

http://labs.apnic.net/ipv6-measurement/Regions/001%20World/ as of 03/08/2014

IPv6 connectivity among Google users

IPv6 Adoption

We are continuously measuring the availability of IPv6 connectivity among Google users. The graph shows the percentage of users that access Google over IPv6.

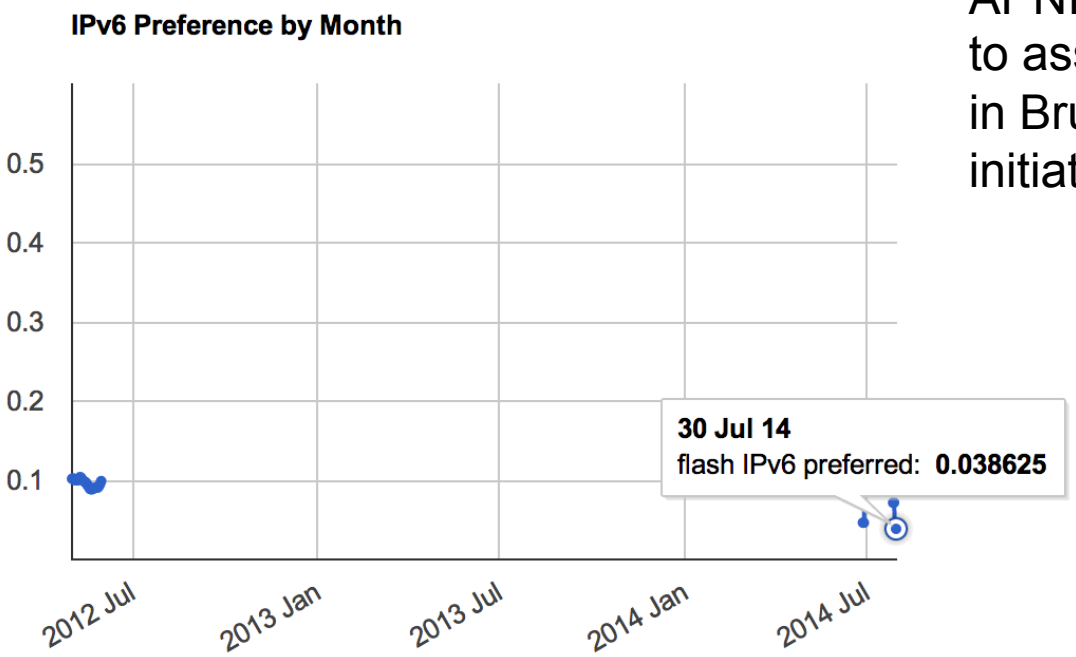


http://www.google.com/intl/en/ipv6/statistics.html as of 03/08/2014

How about ASEAN nations?

- Brunei
- Cambodia
- Indonesia
- Laos
- Malaysia
- Myanmar (no IPv6 end user readiness data is available)
- Philippines
- Singapore
- Thailand
- Vietnam

Brunei

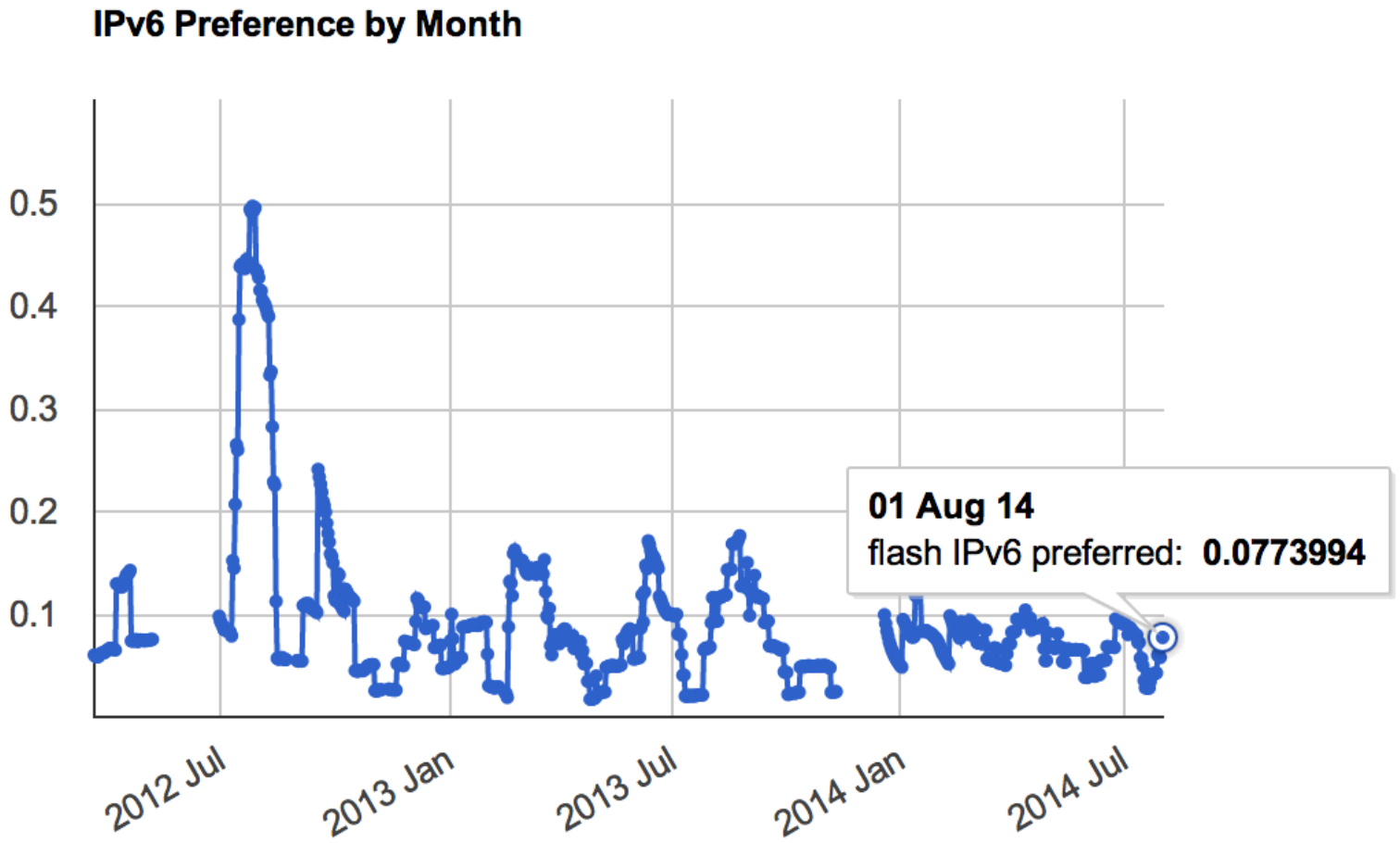


Authority of Info-communications Technology Industry (AITI) organized National IPv6 event in late 2013

APNIC IPv6 workshop delivered to assist network engineers in Brunei in March 2014 with AITI's initiative.

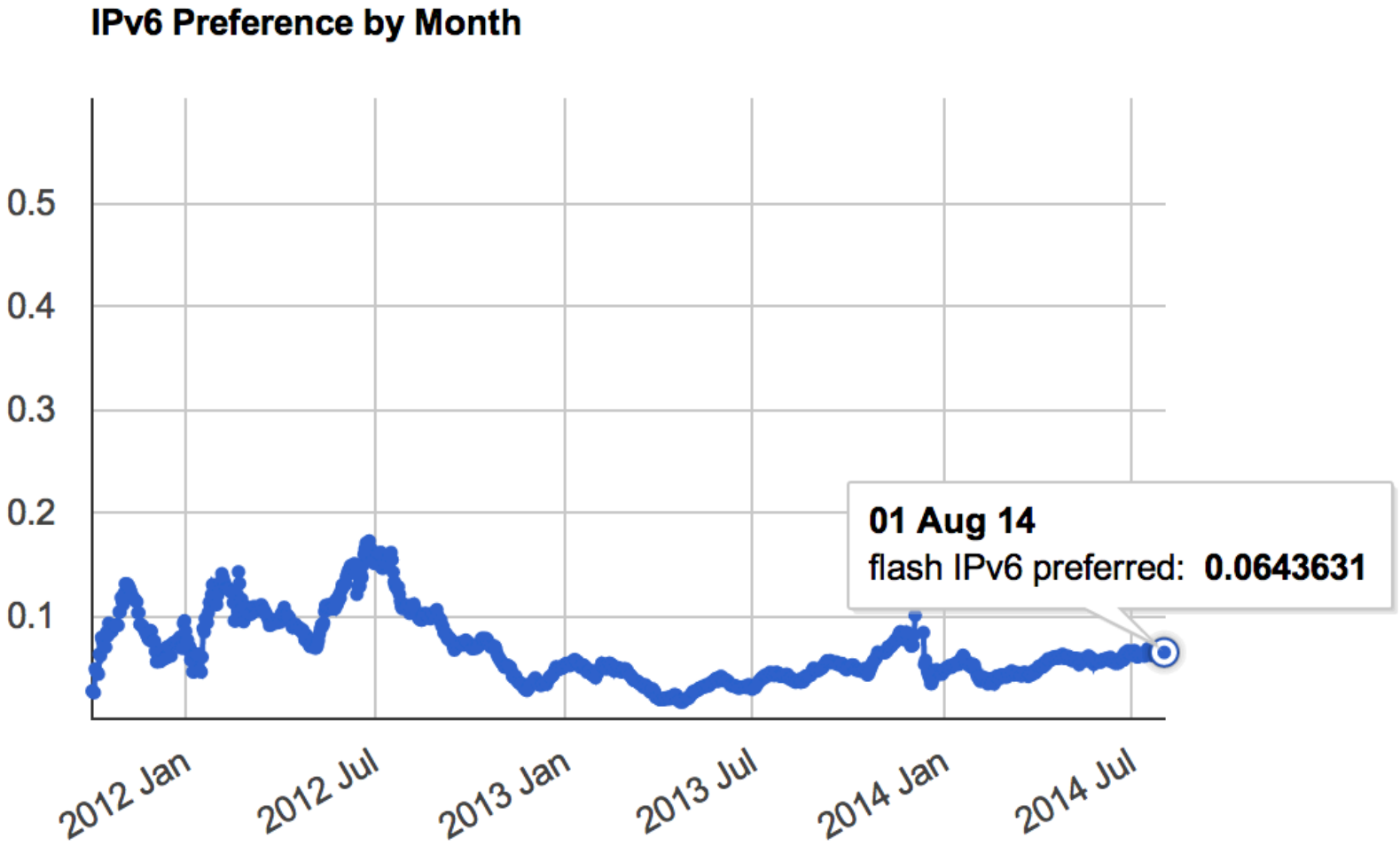
http://labs.apnic.net/ipv6-measurement/Economies/BN/

