

# IPv6 Deployment: Where are we now?

APEC TEL48, Hawaii, USA

19<sup>th</sup> September 2013

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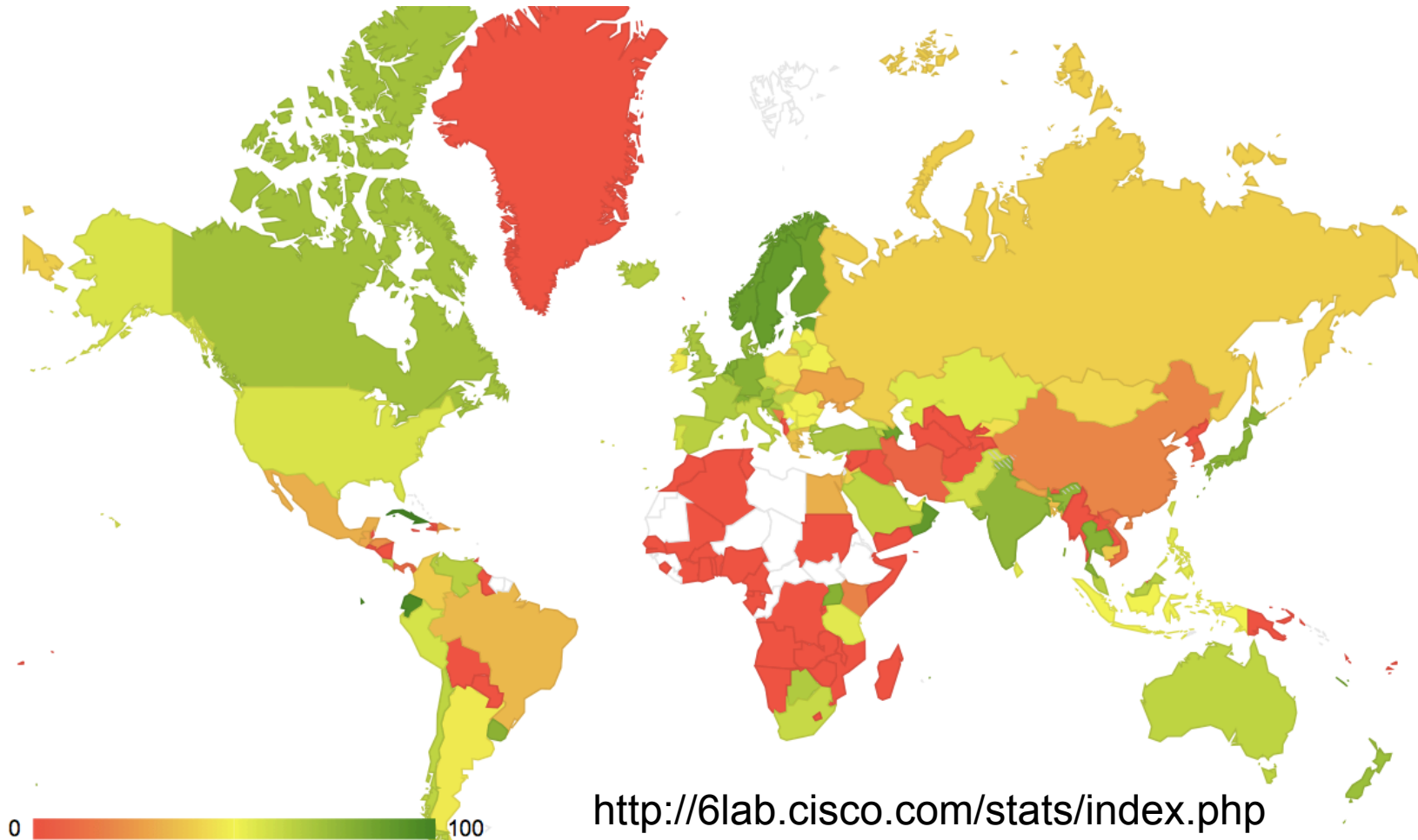
# Agenda

- A quick overview of IPv6 readiness among APEC economies
  - Review of several statistics
  - Transit providers and CPs
  - IPv6 ready end users
- Governments' initiative in the AP region
- Growth path of the Internet
- Conclusion























# IPv6 transit AS

## IPv6 readiness in core of the Internet



# World ranking

## IPv6 ready web sites <http://www.vyncke.org/ipv6status/>

Rank	Country	Sample	Green
1	 <a href="#">Czech Republic</a>	50	32.0% (16)
2	 <a href="#">Slovenia</a>	50	32.0% (16)
3	 <a href="#">Brazil</a>	50	30.0% (15)
4	 <a href="#">Maldives</a>	11	27.3% (3)
5	 <a href="#">United States of America</a>	50	22.0% (11)
6	 <a href="#">Singapore</a>	50	20.0% (10)
7	 <a href="#">Netherlands</a>	50	18.0% (9)
8	 <a href="#">Norway</a>	50	16.0% (8)
9	 <a href="#">Switzerland</a>	50	16.0% (8)
10	 <a href="#">Greenland</a>	14	14.3% (2)
11	 <a href="#">Thailand</a>	50	14.0% (7)
12	 <a href="#">Sweden</a>	50	14.0% (7)
13	 <a href="#">Denmark</a>	50	14.0% (7)
14	 <a href="#">Tokelau</a>	50	14.0% (7)
15	 <a href="#">Congo (Democratic Republic)</a>	15	13.3% (2)
16	 <a href="#">Japan</a>	50	12.0% (6)
17	 <a href="#">India</a>	50	12.0% (6)
18	 <a href="#">Germany</a>	50	12.0% (6)
19	 <a href="#">Malaysia</a>	50	12.0% (6)
20	 <a href="#">Portugal</a>	50	12.0% (6)

