

Peering in Asia and Japan

Katsuyasu Toyama JPNAP (Internet Multifeed Co.)



Chi è Katsuyasu Toyama?



- Chief Operating Officer (2015-)
- Head of Engineering (2001 2012)
- IXP Community
 - Asia Pacific Internet Exchange (APIX) association
 - ex-Chairperson (2010-2017)
 - IX Federation (Global federation of IXP associations)
 - Board member (2011-)
 - Global Peering Forum (GPF)
 - Board member (2015-)
- Internet Service Provider



- SVP of Internet and Mobile Services (2012-2015)
- AS2914(GIN), AS4713(OCN)

- NTT Laboratories
 - Research on IPv6, Internet operation, electronic money, and software engineering



NTT

JPNAP

- Biggest Internet Exchange in Japan
- Operates two independent IXPs in Tokyo and Osaka
 - JPNAP TOKYO: 121 AS, 6 POPs
 - JPNAP OSAKA: 42 AS, 2 POPs
- Not interconnected between each IX
- High quality & reliability
 - High availability + Detailed notification





APIX

Asia-Pacific Internet Exchange

 An association of Internet Exchange Providers in Asia-Pacific region





APIX Members



• 25 IXPs, from 17 countries and economies

 Australia, Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Nepal, New Zealand, Philippine, Singapore, Taiwan, Thailand, Vietnam



25 APIX members



- AMS-IX Hong Kong (HK)
- BBIX (JP)
- BDIX (BD)
- BKNIX (TH)
- CHN-IX (CN)
- CNX (KH)
- DIX-IE (JP)
- Equinix (HK, JP, SG, AU)
- HKIX (HK)
- IIX (ID)
- IX-Australia (AU, NZ)
- JPIX (JP)
- JPNAP (JP)

- KINX (KR)
- Megaport (AU, HK, SG, NZ)
- MumbaiIX (IN)
- MyIX (MY)
- NIXI (IN)
- NP-IX (NP)
- NZIX (NZ)
- PHOpenIX (PH)
- SGIX (SG)
- SOX (SG)
- TPIX (TW)
- VNIX (VN)



Outline

- Broadband penetration and Peering in Japan
- Internet Exchanges in Asia Pacific
- Broadband penetration and Peering in Asia Pacific



Broadband penetration and Peering in Japan



Your map and our map



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Broadband subscribers and average actual speed (FY1999 to FY2016)

• Saturated increase of broadband subscribers, while average actual speed per subscribers increased rapidly



data from the Ministry of Internal affairs and Communication, Japanese Government 2017



Broadband penetration in Japan

- 1997 (20 years ago)
 - Dial-up
 - Analog (56k), ISDN (64k*2)
- 2001
 - ADSL started
 - 1Mbps -> 5Mbps -> 10Mbps -> 40Mbps
 - Softbank offered inexpensive price for ADSL with CPE
 this accelerated ADSL penetration

- 2003
 - FTTH started
 - At first Gov planned to compete three big carriers, electric power companies, and CATV companies.
 - Investment on FTTH is huge so only NTT and electric power companies have done.
 - First 100Mbps, currently 1Gbps
- Subscribers need more speed
 - early 2000s, P2P File share
 - 2010s, video



Current data

- Fiber to the home has been covered 99% area
- But its utilization is 53.6%
- Japanese government now tries to increase the ratio
 - mountainous area, small islands



Broadband deployment in Japan

- Physical access lines (Fibers) are built and owned by
 - NTT (local companies)
 - KDDI and Carriers by local Electric Power companies
 - CATV

- NTT is regulated so they do not provide Internet connectivity. On top of it, ISPs provide it.
- Subscribers have two contracts, to NTT and to ISP



Research by MMRI in 2016 https://www.m2ri.jp/news/detail.html?id=243 (Japanese only)



Japanese ISP market

- Dominant carrier, NTT, is still No.1 but its share is not so high
- Other carrier groups and independent ISPs share some portion
 - Historical background
 - 1985: Liberalization of Telecom market, NTT became private company
 - Hard competition in telephone market and leased line market
 - 1992 commercial ISP started
 - 1996 NTT started ISP business



JPNAP

Peering in Japan

- First commercial ISP in Japan: 1992
 - AT&T Japan, and Internet Initiative Japan (IIJ)
- First establishment of Internet Exchange in Japan was 1994
 - Motivation:
 - to avoid hair-pinning packets over Pacific ocean
 - to reduce circuit cost for connecting among ISPs
 - to improve quality of connectivity



Early internet era in Japan

• Between two ISPs in Japan buying IP transit from US providers, their packets did roundtrip over the Pacific ocean.



