IPv6 Deployment: Where are we now?

TWNIC OPM

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George Kuo

<george@apnic.net>

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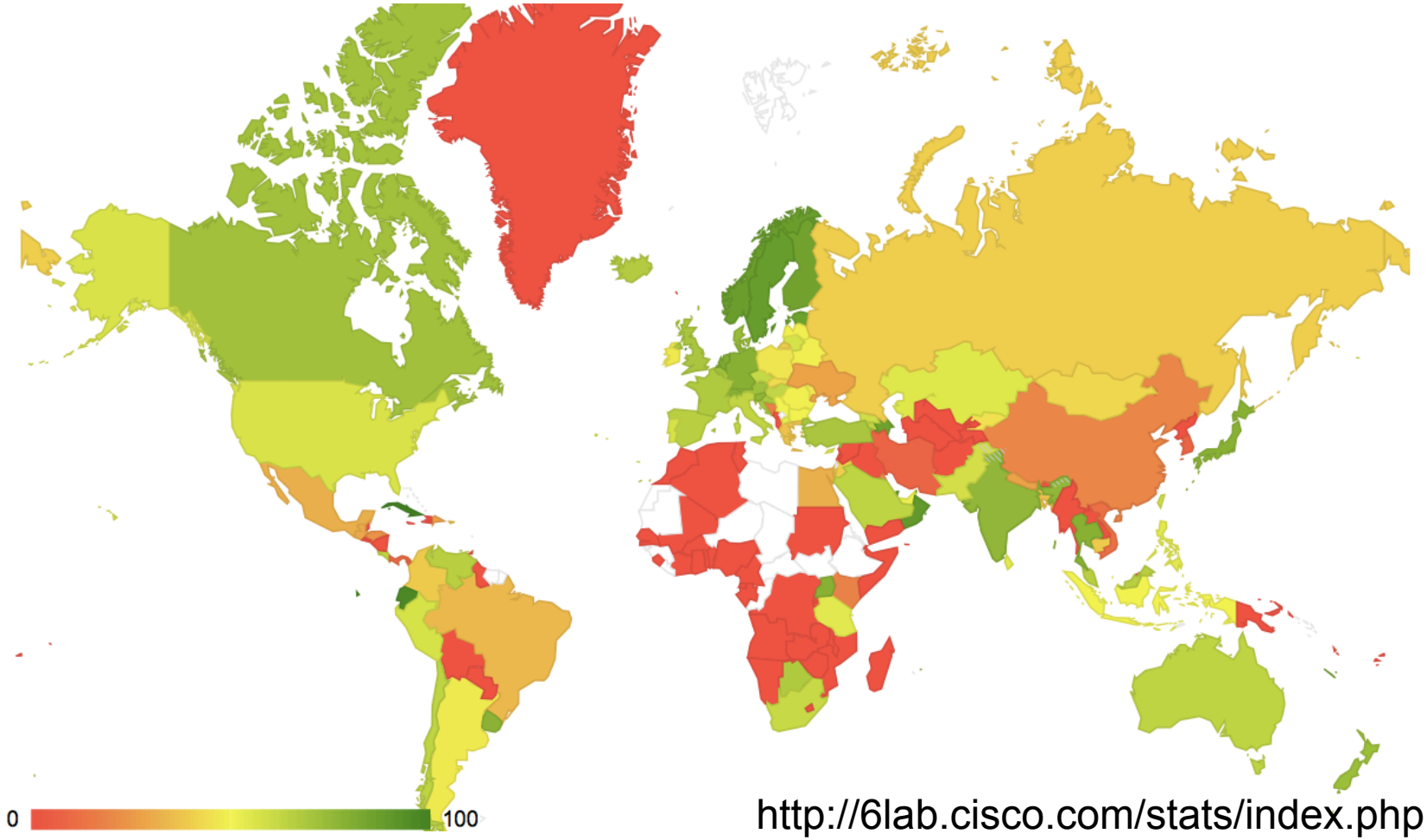
Overview

- Highlights of global and regional economies IPv6 readiness
- Governments' initiative in the Asia Pacific region
- Growth path of the Internet
- Conclusion

IPv6 readiness highlights - global and regional view

Global transit AS IPv6 readiness



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

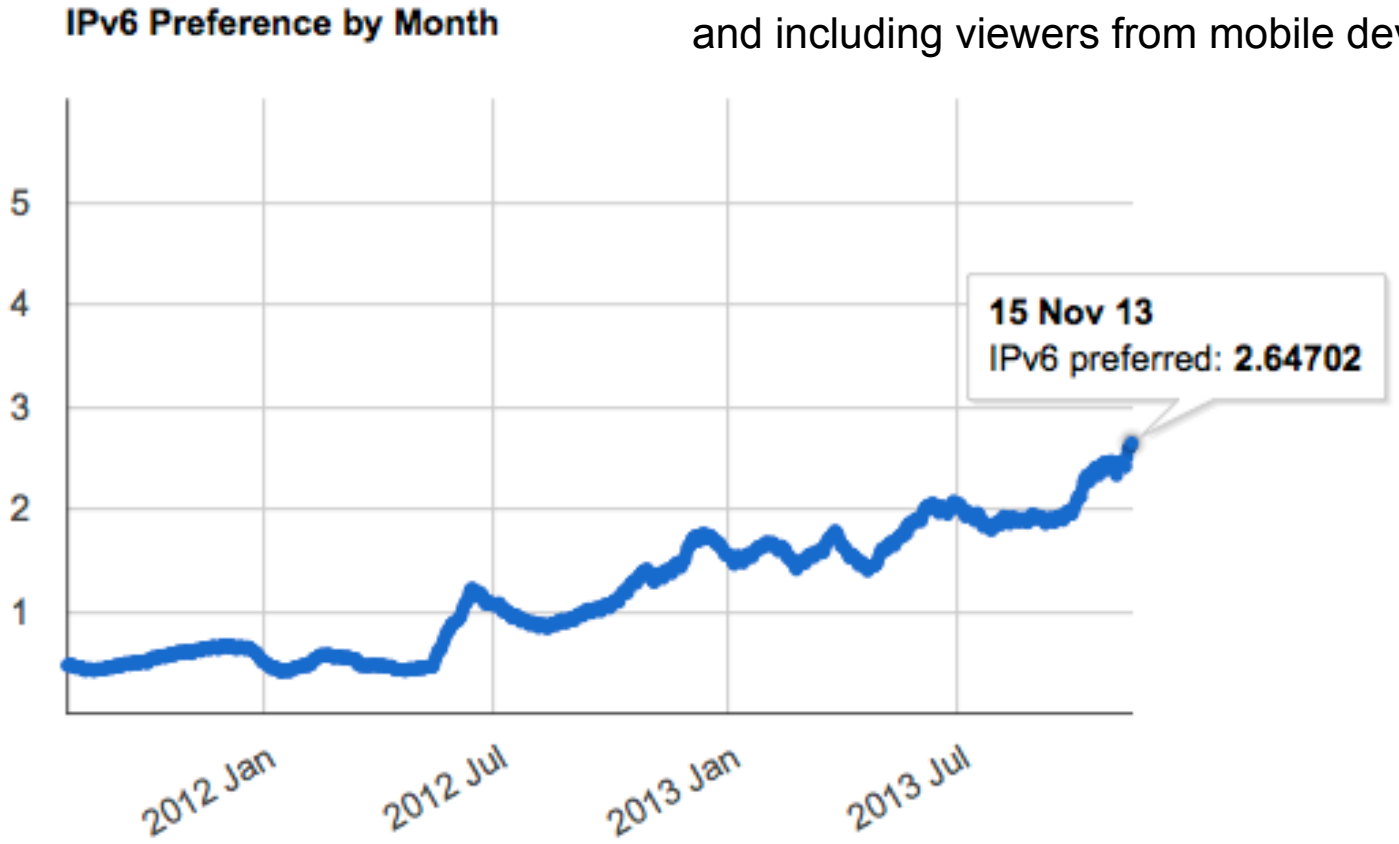
IPv6 ready websites

Rank	Country	Sample	Green
1	Czech Republic	50	34.0% (17)
2	Brazil	50	28.0% (14)
3	Slovenia	50	26.0% (13)
4	Maldives	12	25.0% (3)
5	United States of America	50	22.0% (11)
6	Netherlands	50	18.0% (9)
7	Switzerland	50	16.0% (8)
8	Turkmenistan	14	14.3% (2)
9	Norway	50	14.0% (7)
10	Singapore	50	14.0% (7)
11	Portugal	50	14.0% (7)
12	India	50	14.0% (7)
13	Denmark	50	14.0% (7)
14	Estonia	50	14.0% (7)
15	Congo (Democratic Republic)	16	12.5% (2)
16	Greenland	16	12.5% (2)
17	Taiwan	50	12.0% (6)
18	Poland	50	12.0% (6)
19	Germany	50	12.0% (6)
20	Malaysia	50	12.0% (6)

http://www.vyncke.org/ipv6status/ 18/11//2013

IPv6 end user readiness

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



http://labs.apnic.net/ipv6-measurement/Regions/001%20World/ as of 18/11/2013

IPv6 deployment leaderboard (commercial operators)