Cambodia



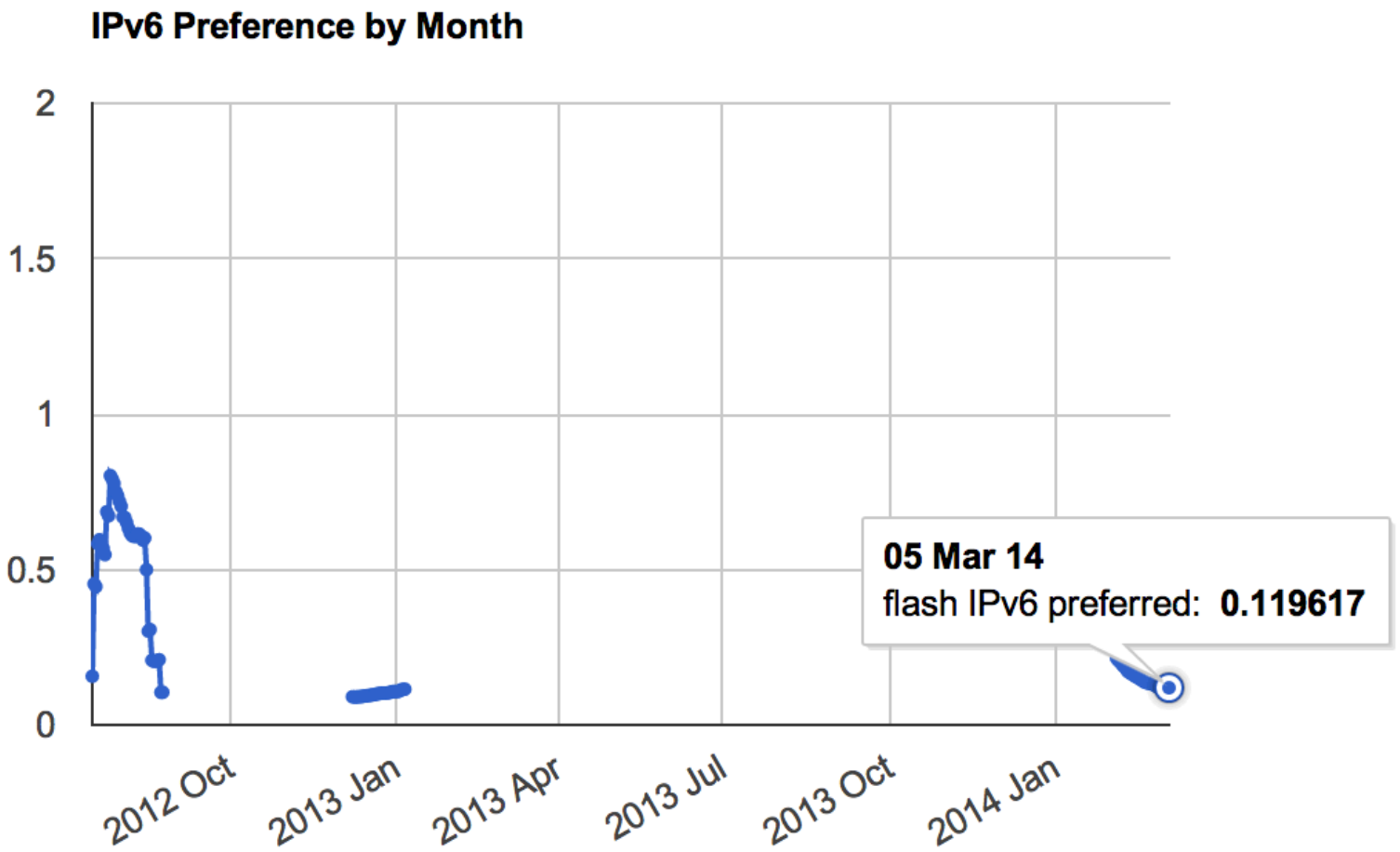
http://labs.apnic.net/ipv6-measurement/Economies/bn/KH

Indonesia



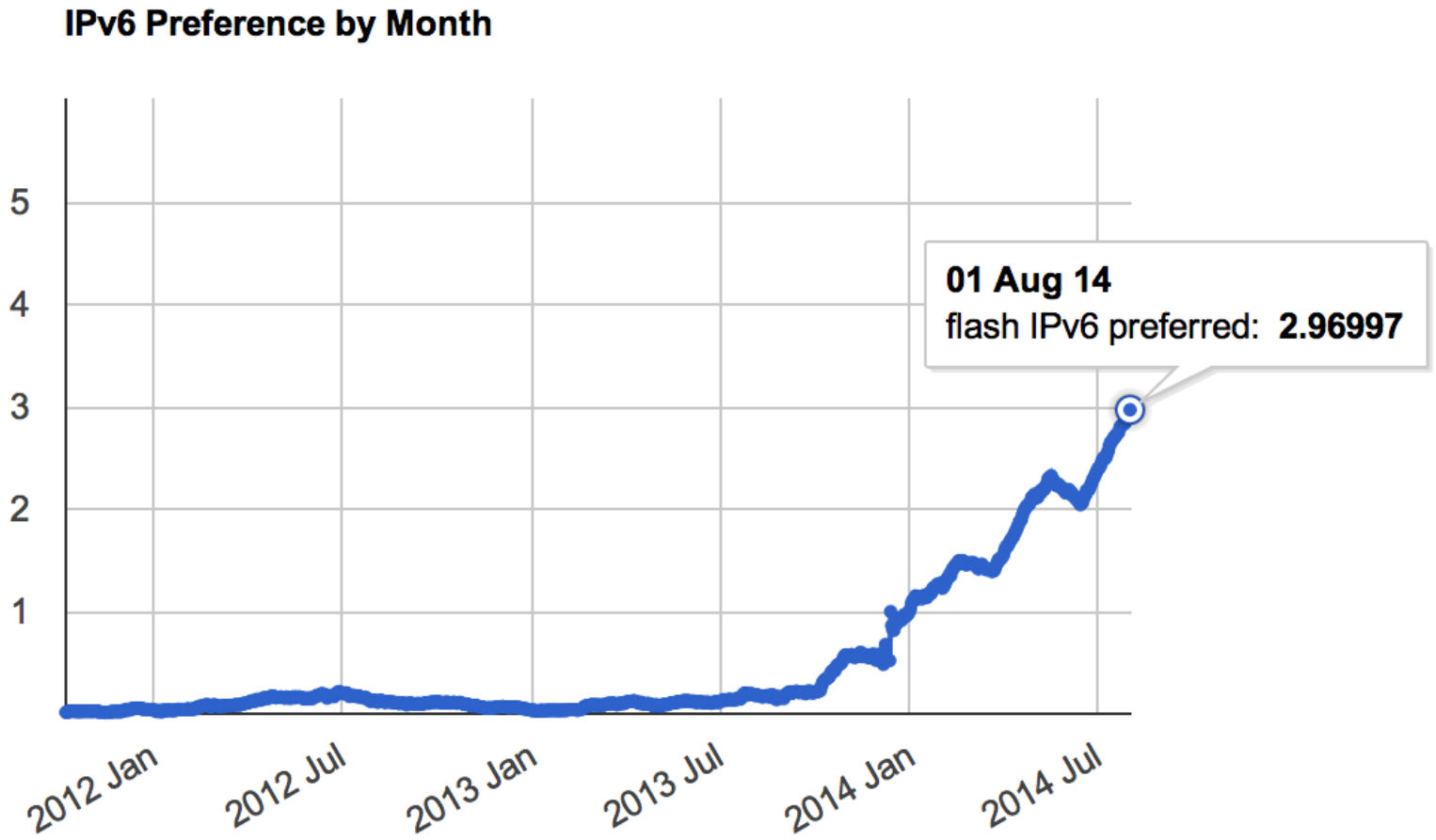
http://labs.apnic.net/ipv6-measurement/Economies/bn/ID

