Internet infrastructure development in the Asia Pacific:
What's needed for sustainable growth

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APNIC's Vision

- A global, open, scalable, and resilient Internet that serves the entire Asia Pacific community

APNIC:
Asia Pacific Network Information Centre

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Who are we?

- Primary function: Distribution and management of Internet number resources
  - Internet Protocol version 4 (IPv4) address numbers
  - Internet Protocol version 6 (IPv6) address numbers
  - Autonomous System Numbers (ASNs)

- Not-for-profit membership organization
  - 4,000 plus Members

- How we achieve APNIC's vision:
  - Supporting capacity development in the region
  - Collaborating with the Internet community and partners
  - Supporting infrastructure development – IPv6, IXPs, root server deployment

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Overview

- Relationship between ICT growth and economic development

- Internet development in the AP region

- Securing scalable growth of IP-based services

- Examples: APNIC's efforts

- Proposals for potential donors

- Way forward: Investments needed

Preamble: Internet architecture

- The Internet: Staged (layered) communication model

- APNIC supports development of **Internet layer**
  - Sending packets across multiple networks**: Internet Protocol (IP) addresses**
  - One layer above the link layer (very close to physical layer cables)

Application layer
Transport layer
Internet layer
Link layer
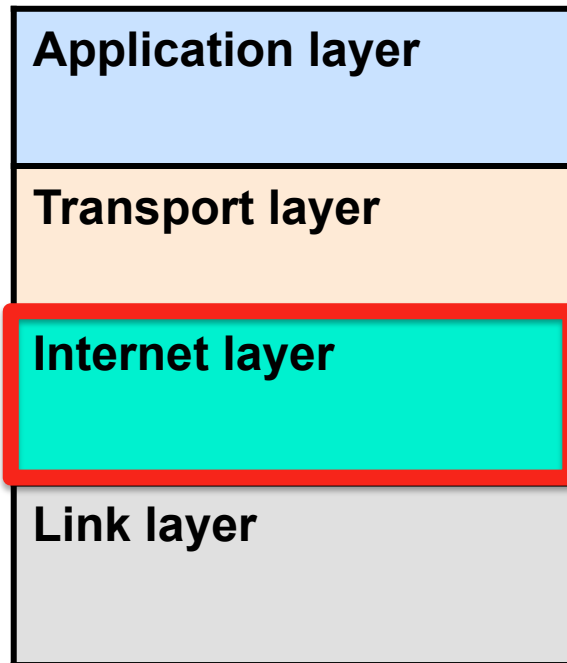
- Healthy development of Internet layer supports global, open, scalable and resilient Internet

- Pre-requisite of successful implementation of national policies:
  - Universal access of broadband
  - e-Government

http://en.wikipedia.org/wiki/Internet_protocol_suite

Relationship between ICT growth and economic development

- World Economic Forum reports:
  – Digitization has boosted world economic output by nearly USD 200 billion and created a million jobs in 2011
  – An increase of 10% in an economy's digitization produced a 0.75% growth in its GDP per capita
  – The same 10% boost in digitization led to a 1.02% drop in the unemployment rate