ASN	Entity	Economy	IPv6 preferred rate
22394	Cellco Verizon Wireless	US	41.58
2516	KDDI KDDI CORPORATION	**JP**	**30.79**
18126	CTCX Chubu Telecommunications Company; Inc.	**JP**	**30.15**
8708	RSC & RDS SA	RO	23.53
7018	AT&T	US	16.26
4739	INTERNODE-AS Internode Pty Ltd	**AU**	**14.34**
17412	Woosh Wireless	**NZ**	**11.01**
2042	Jaring Communications	**MY**	**10.07**
4773	MOBILEONELTD-AS-AP MobileOne Ltd. Mobile/Internet Service Provider Singapore	**SG**	**9.86**
55430	STARHUBINTERNET-AS-NGNBN Starhub Internet Pte Ltd	**SG**	**9.71**
7922	Comcast	US	9.53

http://labs.apnic.net/ipv6-measurement/AS/ 18/11//2013

Observations

- The status of IPv6 deployment is varied among regions, economies, and individual ASNs (network operators)
  - IPv6 deployment is not occurring simultaneously
  - Some economies and network operators have been very active in deploying IPv6
- Let's examine some statistics and anecdotal evidence of deployment in the Asia Pacific region

Governments' initiatives in the Asia Pacific region

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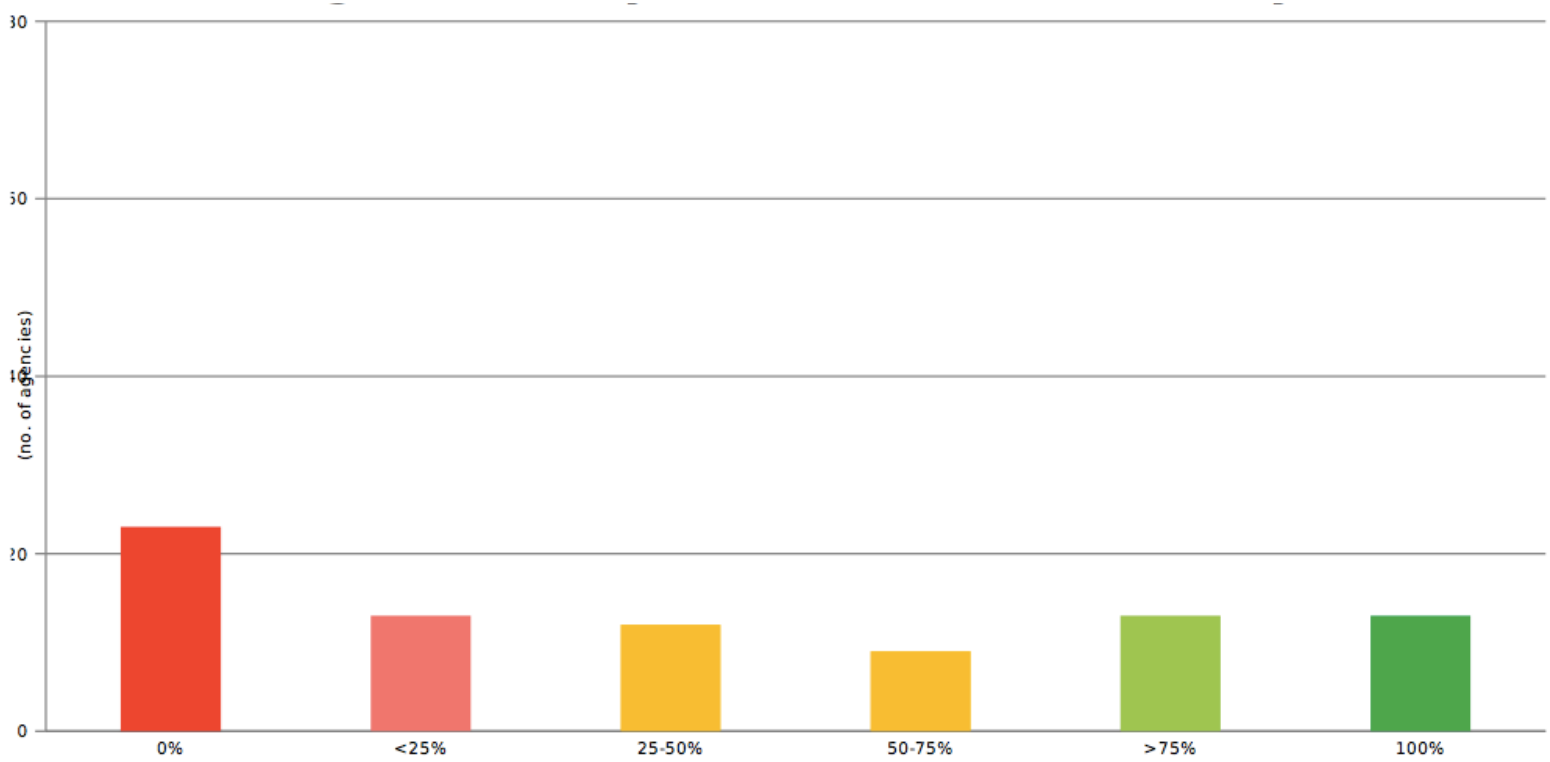
Australia

- Has a strategy for IPv6 implementation in Australian Government Agencies
  - Version 1 in 2007, Version 2 in 2009
  - Have IPv6 capable hardware and software platforms by 2012
  - Operate a dual stack IPv4 and IPv6 environment by 2015
    - Stage 1: Preparation (Jan 2008 – Dec 2009)
    - Stage 2: Transition (Jan 2010 – Dec 2011)
    - Stage 3: Implementation (Jan 2012 – Dec 2012)