Laos



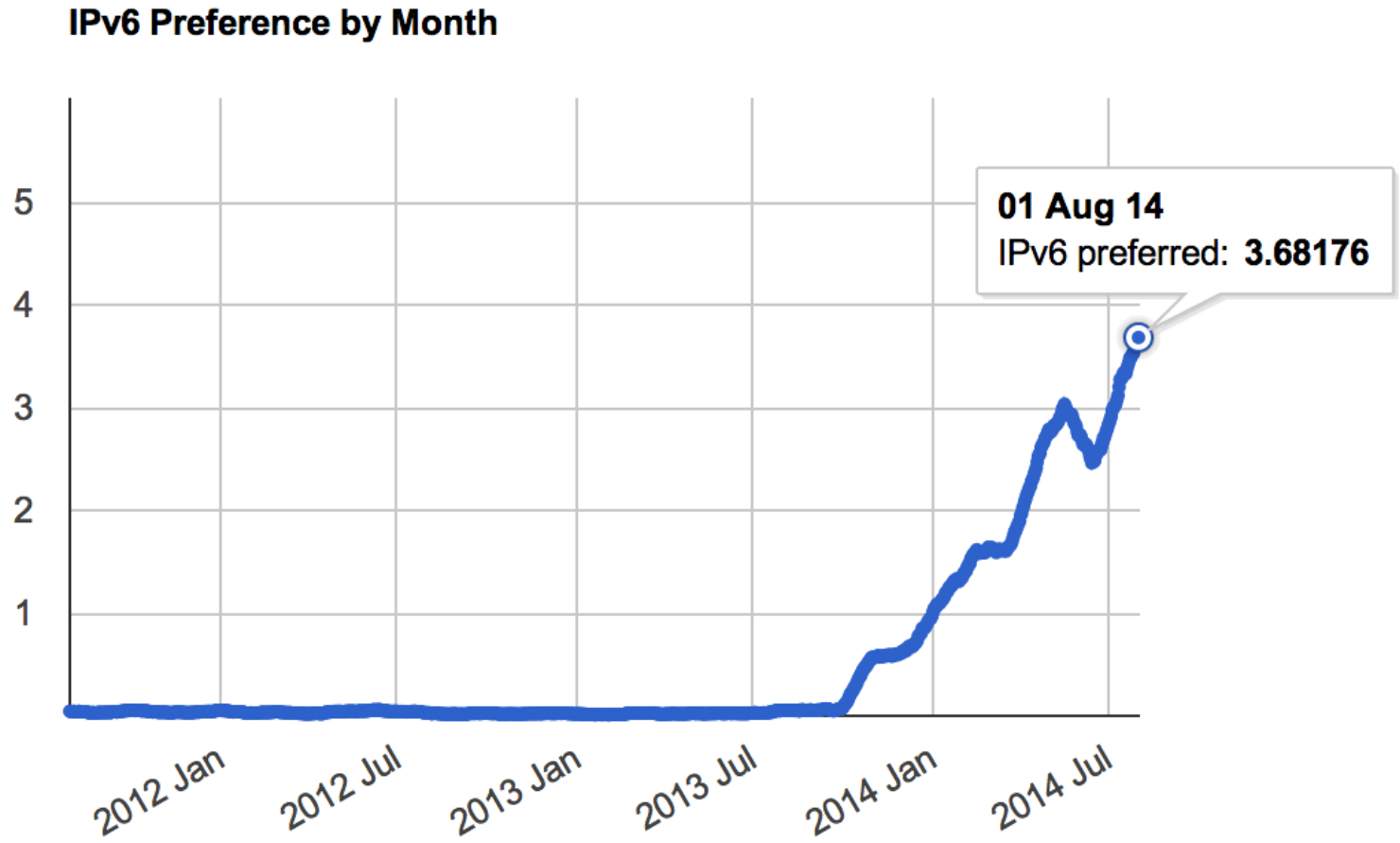
http://labs.apnic.net/ipv6-measurement/Economies/bn/LA

Malaysia



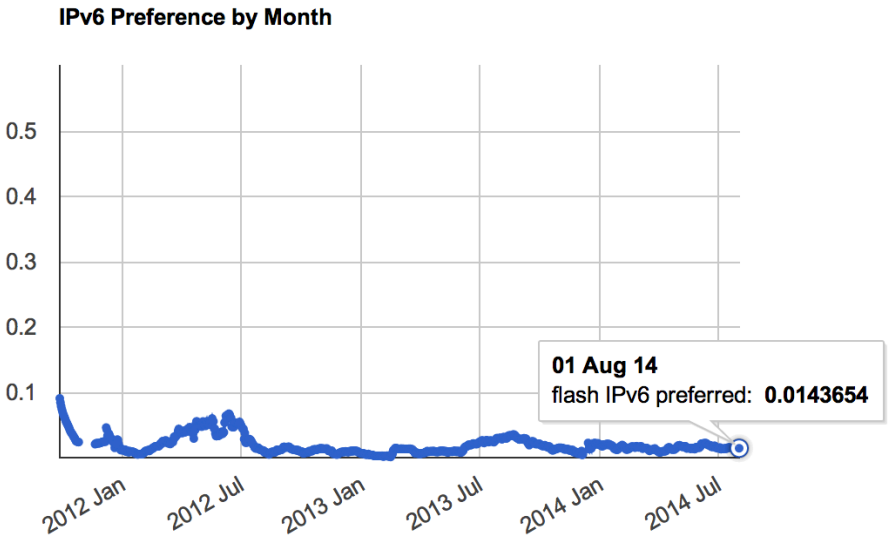
http://labs.apnic.net/ipv6-measurement/Economies/bn/MY

Example: TMnet Malaysia



http://labs.apnic.net/ipv6-measurement/AS/4/7/8/8/

Philippines



Executive Order No.893 in 2010 "Promoting the development and use of IPv6"

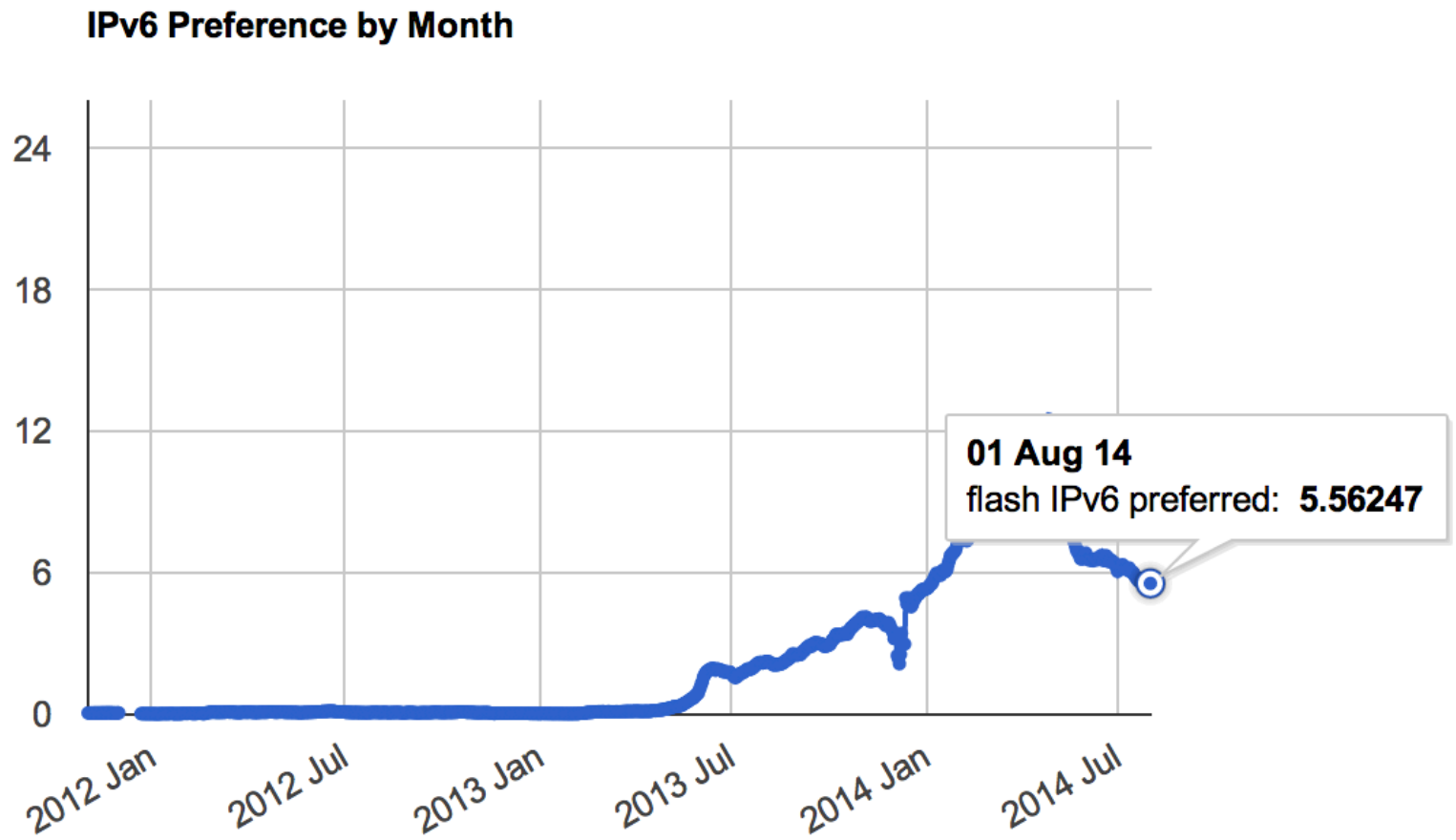
Policies support the industry's effort to adopt IPv6