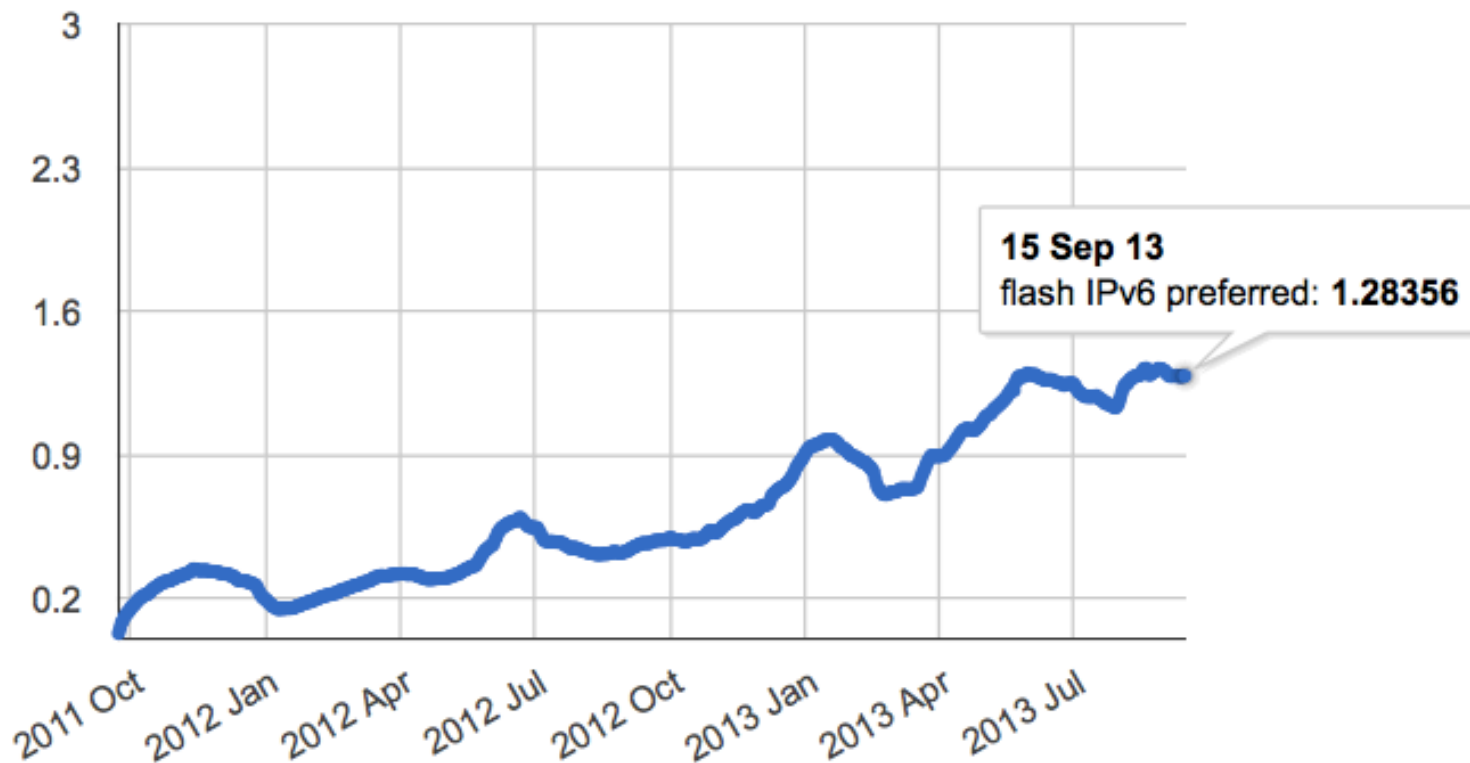


<http://www.vyncke.org/ipv6status/> 16//09/2013

# IPv6 measurement

## End user readiness: World

IPv6 Preference by Month



<http://labs.apnic.net/ipv6-measurement/Regions/001%20World/> as of 16/09/13

# IPv6 deployment leaderboard in the AP region

ASN	Entity	Economy	IPv6 preferred rate
22394	Cellco Verizon Wireless	US	35.62
2516	KDDI KDDI CORPORATION	JP	29.61
18126	CTCX Chubu Telecommunications Company; Inc.	JP	28.50
4739	INTERNODE-AS Internode Pty Ltd	AU	13.49
4773	MOBILEONELTD-AS-AP MobileOne Ltd. Mobile/Internet Service Provider Singapore	SG	9.30
23655	SNAP-NZ-AS Snap Internet Limited	NZ	8.72
7922	Comcast	US	7.88
7470	TRUEINTERNET-AS-AP TRUE INTERNET Co.;Ltd.	TH	6.83
55430	STARHUBINTERNET-AS-NGNBN Starhub Internet Pte Ltd	SG	2.72