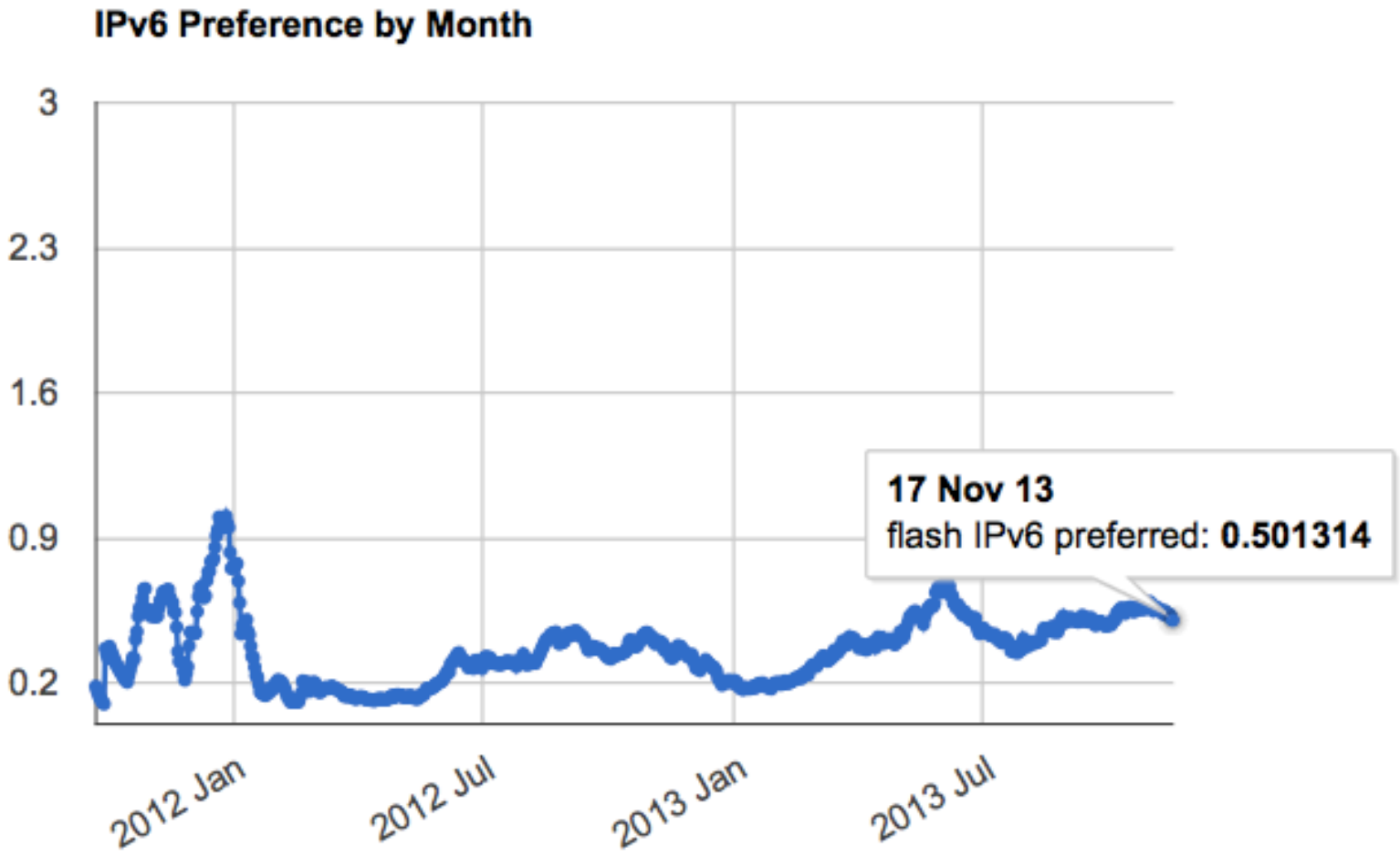
Australia: Statistics

- Reported update on the current levels of Stage 3 implementation (as of 2012) as reported by the AGIMO



http://www.ipv6.org.au/summit/talks/JohnHillier_AGIMO_IPv6Summit12.pdf

Australia: Statistics

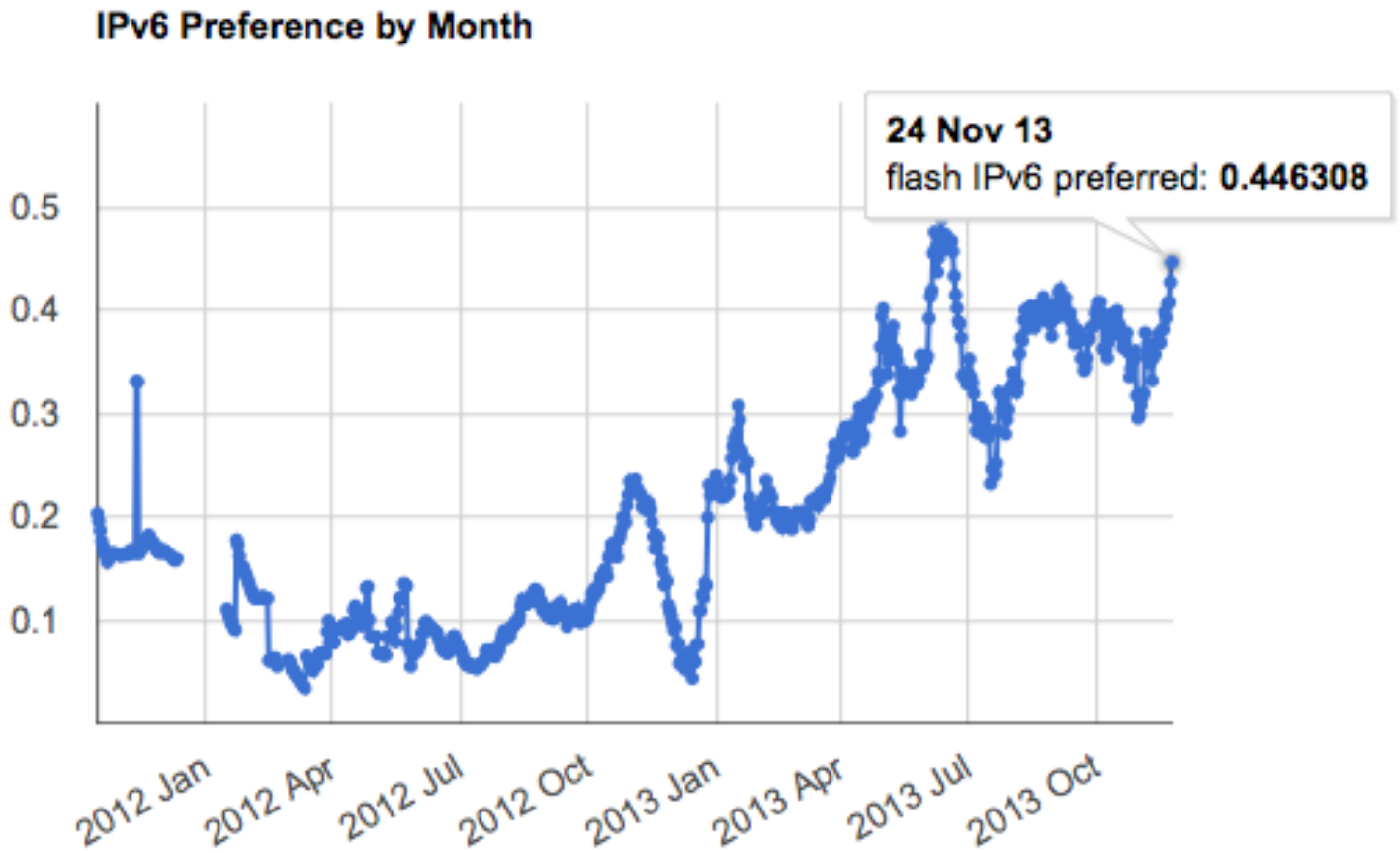


http://labs.apnic.net/ipv6-measurement/Economies/AU/

New Zealand

- GCIO circular in Feb 2012
  - Transition to IPv6 for government agencies
- All government agencies, through the course of technology and application refresh cycles or where funding is available, are expected to:
  - Ensure all public/external Internet facing services (e.g. websites, email, DNS) are IPv6 accessible and operationally use IPv6
  - Ensure that internal networks, applications and devices operationally use IPv6
  - Provide status updates on their progress to the Office of the GCIO
  - http://www.ipv6.govt.nz/assets/GCIO-Circular-1-IPv6.pdf

New Zealand: Statistics



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

China

- An announcement was made by the Chinese State Council in Nov 2011
  - IPv6 mandates to the Industry
    - “China will put Internet Protocol version 6 (IPv6) into small-scale commercial pilot use and form a mature business model by the end of 2013”, the State Council recently said at an executive meeting about the main goals and road map for the China Next Generation Internet project (People’s Daily Online, Jan 2012, http://english.people.com.cn/90778/7696495.html)
    - 3 million users for each operator by 2013
    - 25 million users by 2015
  - Service providers in China are responding to this mandate