- The effective management of the Internet provides the foundation for various ICTs to interact in this inter-connected environment
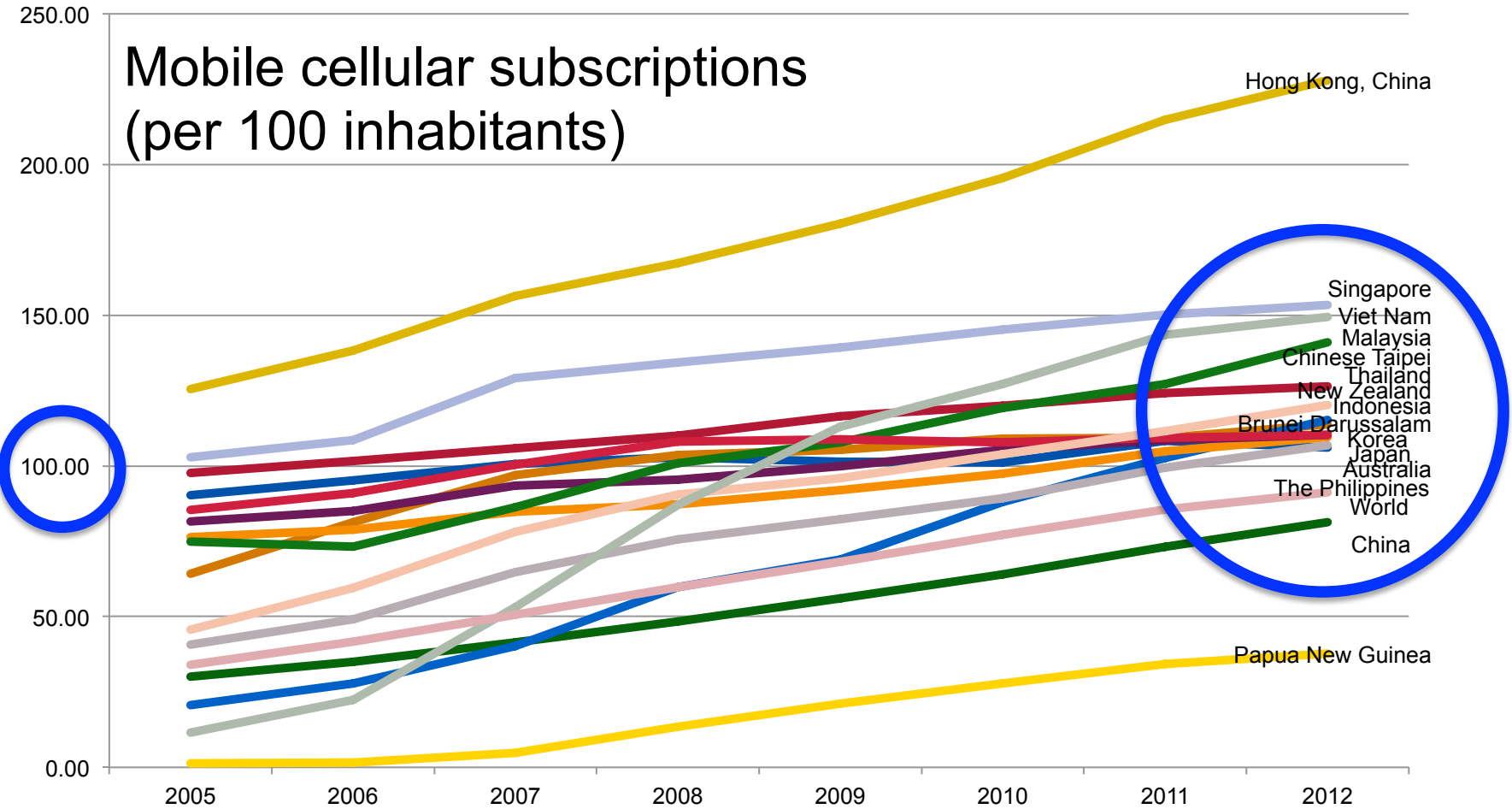
http://www3.weforum.org/docs/WEF_GITR_Report_2013.pdf

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The next wave of Internet growth

- The Internet: Phenomenal growth in the last 20 years
  - 16 million users in 1995 and 2.8 billion users in 2013 in the world
  - 115 million users in 2000 and 1 billion users in 2013 in the Asia

- And the Internet is still growing:
  - 3.6 billion Internet users by 2017: over 47% of the world's projected population (7.6 billion)
    - 1.33 billion Internet users in Asia by 2015, +30 % from 2013

- The next wave of Internet growth will have a much larger impact on the fundamental nature of the Internet
  - It is coming from mobile networks

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

Internet development in AP region: Mobile cellular subscriptions

Mobile cellular subscriptions (per 100 inhabitants)

Hong Kong, China
Singapore
Viet Nam
Malaysia
Chinese Taipei
Thailand
New Zealand
Indonesia
Brunei Darussalam
Korea
Japan
Australia
The Philippines
World
China
Papua New Guinea

http://statistics.apec.org/

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8

Internet development in AP region

- Mobile broadband subscriptions growing very rapidly in developing economies:
  – Reaching more than 100 subscriptions per 100 inhabitants in many economies (see slide #7)
  – Lower CAPEX for network operators, lower entry cost for end users
  – Leapfrogging into the digital economy via mobile networks
  – The existing digital-gap in "Internet users" will be filled by mobile broadband services

- Higher generation mobile networks (e.g. LTE) converge all services on IP-based services
  – Voice, messaging, and data are delivered as digital packets on IP
  – This will impact on format of service delivery and user behaviours
  – Welcome to the world of apps: Mobile-health, mobile-learning, mobile-government services, etc.