<http://labs.apnic.net/ipv6-measurement/AS/> 16/09/2013

# Observation

- IPv6 deployment status is varied among regions, economies and individual ASN (network operators)
  - IPv6 deployment is not happening all at once
  - Some economies have been very active in terms of IPv6 deployment
  - Some ASNs have been very active in terms of IPv6
- Let's look into some statistics and anecdotal evidences of some economies in the AP region



# Governments' initiative in the AP region

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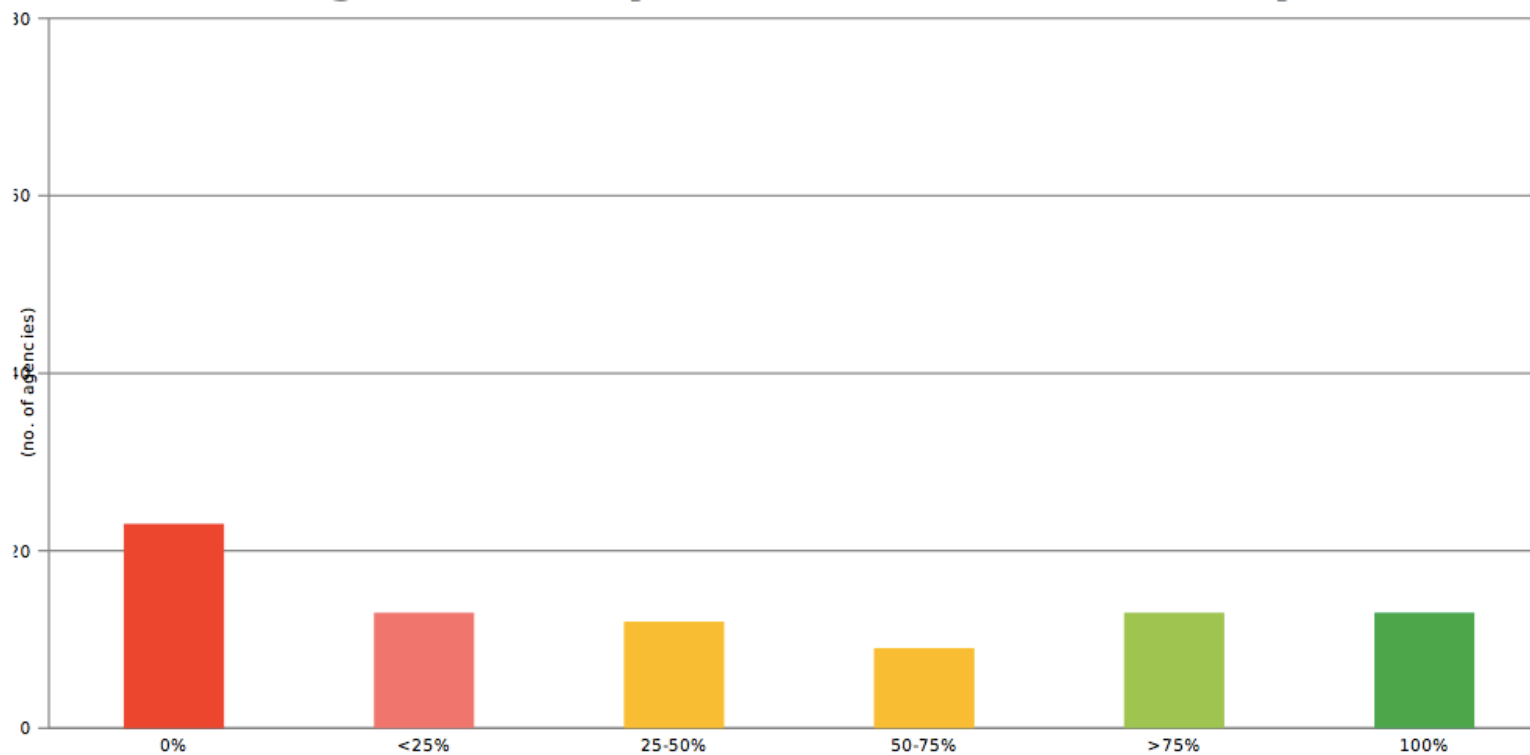


# Australia

- A Strategy for the Implementation of IPv6 in Australian Government Agencies
  - Version 1 in 2007, Version 2 in 2009
  - All government agencies should have IPv6 capable hardware and software platforms by 2012
  - To operate 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: Stats