China

CNNIC 中国互联网络信息中心 CHINA INTERNET NETWORK INFORMATION CENTER

IPv6 Plan of e-Government Extranet

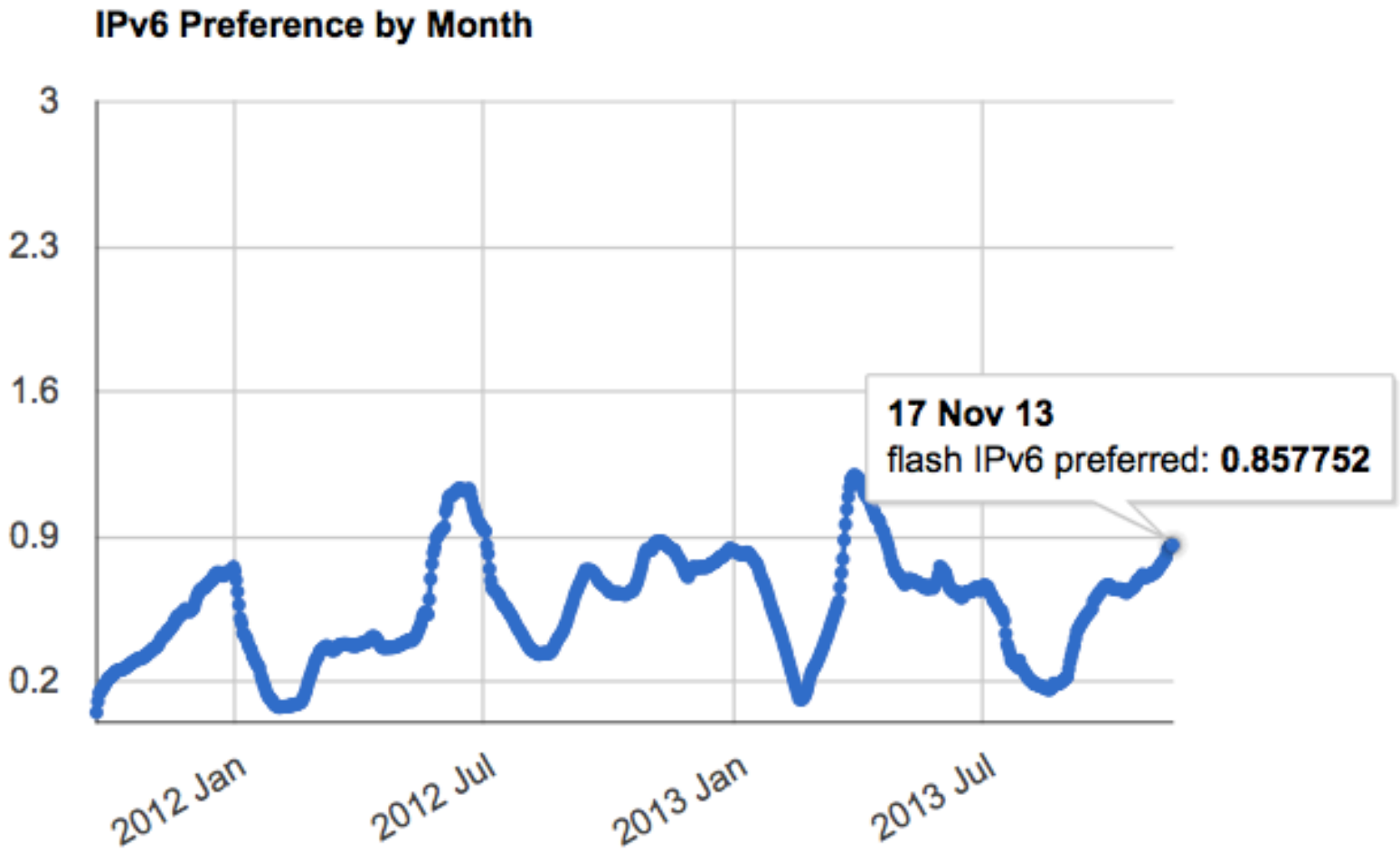
■Chinese authorities pay great attention on the Next Generation Internet based on IPv6 and have issued a series of announcements to specify the target and roadmap of development of next generation Internet, providing policy and financial supporting measures

■Following the important principle 'Government network must go first for the informatization', national e-government extranet (e-government public infrastructure) will take the lead in the field of e-government planning, deployment and pilot IPv6 related technologies

■IPv6 is a must for the e-government extranet, because with the expanding coverage of e-government network and increasing services& applications, IPv4 shortage is a big barrier for system deployment and providing new services

http://conference.apnic.net/data/36/cnnic-update_2013.8.27_1377563880.pdf

China: Statistics



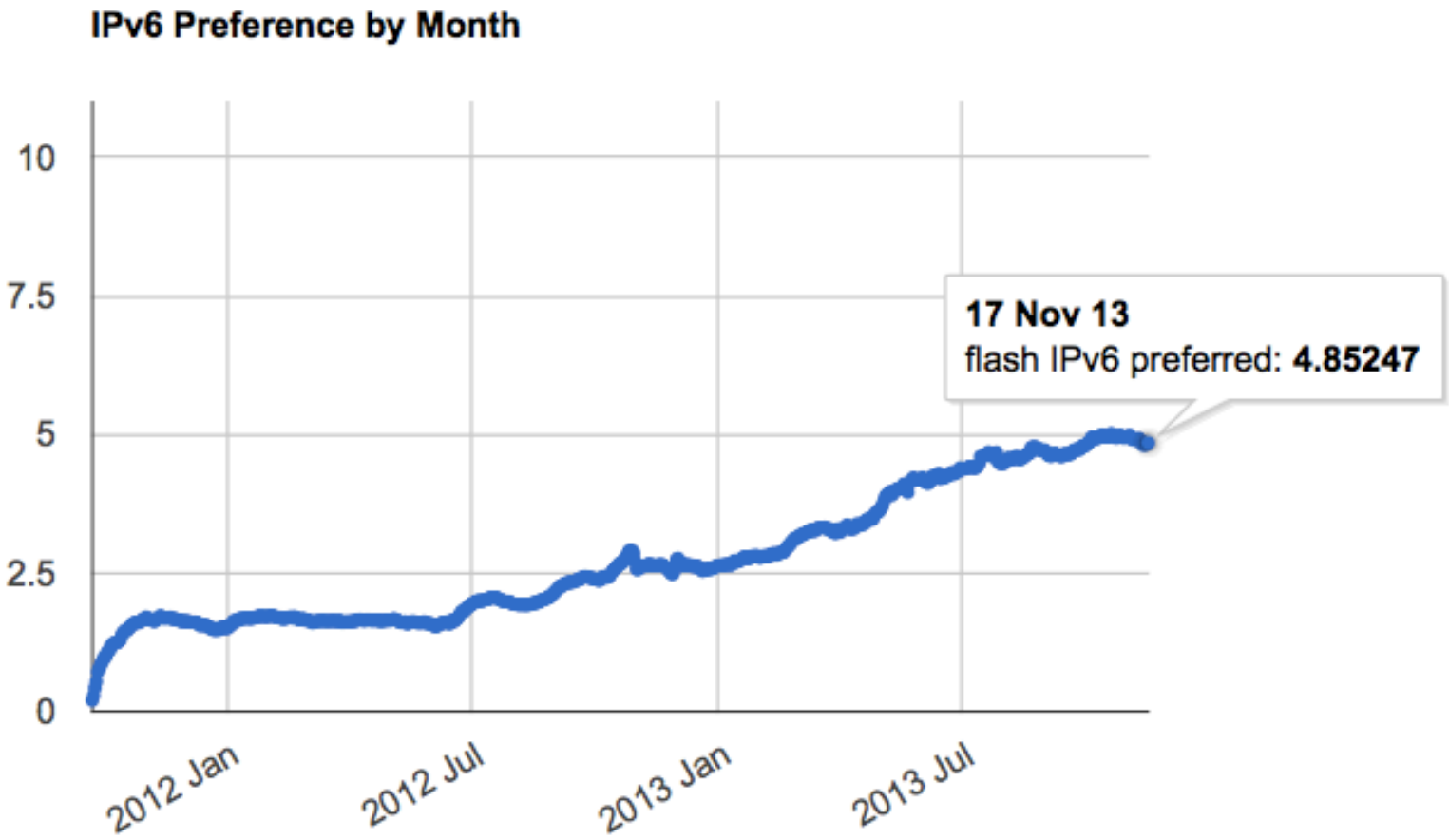
http://labs.apnic.net/ipv6-measurement/Economies/CN/

Japan

- The Ministry of Internal Affairs and Communications conducts regular IPv6 Study Groups
  - Partnership between the public and private sectors
    - Detailed field level discussions
  - Most recent one on July 2013
    - Active discussion on CGN: concerns of its relatively high costs and possible negative impact to end users
    - Update on usage of existing IPv6 test bed (APs and CPs)
    - Discussion on potential formats of IPv6 service deliveries: Default IPv6 services
      - Some providers are experiencing positive results
    - Discussion on IPv6 services in mobile networks
    - Discussion on developing IPv6 security guidelines

http://www.soumu.go.jp/main_sosiki/joho_tsusin/policyreports/chousa/ipv6_internet/02kiban04_03000222.html