Philippine Research, Education and Government Information Network (PREGINET) has enabled IPv6 in 2012

About 50% of PREGINET's traffic is via IPv6 (http://www.worldipv6launch.org/measurements/)

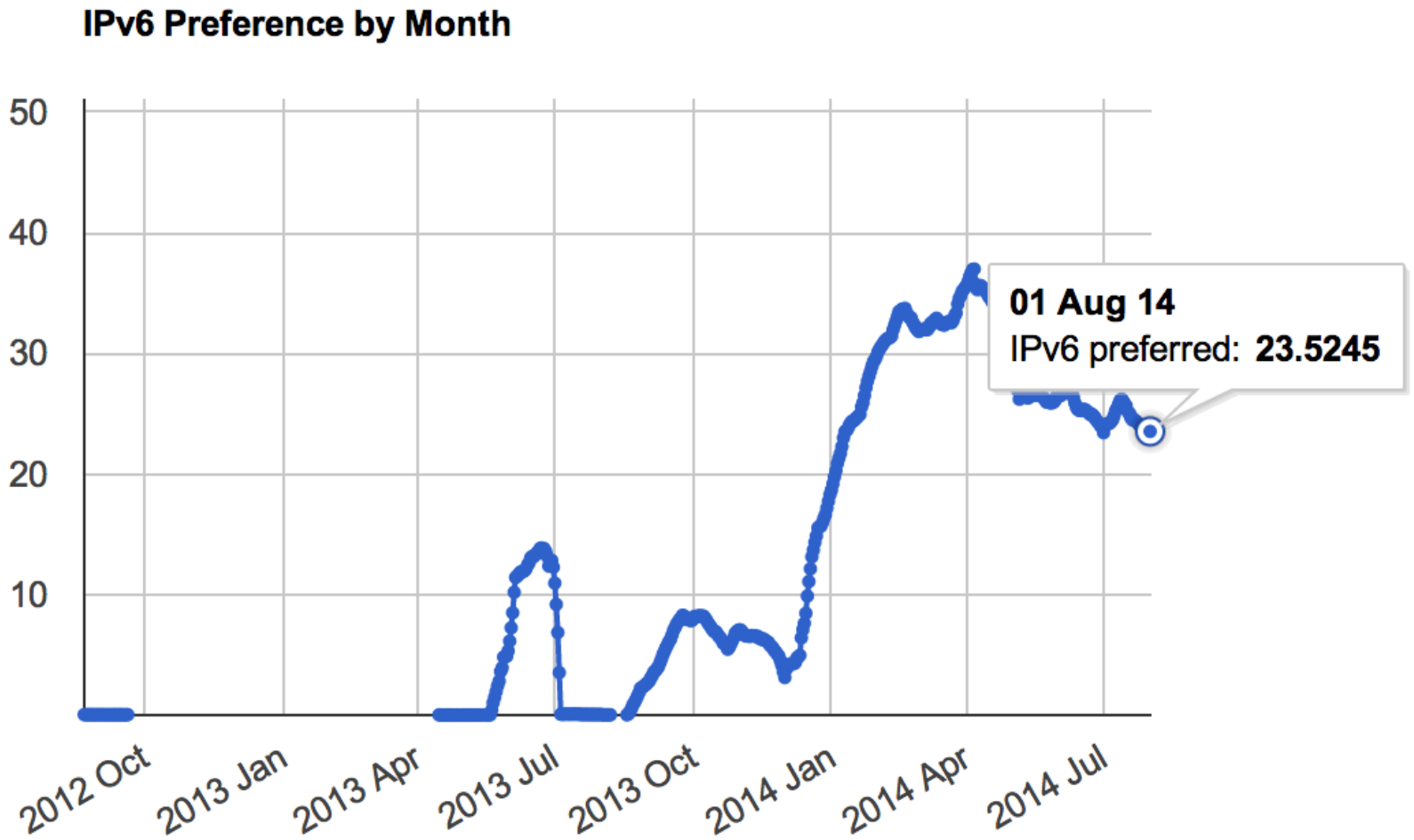
http://labs.apnic.net/ipv6-measurement/Economies/bn/PH

Singapore



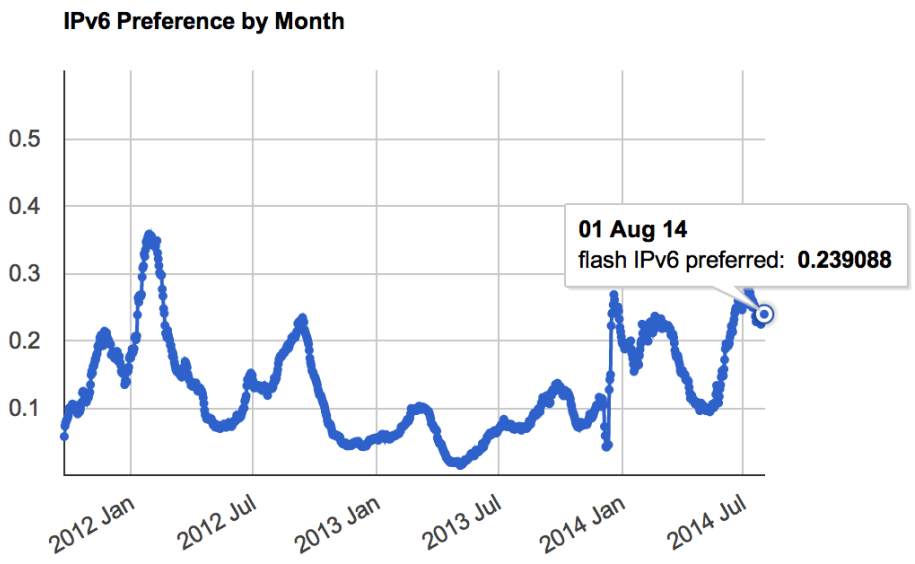
http://labs.apnic.net/ipv6-measurement/Economies/SG/ 30/07/2014

Example: StarHub



http://labs.apnic.net/ipv6-measurement/AS/4/7/8/8/

Thailand



IPv6 Thailand Master Plan issued in 2013

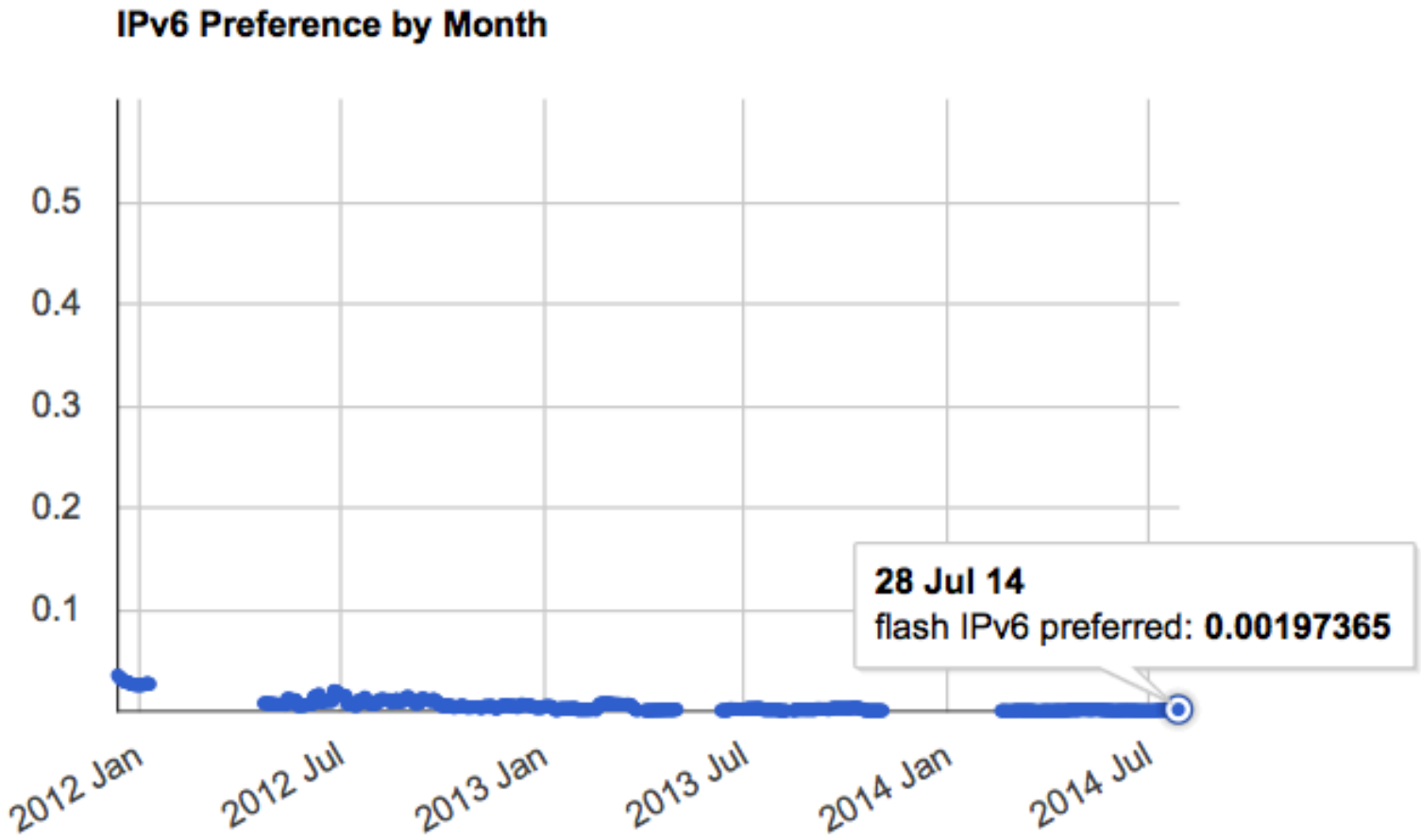
Royal Thai Government endorsed IPv6 Thailand National Plan for 2014 – 2016 (3 year plan)