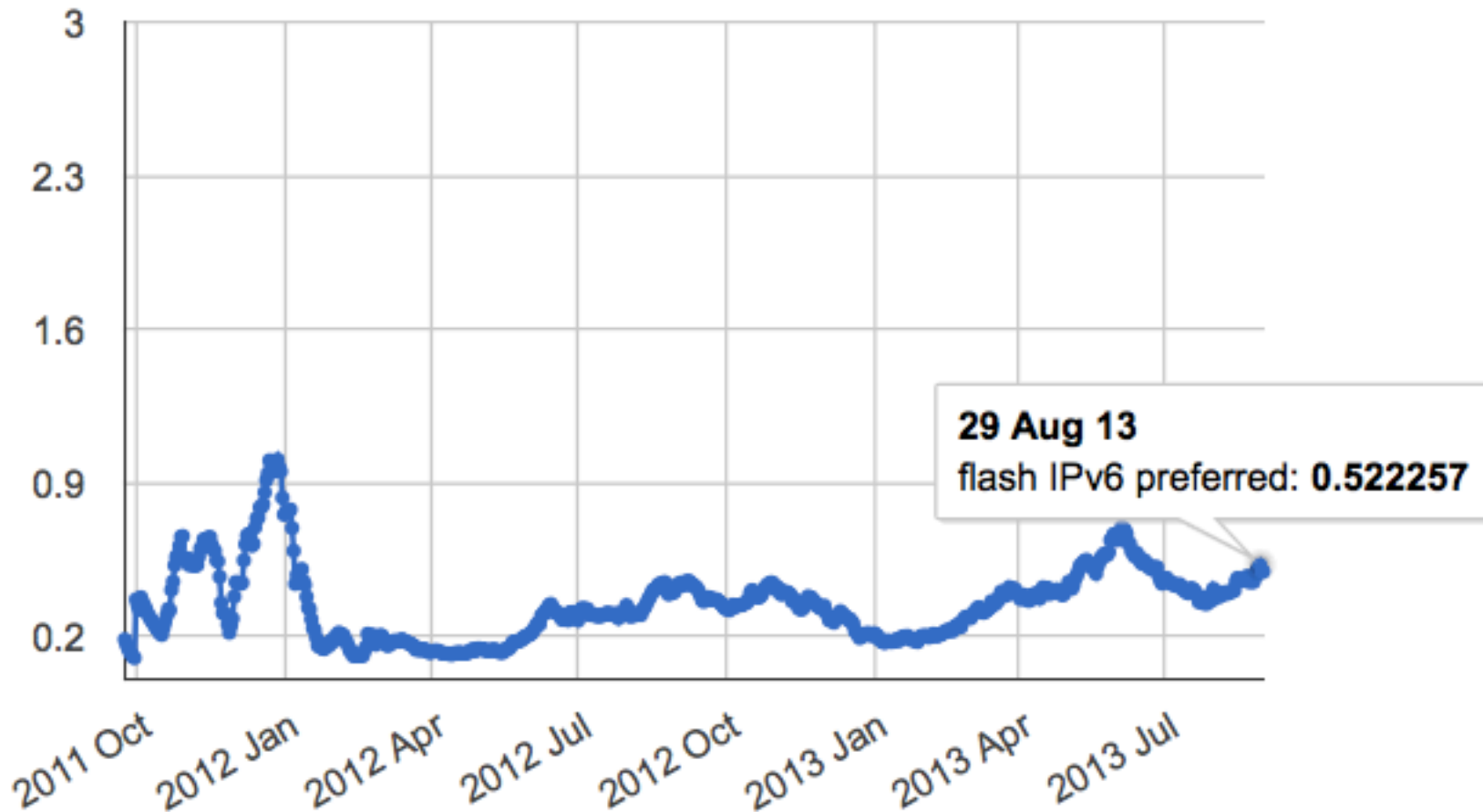
- Reported update on the current Stage 3 implementation level (as of 2012) reported by AGIMO



[http://www.ipv6.org.au/summit/talks/JohnHillier\\_AGIMO\\_IPv6Summit12.pdf](http://www.ipv6.org.au/summit/talks/JohnHillier_AGIMO_IPv6Summit12.pdf)

# Australia: Stats

IPv6 Preference by Month



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

# China

- Announcement 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 operators by 2013
    - 25 million users by 2015
  - SPs in China are responding to this mandate