Japan: Statistics



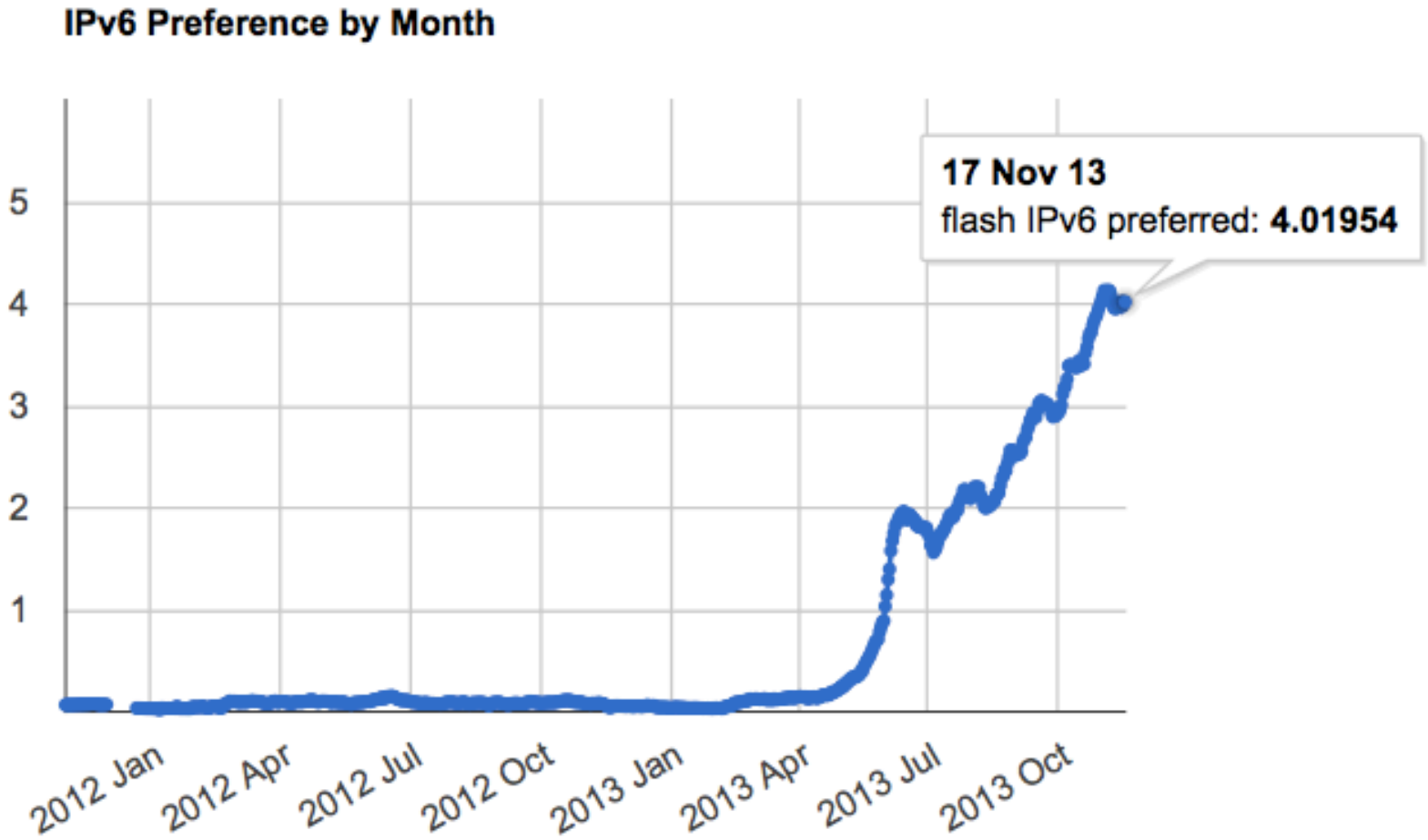
http://labs.apnic.net/ipv6-measurement/Economies/JP/

Singapore

- IPv6 Transition Program lead by Infocomm Development Authority (iDA) of Singapore
  - To apply a multistakeholder approach in conjunction with “pull” and “push” strategies to support IPv6 adoption
    - Create initial IPv6 demand by enterprises, government agencies, content and application providers
    - Create IPv6 supply by network providers
    - Drive competency across multistakeholders
    - Ensure IPv6 and IPv4 performance equity by hardware and software vendors
    - Raise awareness of IPv6 across multistakeholders
    - Managing IPv4 address exhaustion, mainly by network providers
  - To address the issue of IPv4 exhaustion and to facilitate the smooth transition of the Singapore infocomm ecosystem to IPv6
  - To promote IPv6 adoption in the local industry

http://www.ida.gov.sg/Infocomm-Landscape/Technology/IPv6

Singapore: Statistics



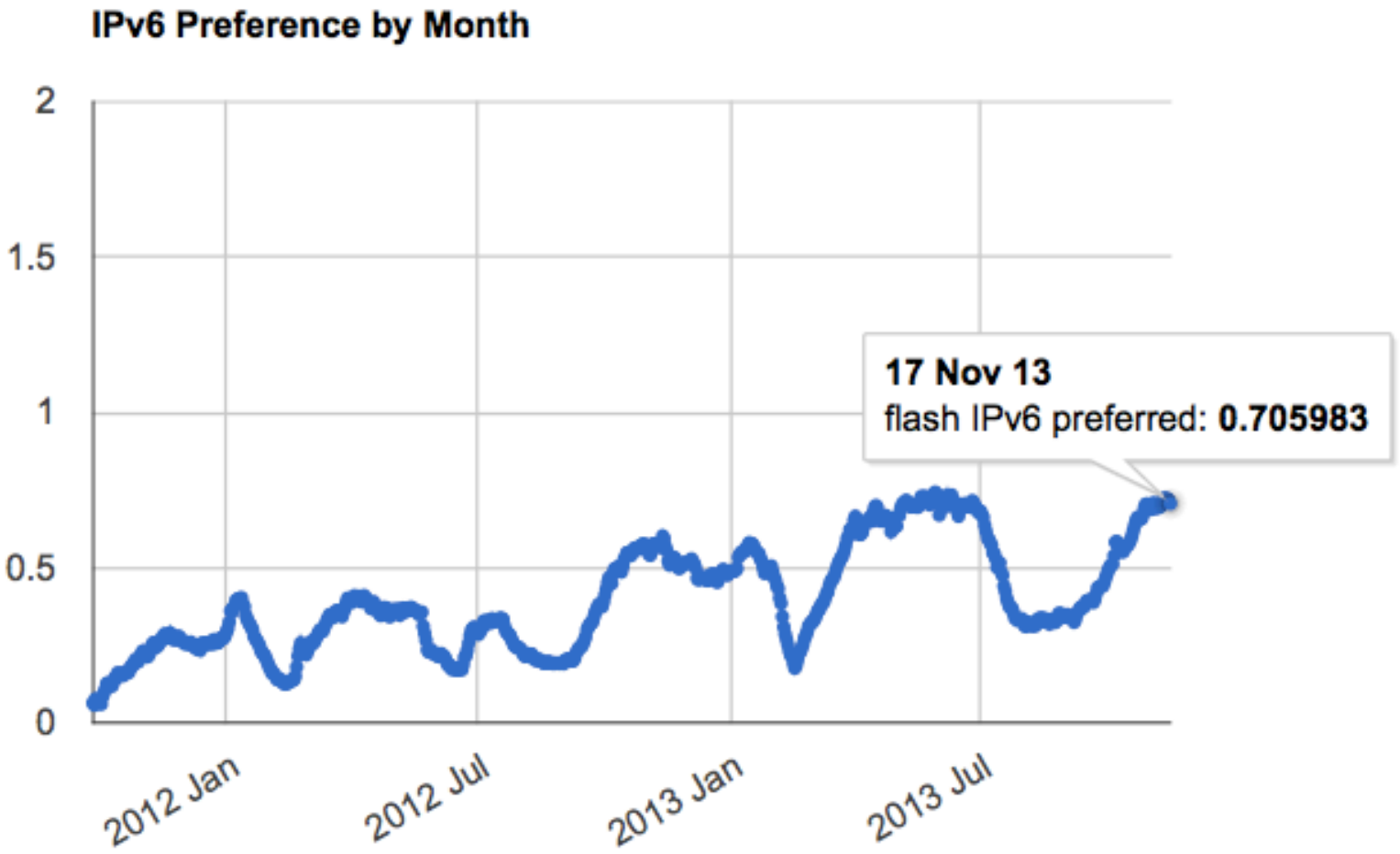
http://labs.apnic.net/ipv6-measurement/Economies/SG/