- IPv6 infrastructure development
- Human resource development
- Services and supports
- Public awareness

IPv6 Forum Thailand

http://labs.apnic.net/ipv6-measurement/Economies/bn/TH

Vietnam



http://labs.apnic.net/ipv6-measurement/Economies/VN/

Growth Path of the Internet

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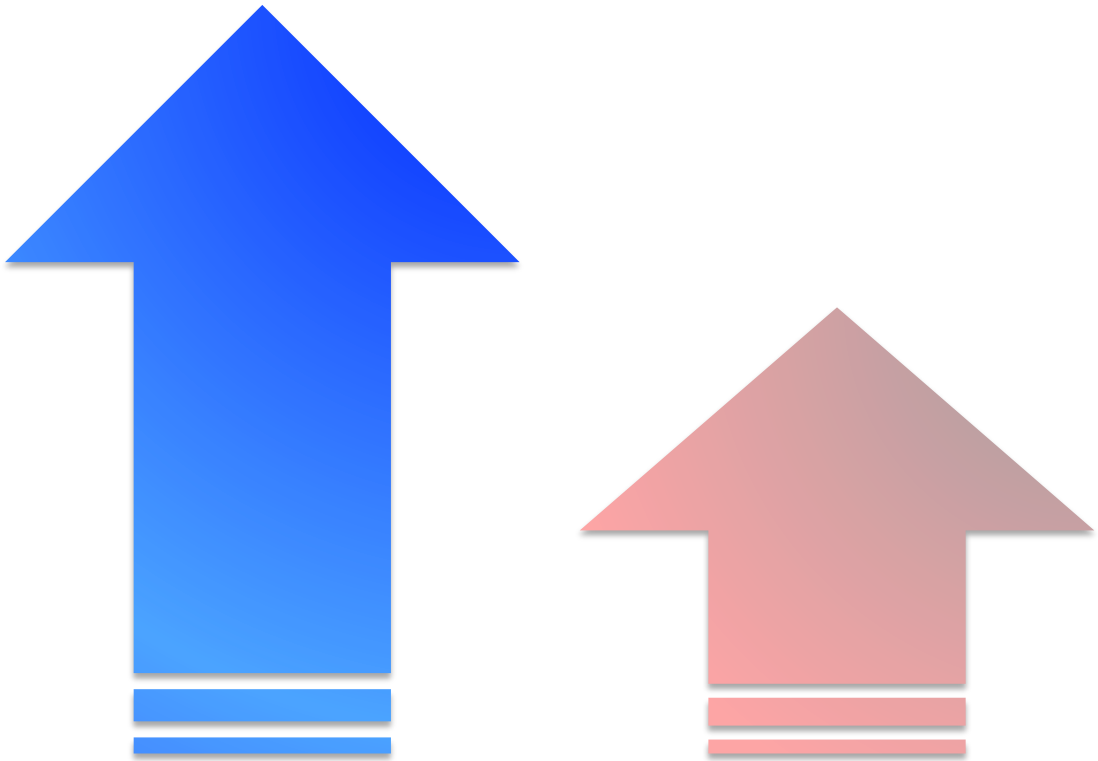
The Internet: Phenomenal growth

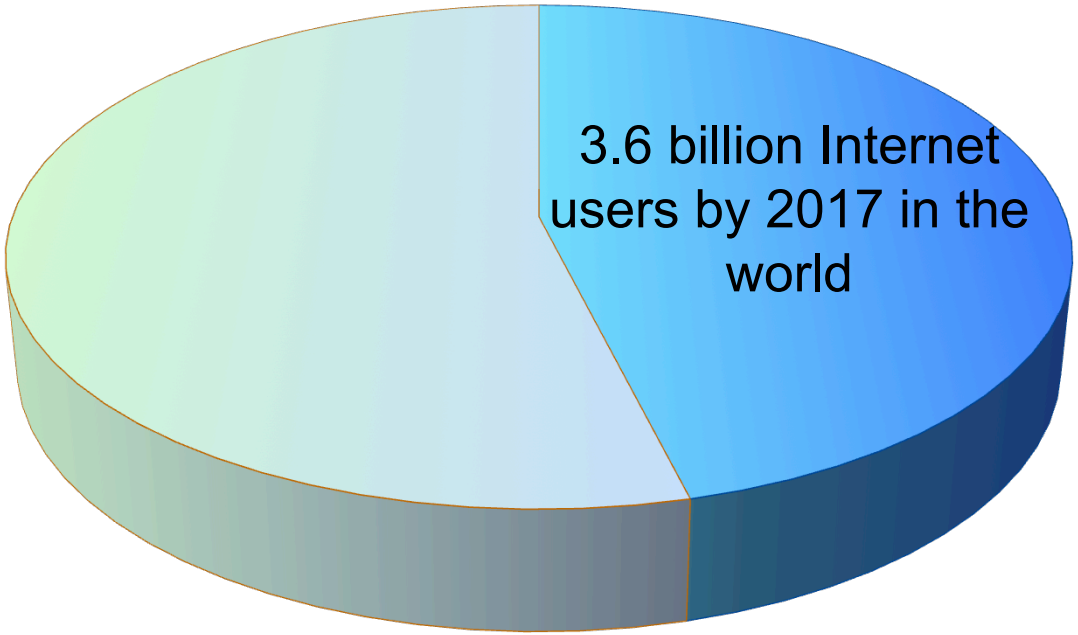


World
16 million users in 1995
2.8 billion users in 2013

Asia:
115 million users in 2000
1 billion users in 2013

http://newsroom.cisco.com/release/1197391/, http://www.internetworldstats.com/stats3.htm#asia, http://www.internetworldstats.com/emarketing.html

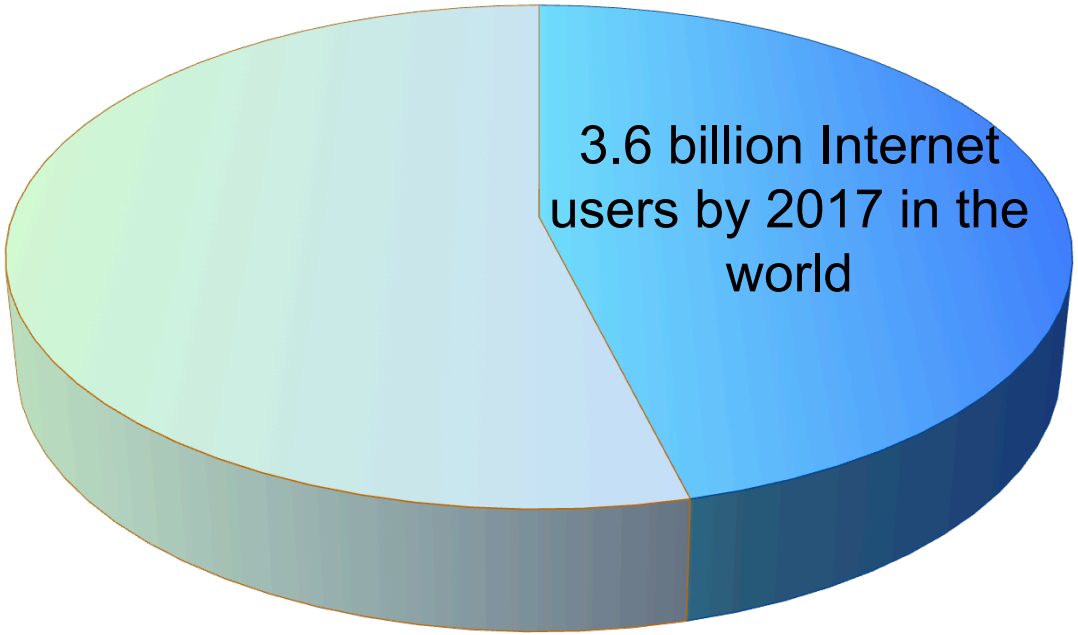
And the Internet is still growing



Over 47% of the world's projected population (7.6 billion)

http://newsroom.cisco.com/release/1197391/, http://www.internetworldstats.com/stats3.htm#asia, http://www.internetworldstats.com/emarketing.html