# China



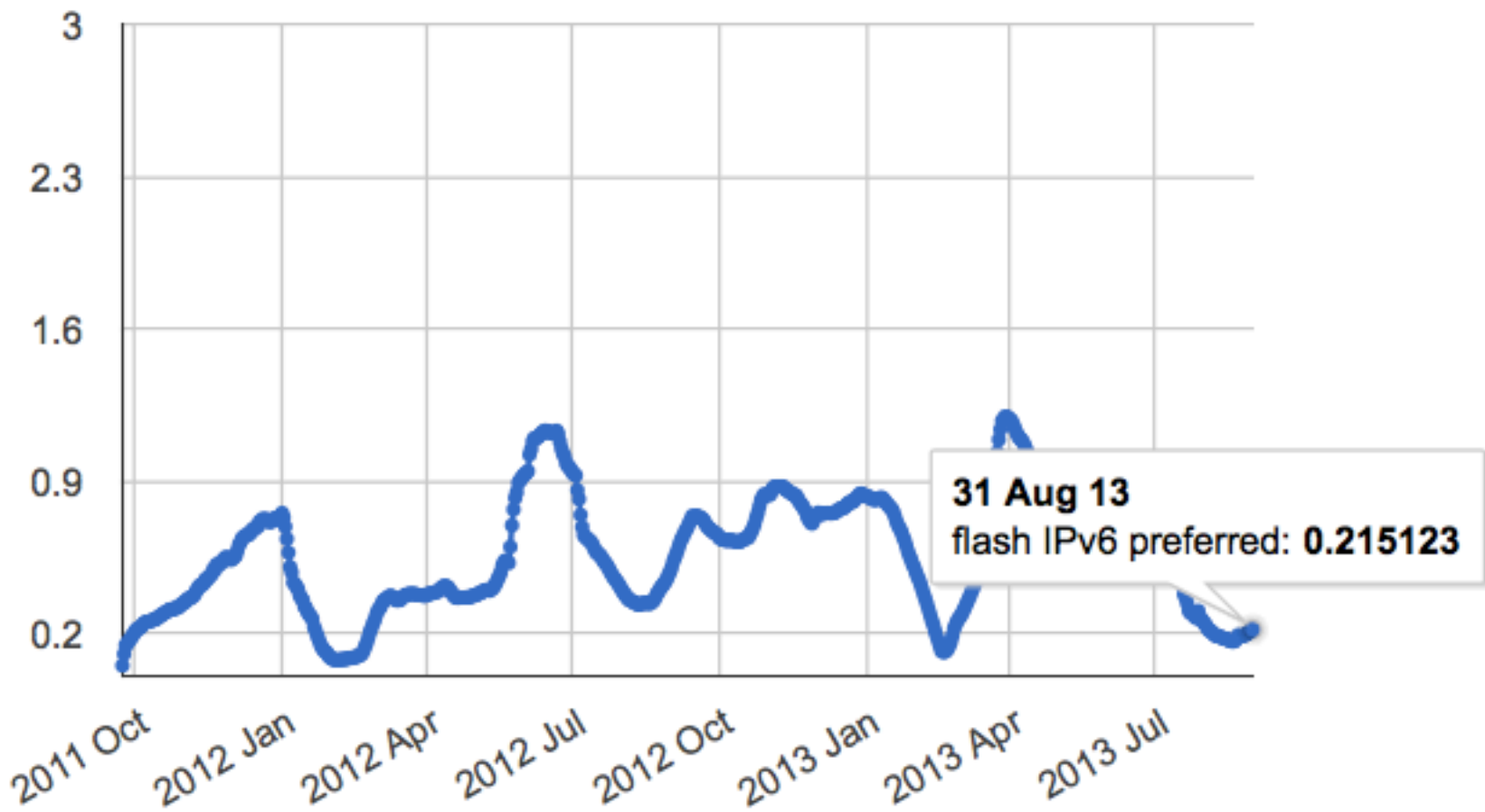
## IPv6 Plan of e-Government Extranet

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

# China: Stats

IPv6 Preference by Month



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

# Japan

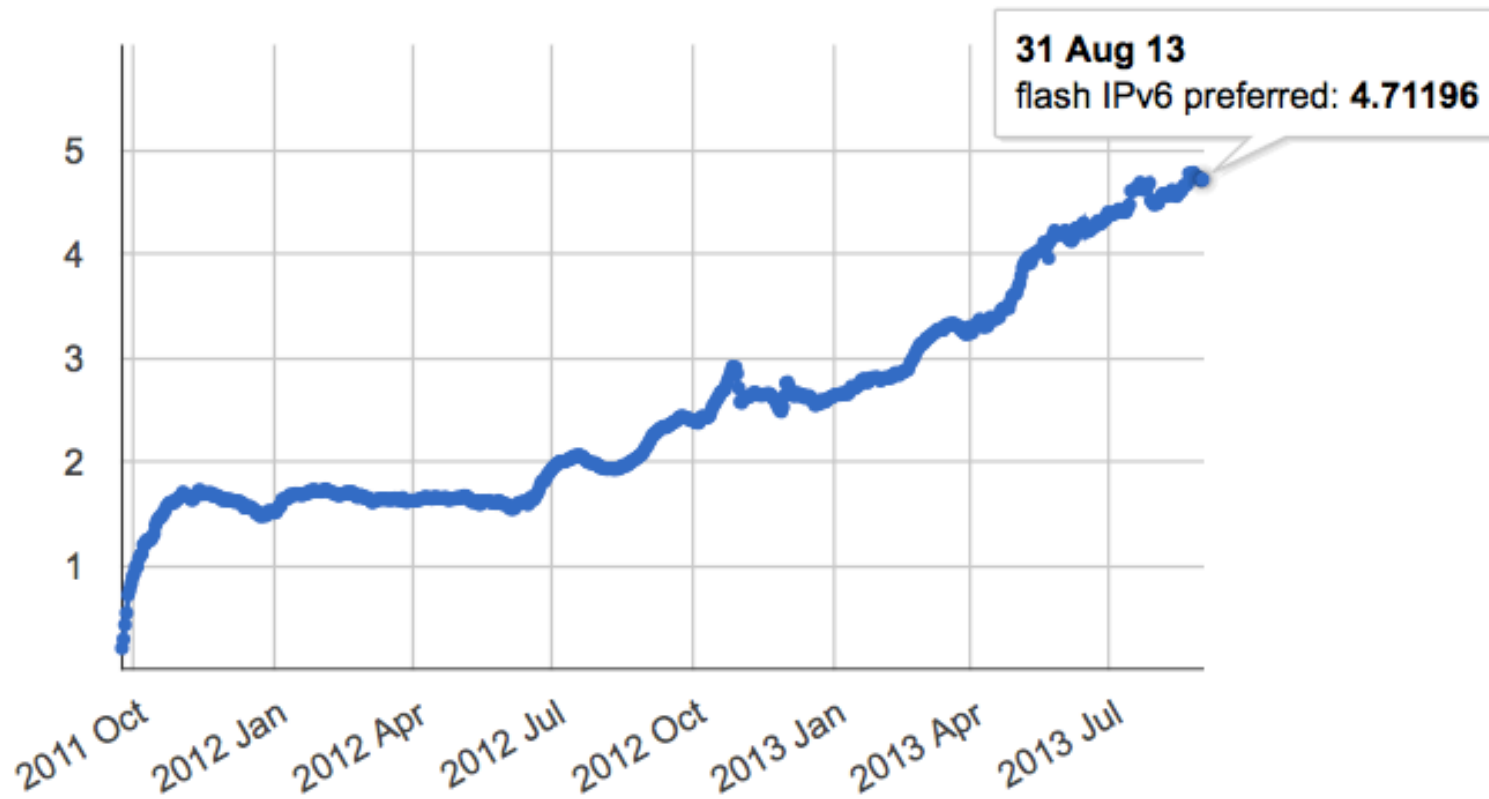
- Ministry of Internal Affairs and Communications conducts regular IPv6 Study Group
  - Partnership between the public and private sectors
    - Detailed field level discussions
  - Most recent one on July 2013
    - Active discussion on CGN: concerns on its relatively high costs, possible negative impact 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
    - Discussion on possibility to have an “IPv6 Launch Japan” to increase IPv6 deployment in multiple SPs including CPs