Taiwan

- “IPv6 Upgrade Promotion Program” led by the Ministry of Transportation and Communications
- Objectives
  - Seamless transfer from IPv4 to IPv6 network environments in Chinese Taipei
  - National Information and Communication’s Initiative to actively promote the gradual upgrade to IPv6
    - By 2013: Enable dual stack among 50% of public network services (Web, DNS, email)
    - By 2015: Enable dual stack on the remaining public network services
    - Around 2016: All government related network services to be IPv6 enabled around 2016
  - Monitoring IPv6 deployment status
  - Active engagement among multistakeholders

http://conference.apnic.net/36/program#/speaker/Sheng-Wei%20Kuo

Taiwan: Statistics



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

Growth path of the Internet

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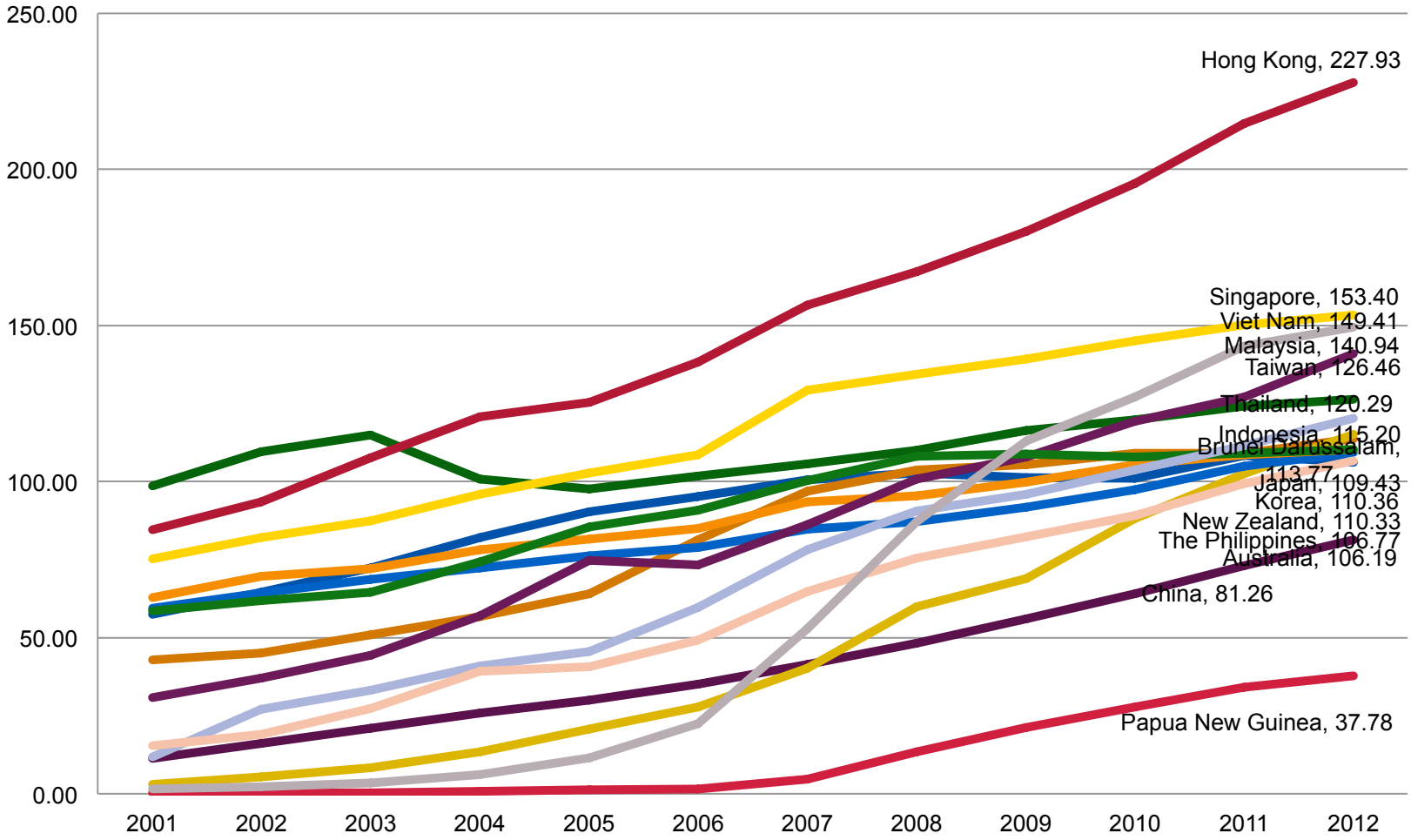
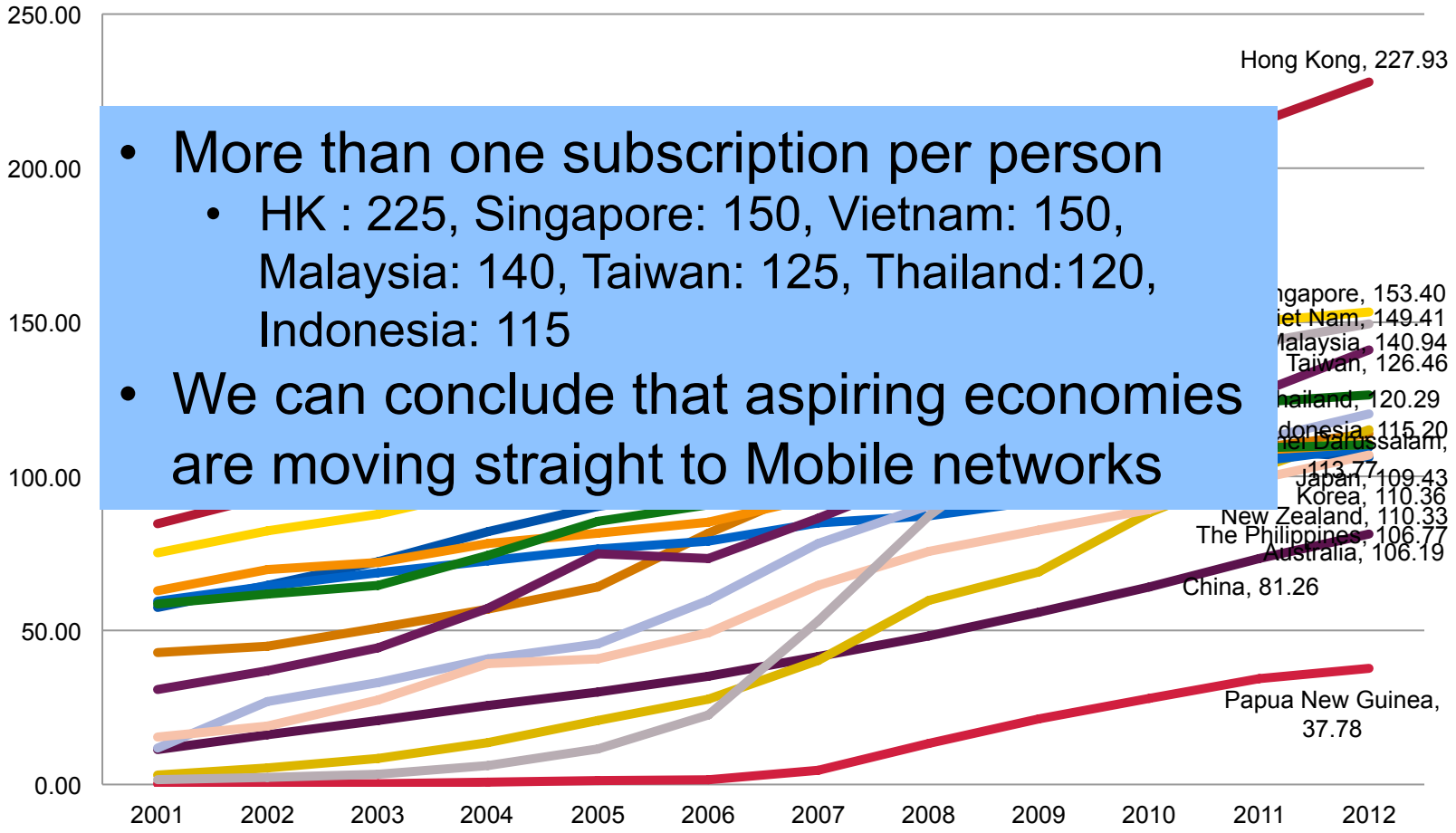
Mobile cellular subscription (per 100 inhabitants)