And the Internet is still growing



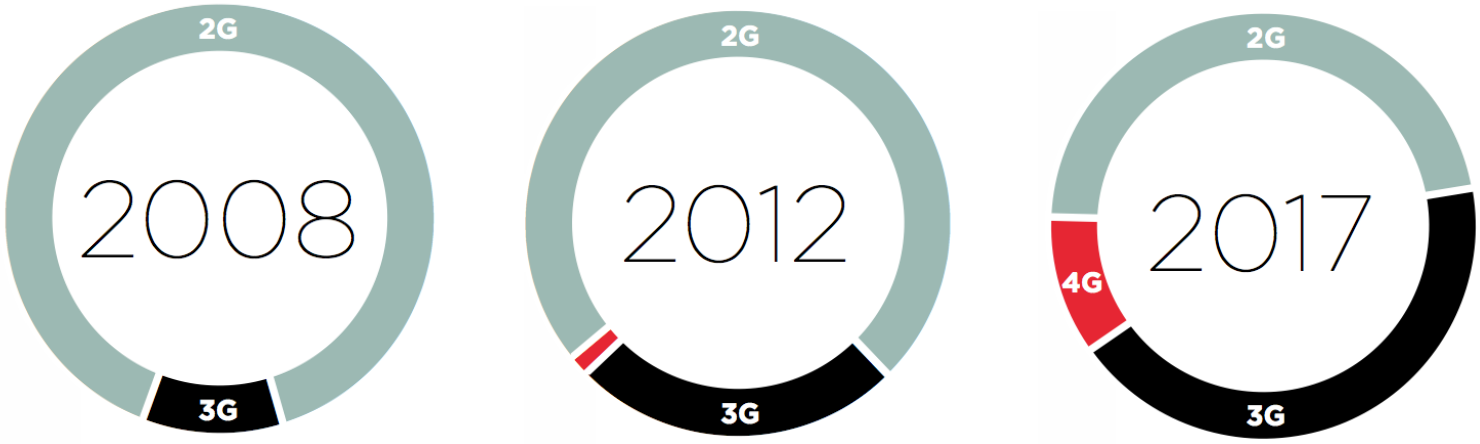
Over 47% of the world's projected population (7.6 billion)

1.33 billion Internet users in Asia by 2015, +30 % from 2013

http://newsroom.cisco.com/release/1197391/, http://www.internetworldstats.com/stats3.htm#asia, http://www.internetworldstats.com/emarketing.html

The next wave of Internet growth

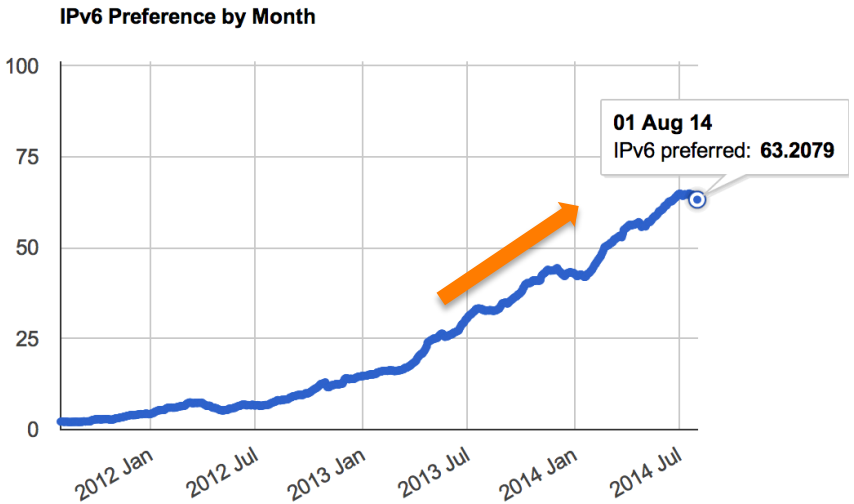
- Mobile networks with always on mobile devices
  - IP-based services
  - Much larger impact on the fundamental nature of the Internet
- Research projects 3G and 4G market share to increase to 53% by 2017



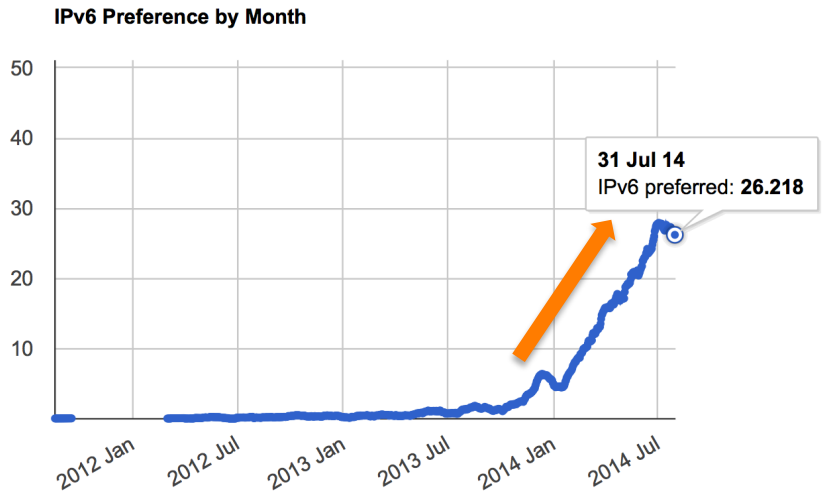
http://www.gsmamobileeconomy.com/GSMA%20Mobile%20Economy%202013.pdf

IPv6 in mobile networks

- 3G+ and 4G (LTE, TD-LTE): Services on voice, messaging and data are converging on IP-based services
- Rapidly increasing global 3G+ and 4G deployment
  - Some mobile network operators have already deployed IPv6



Verizon



T-Mobile USA

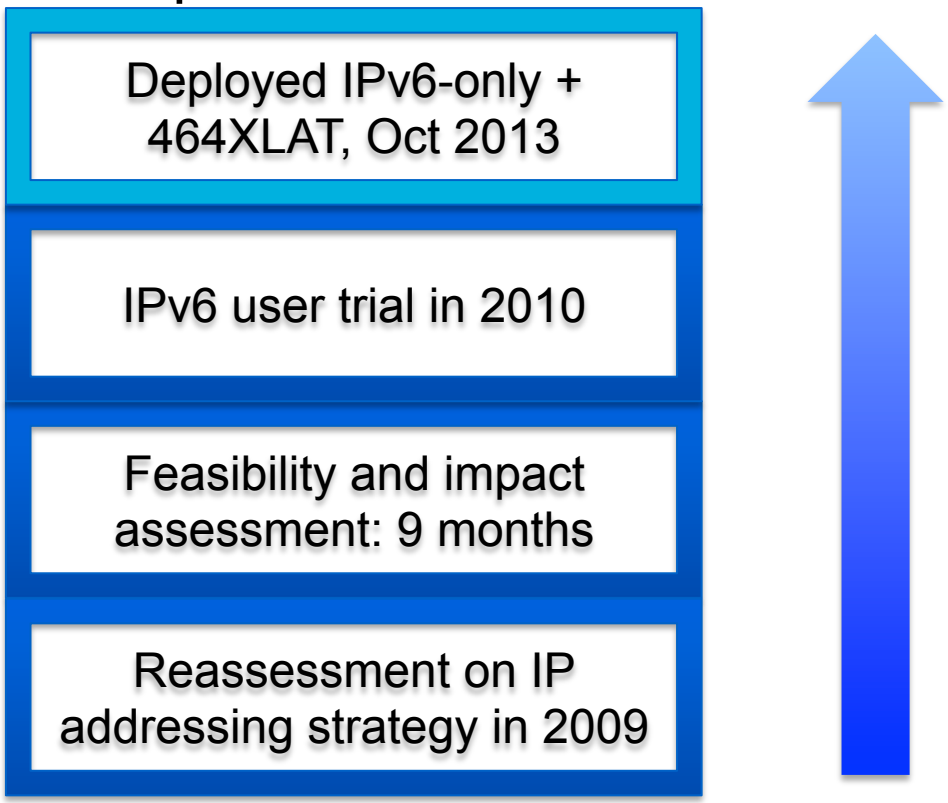
Case Study: T-Mobile USA

- Reassessment on IP addressing strategy in late 2009
  - Lack of IPv4 address space + rapid growth in "always-on" devices
  - IPv4 does not fit the business need
  - IPv6 deployment in 3GPP is easy
- Feasibility study and impact assessment: 9 months
- Started an IPv6 user trial in 2010 on 2G/3G/HSPA network
  - Settled with IPv6-only + 464XLAT transition technology to make everything work with IPv6-only

http://conference.apnic.net/__data/assets/pdf_file/0010/58870/tmo-ipv6-feb-2013_1361827441.pdf

Case Study: T-Mobile USA

- T-Mobile USA reconsidered their IP addressing strategy and chose a scalable option



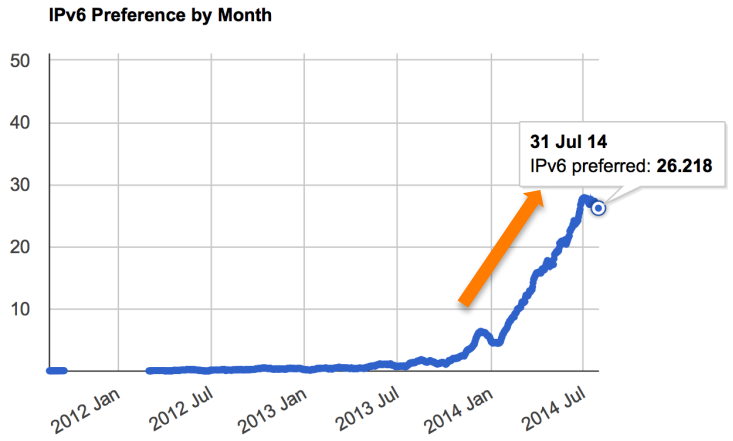
Case Study: T-Mobile USA

- Did not spend any CAPEX to deploy IPv6
- Introduction feature to handsets
  - A slow and careful process
- Android 4.3 introduced support for 464XLAT in Oct 2013
- Launched 5 Android phones with 464XLAT as the default in Oct 2013
  - All Android 4.3+ smartphones will be 464XLAT in the future at T-Mobile USA
  - **End users will be assigned with IPv6 as a default**
  - **No IPv4 addresses will be assigned**

https://conference.apnic.net/data/37/464xlat-apricot-2014_1393236641.pdf
https://conference.apnic.net/data/37/v6lessonstmo_1393297978.pdf