[http://www.soumu.go.jp/main\\_sosiki/joho\\_tsusin/policyreports/chousa/ipv6\\_internet/02kiban04\\_03000222.html](http://www.soumu.go.jp/main_sosiki/joho_tsusin/policyreports/chousa/ipv6_internet/02kiban04_03000222.html)



# Japan: Stats

IPv6 Preference by Month



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

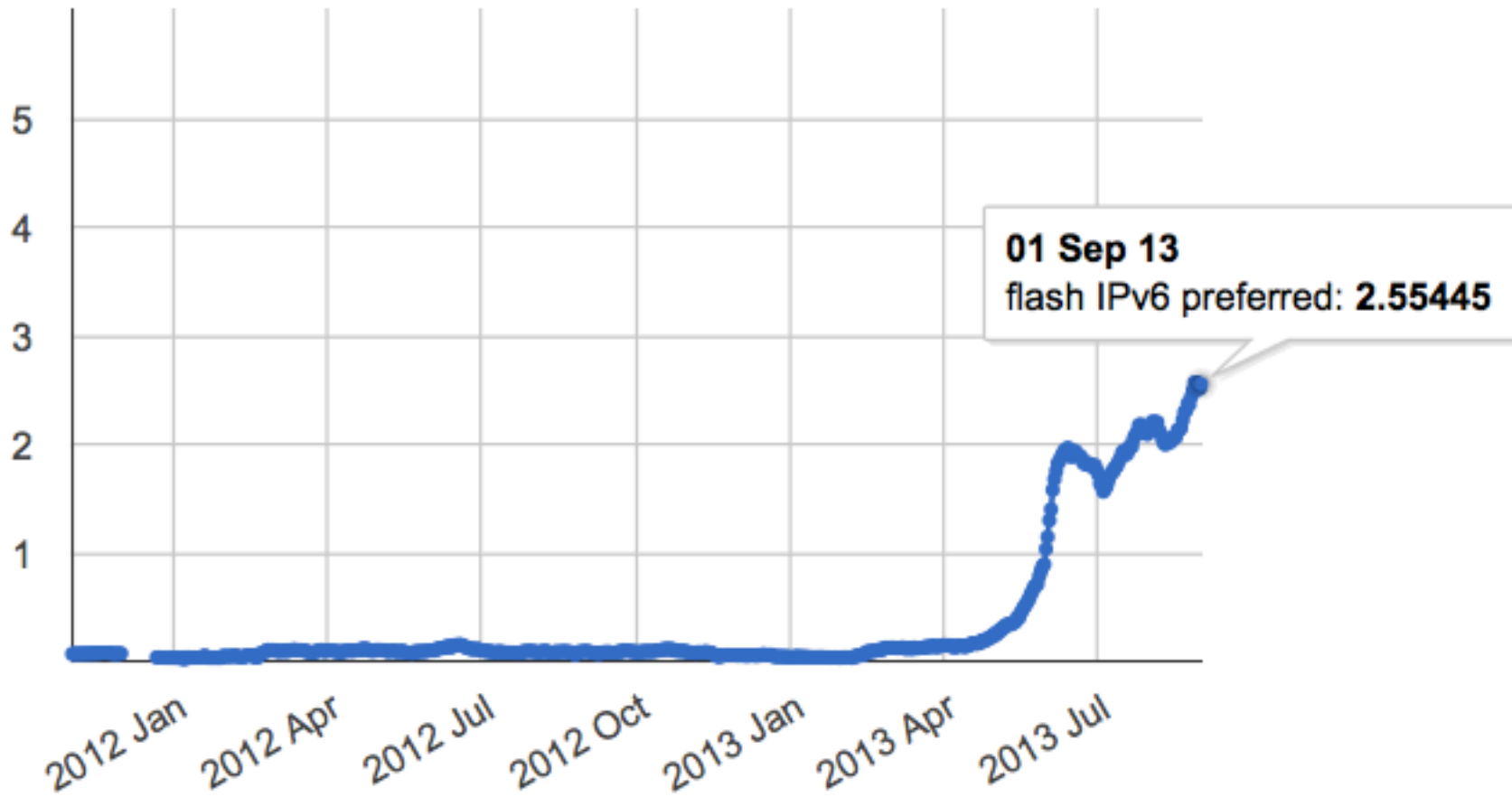
# Singapore

- IPv6 Transition Program lead by Infocomm Development Authority (IDA) of Singapore
  - To apply multi-stakeholder 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 multi-stakeholders
    - Ensure IPv6 and IPv4 performance equity by hardware and software vendors
    - Raise awareness on IPv6 across multi-stakeholders
    - 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: Stats