http://statistics.apec.org/index.php/key_indicator/index

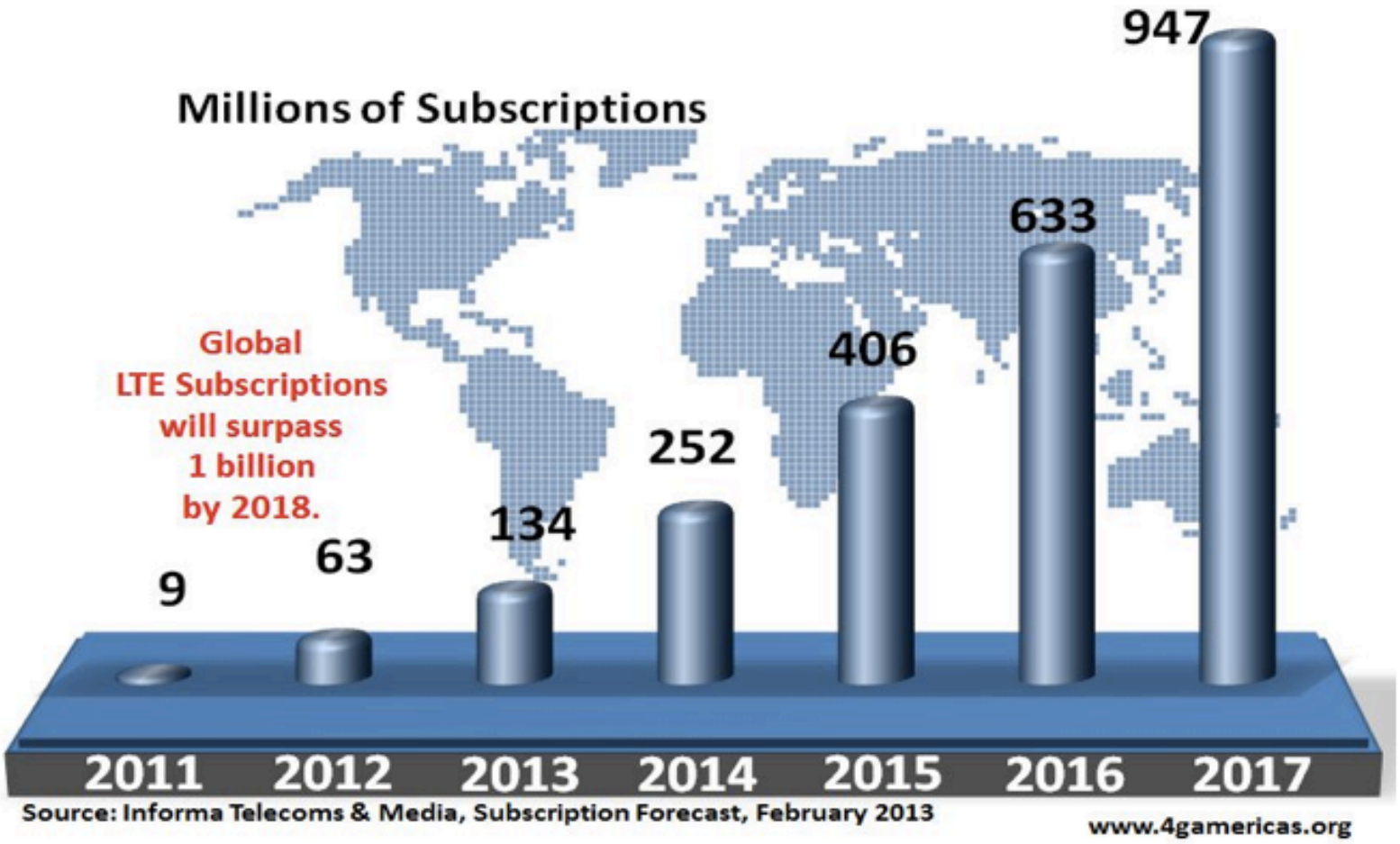
Mobile cellular subscription (per 100 inhabitants)



- More than one subscription per person
  - HK : 225, Singapore: 150, Vietnam: 150, Malaysia: 140, Taiwan: 125, Thailand:120, Indonesia: 115
- We can conclude that aspiring economies are moving straight to Mobile networks

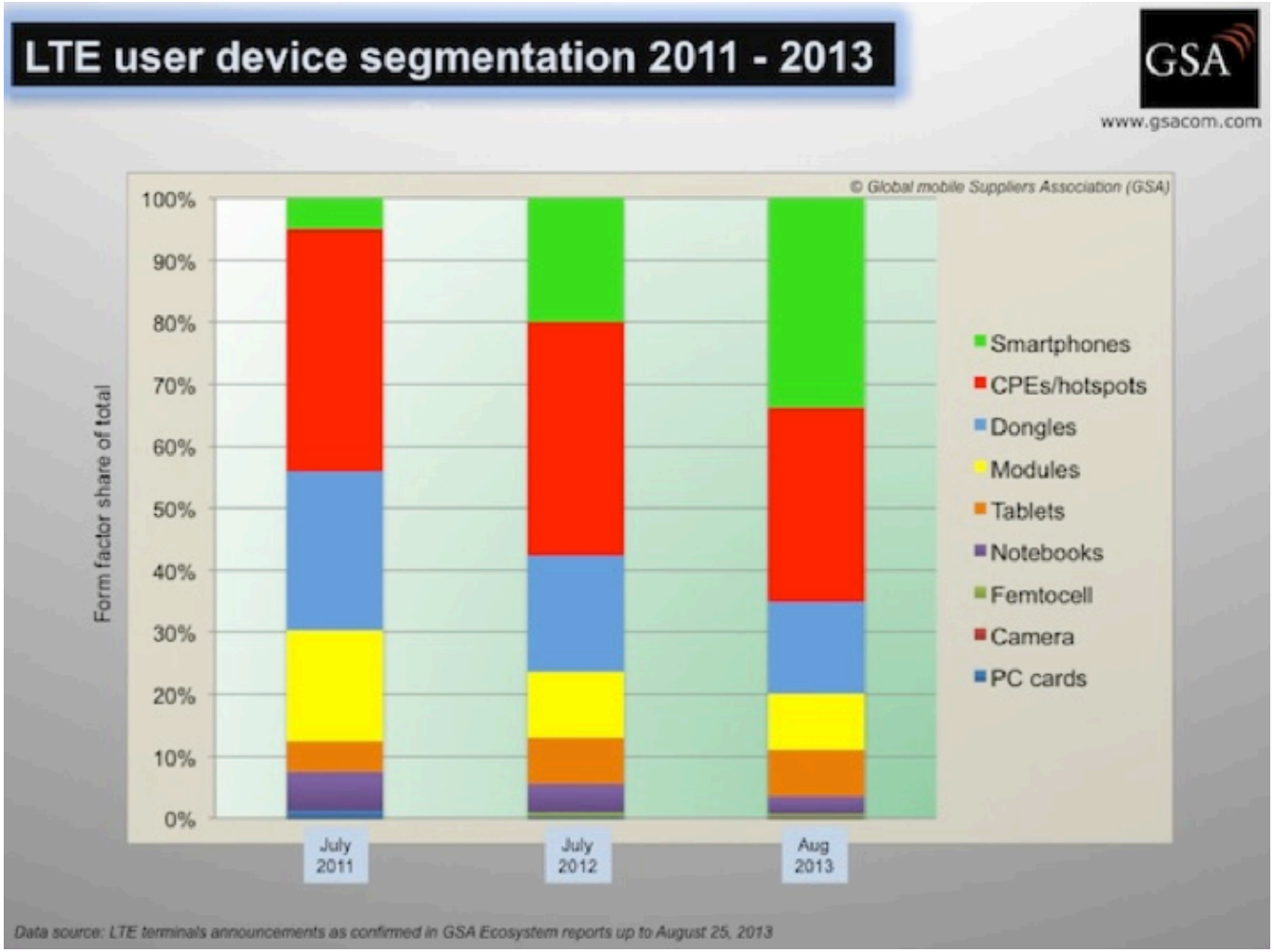
http://statistics.apec.org/index.php/key_indicator/index

Global LTE growth focus



www.4gamericas.org/index.cfm?fuseaction=page&pageid=1781

LTE user devices 2011 - 2013



http://www.gsacom.com/news/gsa_387.php

Mobile networks

- The business competency of mobile network operators:
  - Shifting from being a traditional voice and messaging provider to a mobile broadband service provider
  - Services on voice, messaging and data are converging on IP-based services
  - Rapidly increasing LTE deployment in the region
- Decision makers' (mobile network operators) view
  - Ready to move to voice over LTE?
  - Mobile cloud computing on top of the LTE network?
  - What are the key building blocks of an all-IP strategy?