Case Study: T-Mobile USA

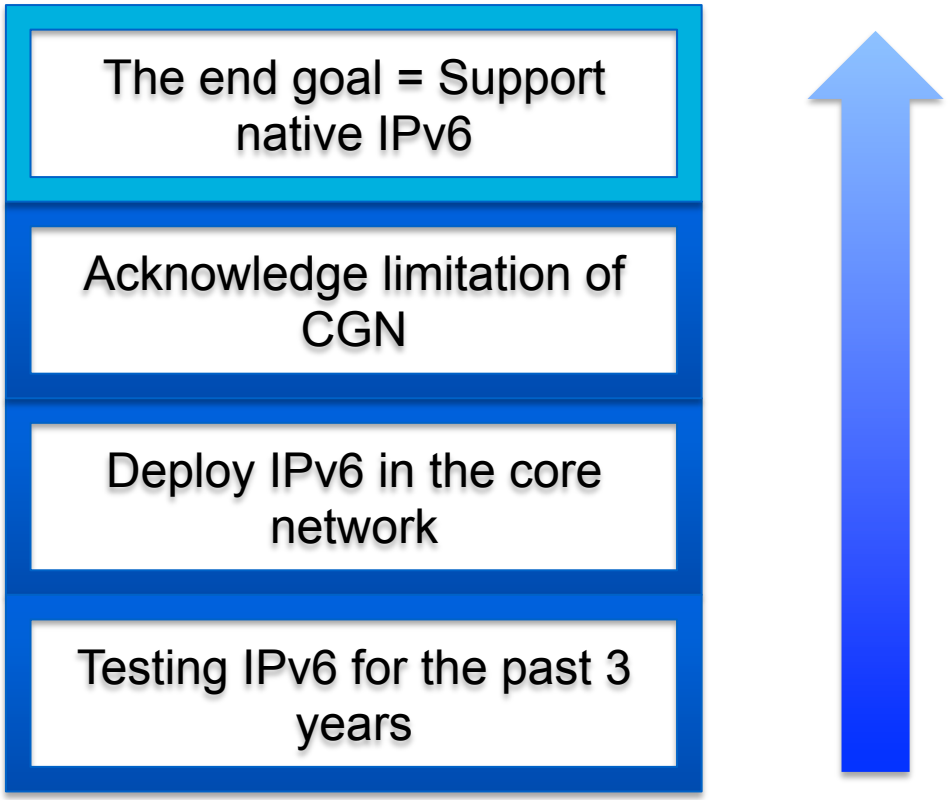
- Result of the above operation
  - 3.6 million unique IPv6 subscribers are active on the network after five months (as of Feb 2014)
  - Over 50% of IPv6 user traffic is end-to-end IPv6
  - No complicated IPv6 to IPv4 or IPv4 to IPv6 translation needed
  - This saves CAPEX and OPEX and makes the network simpler



https://conference.apnic.net/data/37/464xlat-apricot-2014_1393236641.pdf
https://conference.apnic.net/data/37/v6lessonstmo_1393297978.pdf

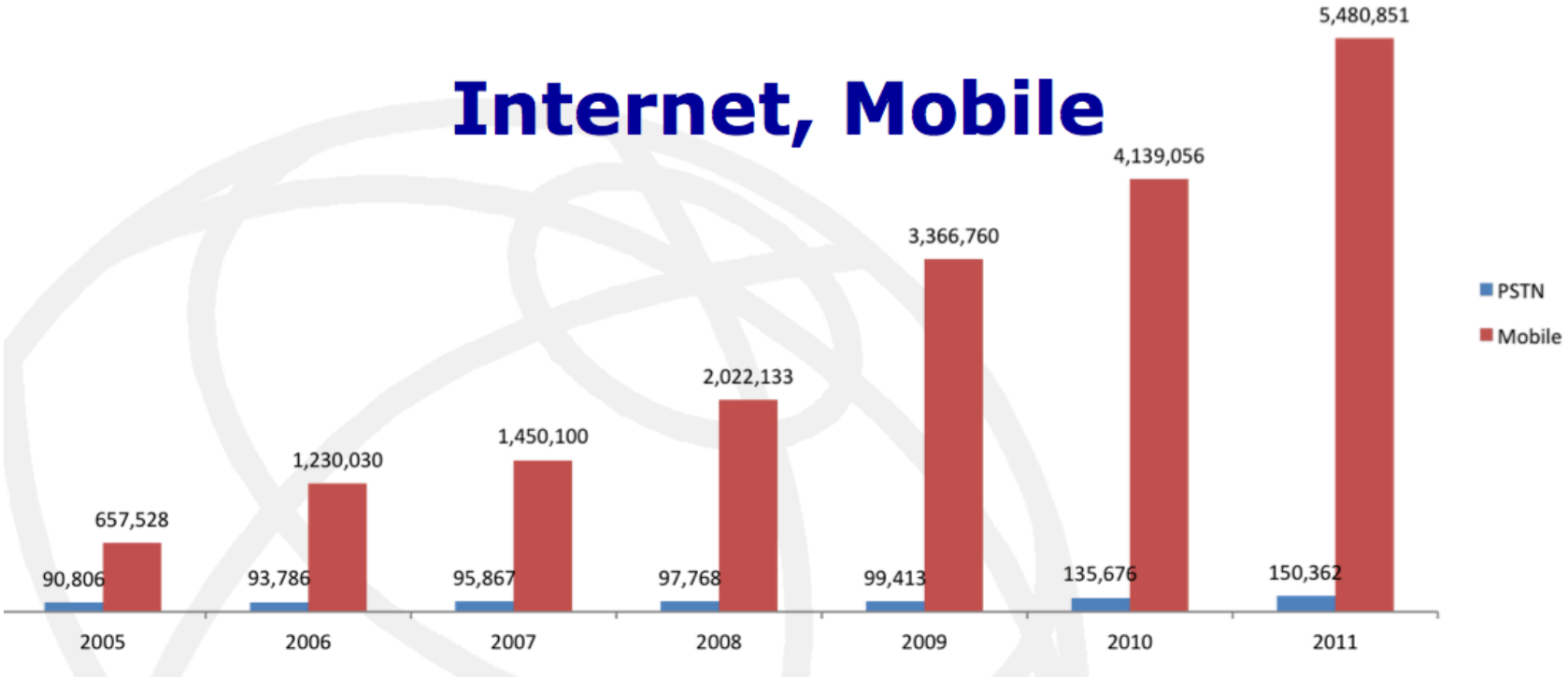
Case study: Telstra Australia

- Telstra is committed to introducing IPv6 into its mobile network: 464XLAT

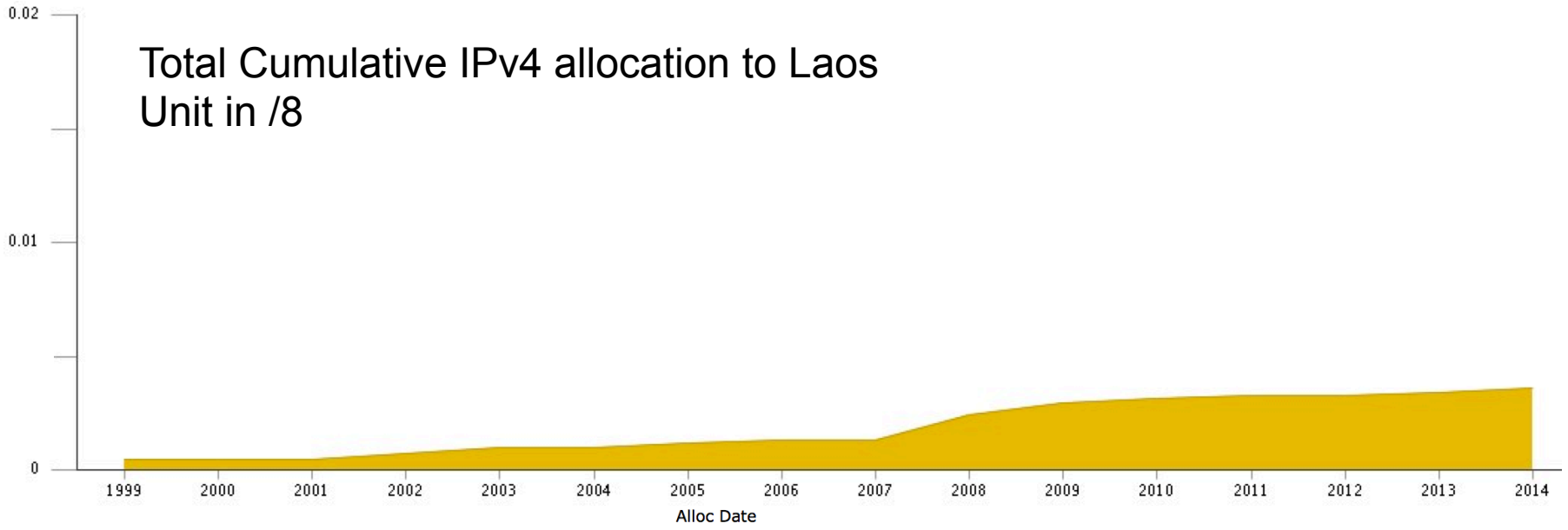


https://conference.apnic.net/data/37/yeung.-s-ipv6-in-telstra-apipv6tf-apnic37_1392858273.pdf