IPv6 Preference by Month



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

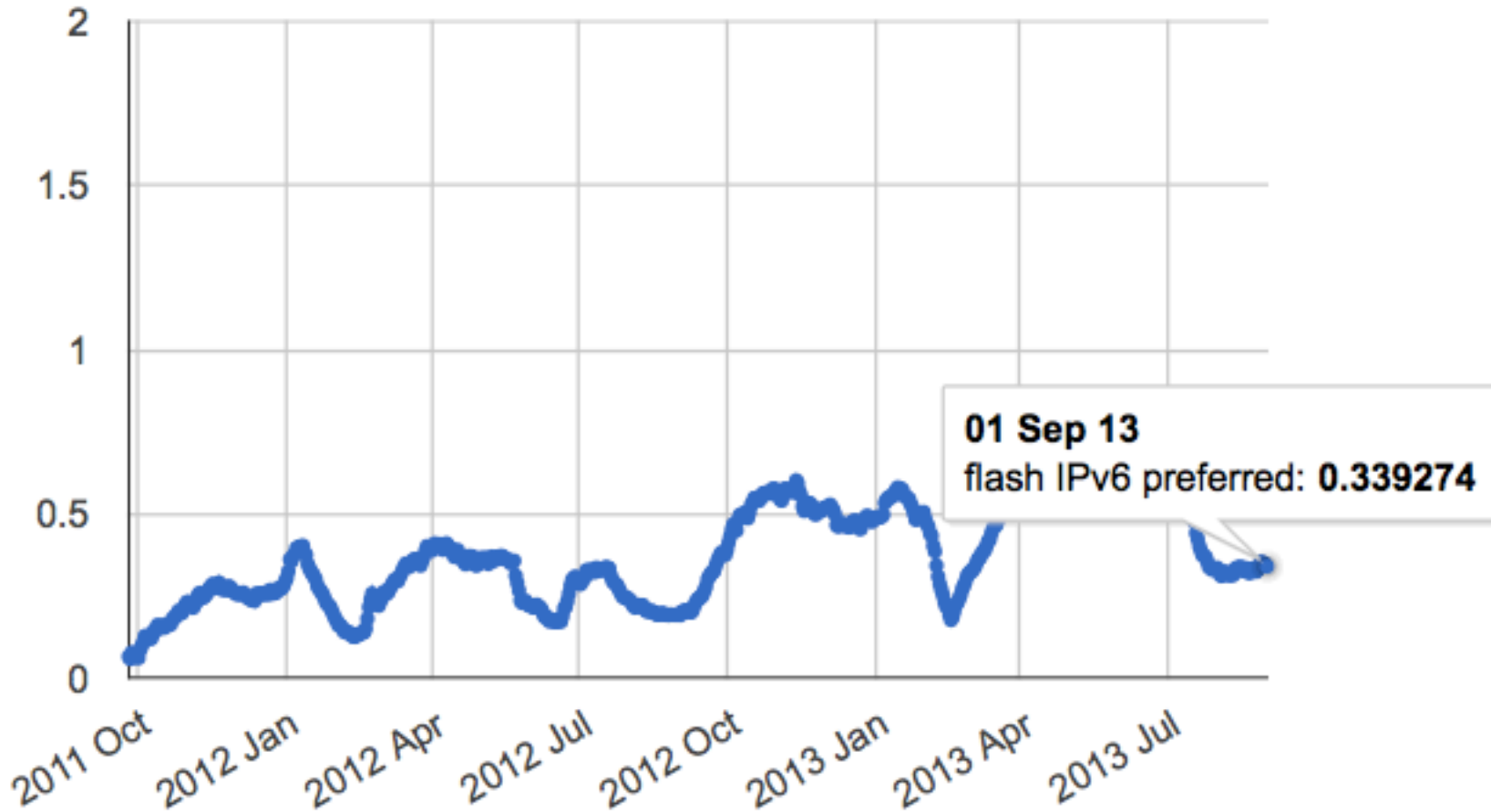
# Chinese Taipei

- “IPv6 Upgrade Promotion Program” lead by 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 the remaining public network services
    - Around 2016: All governments related network services to be IPv6 enabled around 2016
  - Monitoring IPv6 deployment status
  - Active engagement among multi stakeholders