Securing scalable growth of IP-based services

- The Internet is a global system of interconnected networks

- The most prominent component of the Internet is the IP
  - IP addresses are unique and essential numbers required to identify the source and destination of digital packets
  - Vast supply and management of IP addresses is the key in supporting future growth
  - **Newer IP version 6 (IPv6) needs to be widely deployed to secure future growth of the Internet**

- Enable cost-effective data traffic among service providers in an economy, a region and in the world
  - IP peering

- Implement up-to-date network infrastructure security measures

Example: APNIC's efforts

- APNIC supports the development of **Network Operator Groups (NOG) in 15 AP nations** with technical training and financial support. E.g.,
  - PHNOG in Manila (April 2014):
    - Advanced Internet routing protocols configuration training
  - BDNOG in Dhaka (May 2014):
    - Internet protocols configuration training
    - Network security training
    - Internet development experiences and lessons

- Collaborating with the ITU Asia Pacific Center of Excellence (ASP CoE) on deploying an IPv6 workshop to educate network operators from developing AP economies
  - IPv6 migration strategies for telecom service providers (2012)
  - IPv6 infrastructure network security (2013, 2014)

APNIC technical training statistics

Face-to-face training	2008	2009	2010	2011	2012	2013
Number of courses conducted	63	77	64	67	73	89
Number of locations (cities)	27	36	29	36	33	37
Number of economies in AP	21	22	24	23	25	22
Number of participants	1480	1870	1923	1813	2347	2622

Number of participants eLearning	2008	2009	2010	2011	2012	2013
Number of courses conducted	NA	NA	22	76	93	135
Number of participants	NA	80	301	786	932	969

Total number of participants	2008	2009	2010	2011	2012	2013
	1480	1950	2224	2599	3279	3591

Example: APNIC's efforts

- Some examples of APNIC Engineering Assistance (EA) include network design, IP services, IP peering, network operations, and configurations of various Internet protocols
  - A broadband network operator in Malaysia in 2012
  - A telecom operator in Bhutan in 2014
  - A network operator in Vanuatu in 2014 (initial consultation only)

- Current business model of APNIC EA is on a cost-recovery basis:
  - Recipients of APNIC EA cover the cost of Internet technical experts' professional fees and travel costs
  - This business model is not scaling as it could be due to the cost factor

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Proposals for potential donors

- APNIC EA will assist in sustainable and resilient Internet infrastructure deployment in the AP region
  - **Proposed timeframe:** 2014 - 2016
  - **Targeted organizations:** Internet Service Providers and Telecom Service Providers in developing economies
  - **Proposed work:** Assist network engineers and organizations' decision makers with following approaches:
    - Examining issues and challenges that they are facing
    - Provide Best Current Practice (BCP) knowledge and ideas for potential solutions
    - Assist local network engineers to become self-reliant
    - Provide capacity-building training to implement their own solutions
    - Provide follow-up support

Proposals for potential donors

- APNIC facilitates and coordinates EA programs with Internet technical experts
  - Visiting network operators once a year for three consecutive years to monitor progress

- APNIC seeks your financial support to enable this project
  - Mobilize Internet technical experts via direct collaboration with economies and other organizations, e.g., ITU ASP CoE
  - Size of this project proposal can be varied depending on available funding, e.g., 5 economies to support for 3 years = USD 2.5 million (estimate)

Way forward: Investments needed

- To enable effective Internet network infrastructure development and management
  - Capacity building among network operators in key organizations in developing economies is a must
  - Economy direct assistance enables real and tangible support

- APNIC will keep striving in this effort through partnership with various organizations

- **APNIC welcomes your support for strengthening our commitment to the region**

THANK YOU

www.facebook.com/APNIC

https://twitter.com/apnic

www.youtube.com/user/apnicmultimedia

www.flickr.com/photos/apnic

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Supplement

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APNIC supports Internet development

- APNIC has the expertise to support network operators to establish stable and resilient networks

- APNIC delivers Internet technical trainings in bridging the gap between plans and reality among network operators in developing economies
  - Collaboration with ITU Asia Pacific Centre of Excellence

- APNIC works closely with external partners and community groups to share knowledge and information
  - Network Operators Groups (NOGs) in the region
  - APEC TEL, APT, ASEAN, and SPC, etc.

- APNIC mobilizes Internet technical experts for organizations needing technical assistance
  - Economy direct engineering assistance