Growth of mobile subscribers in Laos

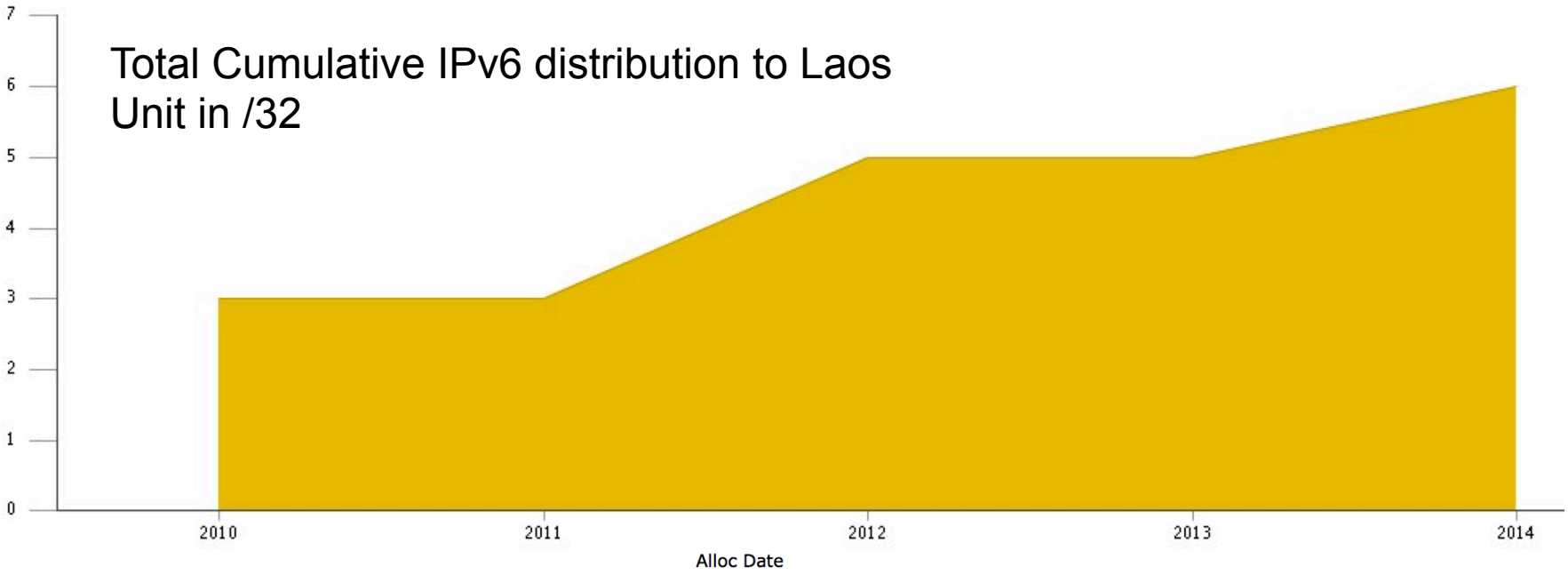


IPv4 address distribution to Laos



http://stats.apnic.net:8080/o3portal

IPv6 address distribution to Laos



Conclusions

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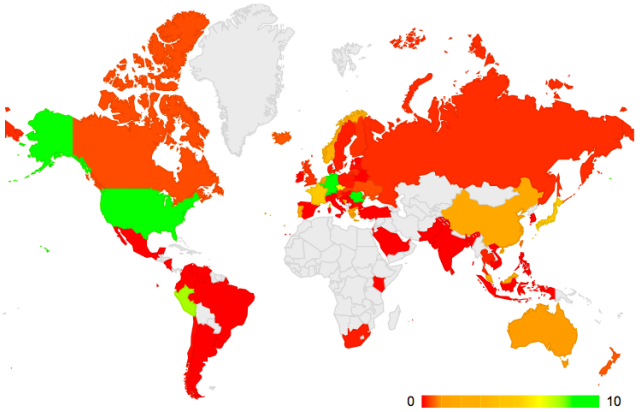
Conclusions

- IPv6 deployment is increasing steadily
  - But varies among regions, economies, and individual ASNs
  - Not happening simultaneously
  - Some economies and ASNs have been very active in terms of IPv6 deployment
    - Particularly some mobile network operators and cable TV operators
    - Once they enable IPv6 in their network and handsets, their end user readiness grows VERY rapidly



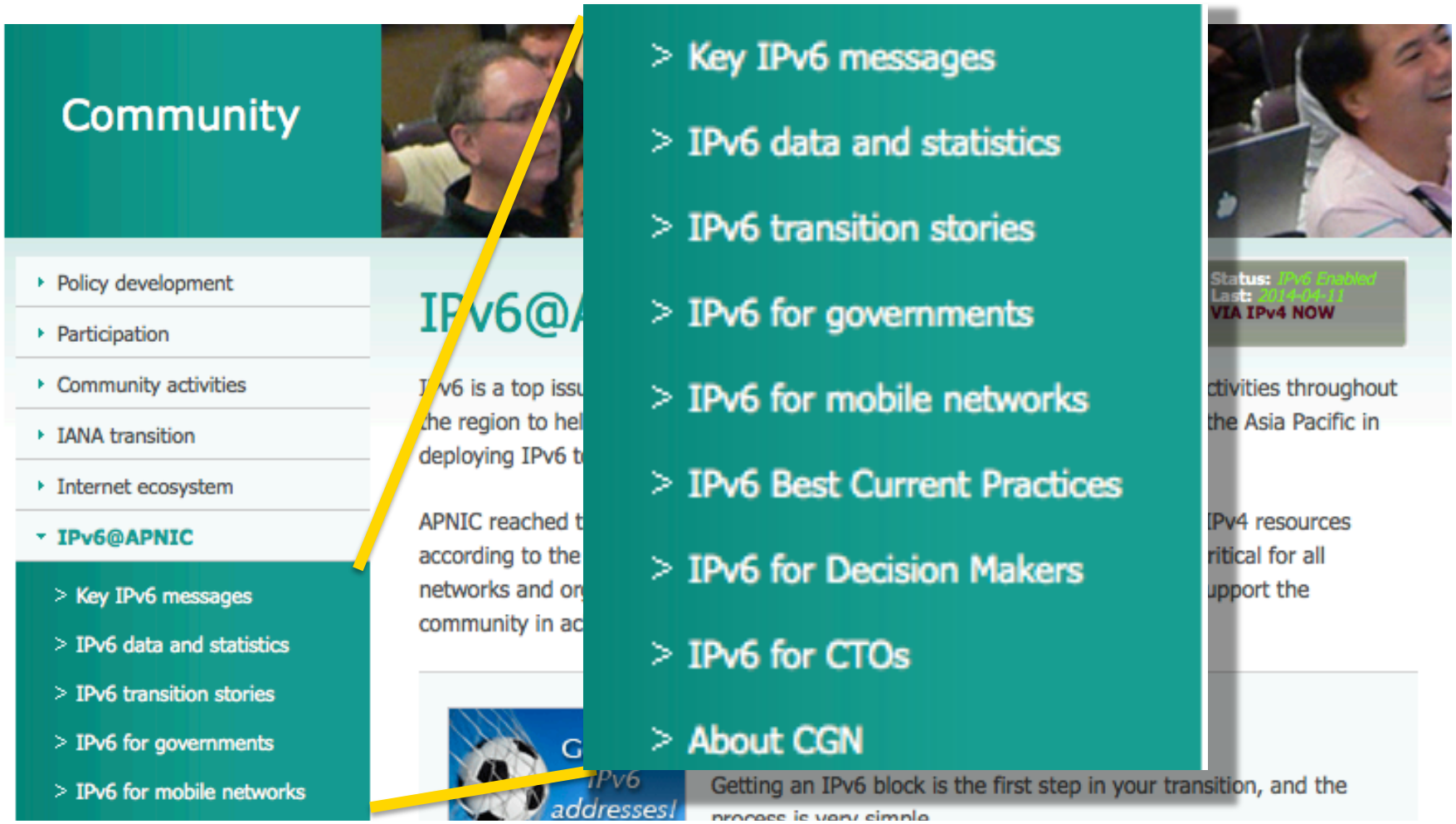
Conclusions: A recipe for successful IPv6 deployment

Plan and act

Test

IPv6 default for new customers in new networks

Extensive IPv6 informaton
www.apnic.net/ipv6



APNIC Training and Engineering Assistance

- Building capacity with APNIC Training
  - Topics offered to support resilient and scalable Internet infrastructure
    - IPv4 to IPv6 Transition, IPv6 Workshop, Network Security, Routing and BGP etc.

- Engineering Assistance provided by Internet experts
  - Direct assistance – IP peering, IPv4 and IPv6 network, Internet infrastructure security

Direct assistance

- ITU and APNIC have been collaborating since 2011
  - To support IPv6 deployment in the AP region mainly through capacity building

- Upon request, ITU in partnership with APNIC can provide economy specific assistance
  - To deliver hands-on workshop and Engineering Assistance to provide IPv6 support to your economy

APNIC 38 Workshops

DNSSEC

Network Security

Advanced BGP, IPv4 and IPv6

- Conducted by industry experts, including APNIC Trainers
- Classes are limited to up to 28 participants, so register now!
- More information: conference.apnic.net/38/program

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