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

# Chinese Taipei: Stats

IPv6 Preference by Month



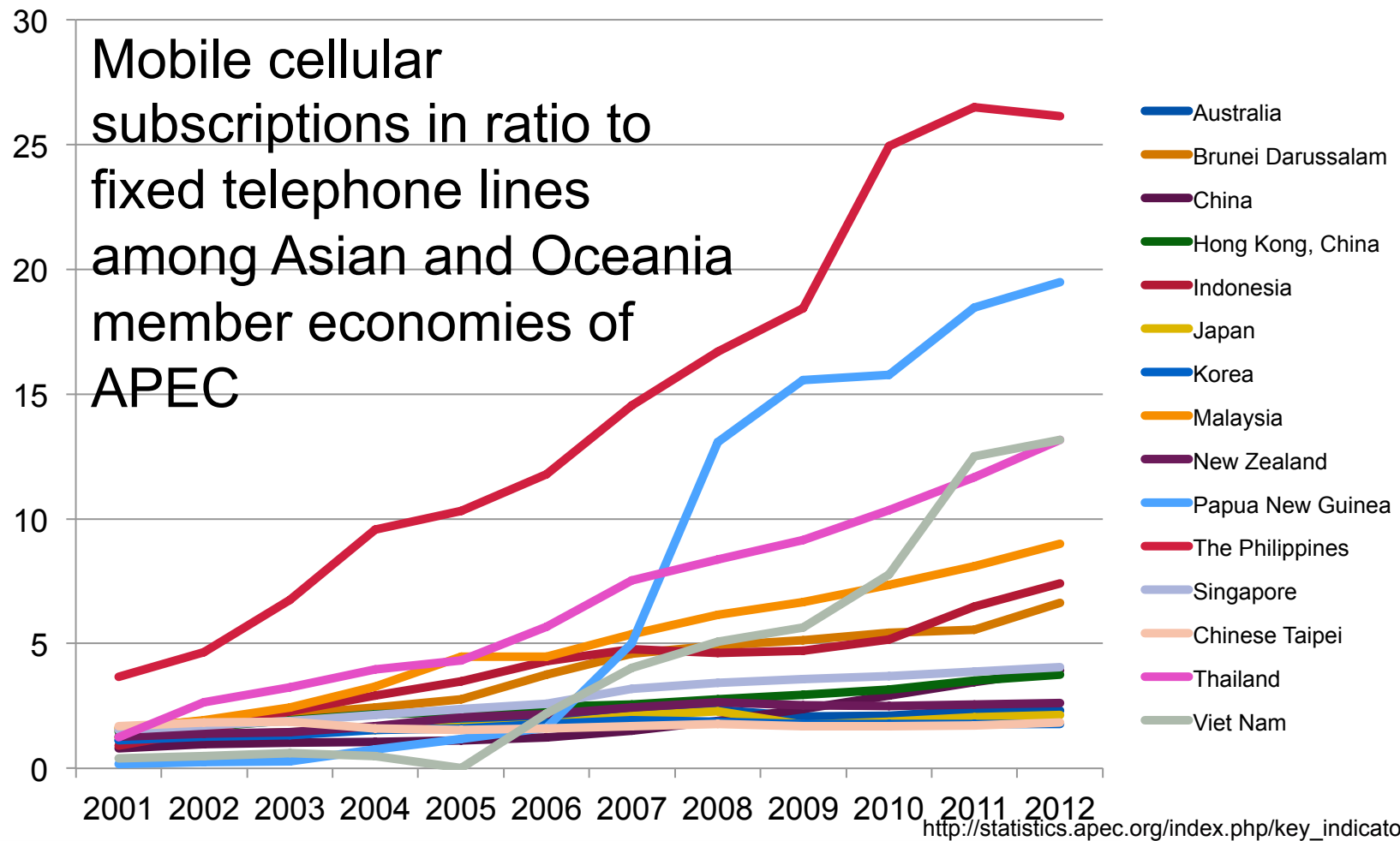
<http://labs.apnic.net/ipv6-measurement/Economies/TW/>

# Growth path of the Internet

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# Attention to the future growth path



# 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 key building blocks of 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 re-think on 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 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](http://conference.apnic.net/__data/assets/pdf_file/0010/58870/tmo-ipv6-feb-2013_1361827441.pdf)

# Conclusion

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# Governments' support

- IPv6 awareness among governments' in the AP region is very high
  - Many initiatives from governments has been implemented
    - Partnership between the public and private sectors in various forms
    - Developing national policies and 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 skill up training
    - Monitoring IPv6 deployment measurement and share information with industry
    - Include the necessity of IPv6 deployment in ministerial statements
- Continuous engagement with industry will help
  - **Adding IPv6 criteria in universal accessibility projects (discussed at APEC TEL47 DSG Meeting)**

# Support the current and future growth

- The end-to-end Internet principle allows many stakeholders to interact directly, and provide 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 organisation 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 multi-stakeholders of the Internet

# www.apnic.net/ipv6



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  - IPv6 data and statistics
  - IPv6 transition stories
  - IPv6 for governments
  - IPv6 Best Current Practices
  - IPv6 for Decision Makers
  - IPv6 for CTOs
  - About CGN

### IPv6@APNIC



IPv6 is a top issue for the Asia Pacific Internet community. APNIC engages in activities throughout the region to help facilitate a smooth transition. The greater goal is to support the Asia Pacific in deploying IPv6 to maintain a scalable Internet for everyone.

APNIC reached the last /8 of IPv4 addresses in April 2011, and now delegates IPv4 resources according to the "last /8 policy". The scarcity of IPv4 makes IPv6 deployment critical for all networks and organizations in the Asia Pacific. Here's what APNIC is doing to support the community in achieving real and tangible IPv6 deployment:



#### Distributing IPv6 addresses

Getting an IPv6 block is the first step in your transition, and the process is very simple.

**Kickstart IPv6 - one click to IPv6**

### Related links

- IPv6 news feed

### IPv6 Info

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IPv6 Plenary 2 - APNIC 34

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## IPv6@APNIC

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APNIC reached the last according to the "last networks and organization community in achieving



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