http://lteconference.wordpress.com/

Case Study - T-Mobile USA IPv6 on LTE Story

- Lack of IPv4 address space combined with rapid growth in "always-on" devices prompted a rethink of the IP addressing strategy in late 2009
  - IPv4 does not fit the business need
  - IPv6 deployment in 3GPP is easy
- Feasibility study and impact assessment on IPv6 deployment took about 9 months
- T-Mobile USA started an IPv6 friendly user trial in 2010 on their 2G/3G/HSPA network
  - Currently settled with IPv6-Only + 464XLAT transition technology to make everything work with IPv6-Only
- T-Mobile USA did not spend any CAPEX to deploy IPv6
- Introduction feature to handsets is a slow and careful process

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

Conclusions

Governments' support

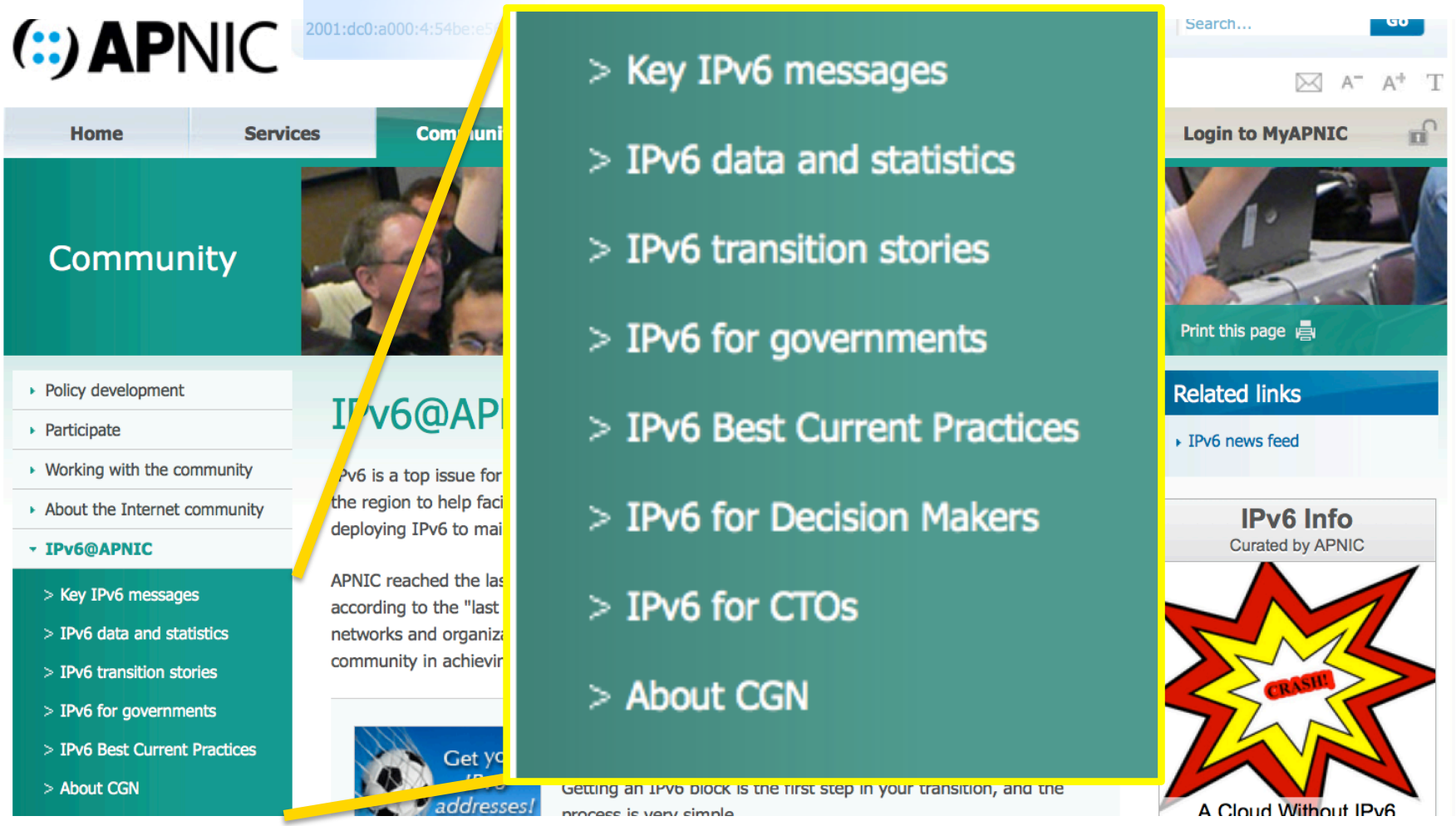
- IPv6 awareness among governments' in the Asia Pacific region is very high
- Governments have implemented many initiatives
  - Partnership between the public and private sectors in various forms
  - Developing national policies, guidelines, and roadmaps to enable IPv6
  - Enabling IPv6 in government networks
  - Mandating for IPv6 readiness in government procurement for ICT goods and services
  - Raising IPv6 awareness among key people in the government and industry
  - Providing timely up skilling and training
  - Monitoring IPv6 deployment measurements and sharing information with the industry
  - Including the necessity of IPv6 deployment in ministerial statements
- Continuous engagement with the industry needs support from governments

Support the current and future growth

- The end-to-end Internet principle allows many stakeholders to interact directly, and provide a foundation for innovation
  - The Internet is a highly diverse and flexible amalgam of many components
  - The speed of innovation is rapid
- Internet industry is at a critical turning point
  - Some may be left behind if their organization does not learn how to provide both IPv4 and IPv6 services
  - Choosing technologies that support the current business model, while establishing a foundation for a future business model is no simple task – there is no one strategy that fits all
  - Key success factor: Information sharing and continuous collaboration among the Internet's multistakeholders

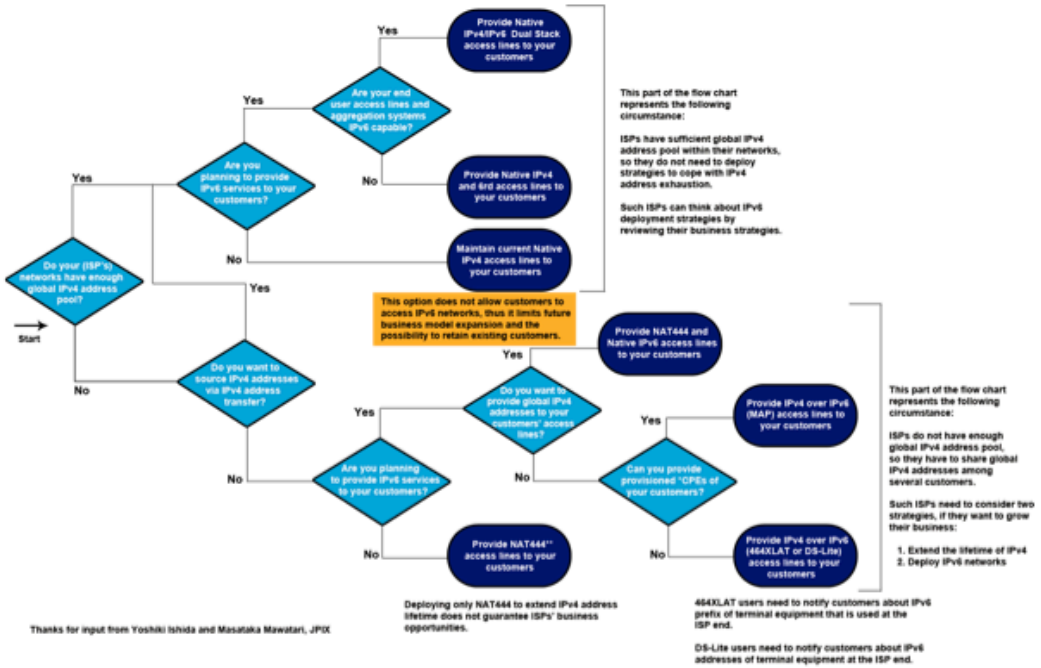
www.apnic.net/ipv6

www.apnic.net/ipv6



IPv6 for CTOs

www.apnic.net/ipv6-cto



A quick glance of the options currently available

IPv6 transition while extending the lifetime of IPv4 addresses

APRICOT 2014 and APNIC 37

- 18-28 February 2014
- Bangkok Convention Center, Centara Grand Hotel and Convention Center

http://2014.apricot.net/program

Thank you!