 Academic group started an internet exchange called NSPIXP, with some commercial ISPs

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Internet exchange history in Japan

- At first academic group operated IXP
- ISPs needed stable and reliable IXP operation





IXP competition in Japan

- Major IXPs in Japan
 - JPNAP
 - JPIX
 - BBIX
 - EIE (Equinix)



- They are all commercial, and neutral internet exchanges
- Almost content providers connects all IXPs
- Small eyeballs connect one or two IXPs



IXP competition in Japan

	Japan Internet Exchange		BB	
	JPIX	JPNAP	BBIX	EIE (Equinix)
	Commercial, Neutral	Commercial, Neutral	Commercial, Neutral	Commercial, Neutral
	KDDI group	NTT/IIJ group	Softbank group	US company
Токуо				
ASN	142	111	122	80
Traffic	700G	870G	Not Disclosed	Not Disclosed
Osaka				
ASN	35	38	14	14
Traffic	150G	180G	Not Disclosed	Not Disclosed
Features				
	 Number of Networks is biggest in Tokyo 	Peering with Docomo,Biggest in Osaka	 Paid peer to Softbank 	US content providers

Calculated from PeeringDB data on 2017/6/30 http://www.peeringdb.com/



Peering market in Japan

- Peering policy: Restrictive
 - Global Tier-1
 - Tier-2 (IP transit in Japan)
- Peering policy: Open
 - Eyeball
 - Content, CDN



Dispute between OTT and Eyeballs

- "Free ride by OTT" approximately 10 years ago
 - Gradually saturated broadband subscribers in Japan at that time
 - Eyeballs competed each other in monthly flat rate price
 - Accordingly, increasing traffic by OTT's rich content means more investment on network infrastructure without increase of income
 - This led to request OTTs to pay for it = "paid peer"

- Paid peer was successful?
 - Yes and No
 - Some big eyeballs and some OTTs might have negotiated (rumor)
- Recent trend
 - No dispute on this
 - OTTs and Eyeballs peer with each other in major IXPs or privately, which seems to be equal peer
 - OTTs connect with multiple 100G ports, while eyeballs just start to connect with 100G ports



Internet Exchanges in Asia Pacific



Overview of Asia Pacific

- Submarine cable map
 - Eastbound
 - South East Asia and East Asia to North America
 - Australia and New Zealand to North America
 - Westbound
 - Singapore to India, to Middle East, to Europe



map: Telegeography



Focusing into SE/E Asia

- Hubs
 - Hong Kong
 - Singapore
 - Tokyo



map: Telegeography



Asian Internet Scale from IXP perspective

- Key Performance Indicators for IXPs in APAC region
 - 1. Number of ASN
 - How many networks you can potentially peer there
 - 2. Peak traffic
 - How much traffic you can potentially distribute there
 - 3. Average traffic per ASN
 - = (peak traffic)/(number of ASN)
 - How big eyeball and content providers gather there, or
 - How much broadband internet is spread in the market

JPNAP

Data from:

1. Number of ASN

- PeeringDB or their web page on members/customers
 - Usually data of PeeringDB is less than actual number of ASNs
- 2. Peak traffic

Their web page on traffic stats

- Unfortunately some IXPs do not disclose data. They are excluded.
- 3. Average traffic per ASN

= (peak traffic)/(number of ASN)



Members/Customers



JPNAP

Peak traffic





Average traffic per member





Comparing Asia and the rest of the world

- Europe:
 - AMS-IX
 - DE-CIX
 - LINX
 - MSK-IX

- Amsterdam, Netherland (761ASN, 5.5Tbps) Frankfurt, Germany (669ASN, 5.6Tbps) London, United Kingdom (675ASN, 2.9Tbps) Moscow, Russia (498ASN, 2.8Tbps)
- Latin America:
 - IX.br Sao Paulo, Brazil (805ASN, 1.2Tbps)





Scatter plot: Members x Peak traffic





Broadband penetration and Peering in Asia Pacific

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Overview of Asian Broadband

- Fixed line broadband
 - Japan, Korea, Hong Kong, Singapore
 - Population and its density
 - Return of investment on fixed line infrastructure may pay for it in these contries

- Mobile broadband
 - Other Asian countries
 - Investment on fixed line is very expensive
 - Mobile technology will progress rapidly from 3G to 4G to 5G
 - Fiber to the curb and wireless at last mile would be better



Thailand

• Fixed line

- Telephone Organization of Thailand (TOT) -- state-owned
- True Corporation (formerly Telecom-Asia) private company
- Thai Telephone & Telecommunications (TT&T)
- Mobile
 - Advanced Info Service (AIS)
 - DTAC
 - True move



https://www.jetro.go.jp/ext_images/_Reports/02/2bf76b9d5b26c0b1/thrp_it201510.pdf



IX in Thailand: BKNIX

- Bangkok Neutral Internet Exchange
 - In Thailand, so far carriers or big ISPs own their "IX", but they are layer-3 (routers)
 - BKNIX is a "neutral" internet exchange in Thailand
- Big carriers and ISPs have restrictive peering policy, but if some networks (like OTTs) which are beneficial to them, they will have private peering with them.



http://internet.nectec.or.th/webstats/internetmap.current.iir?Sec=internetmap_current





https://bknix.co.th/en/index.php?module=service&content=1



Taiwan

- Chunghwa Telecom Group
 - Old carrier, still big share in Taiwan market both in Fixed and Mobile
 - HiNet 3462, TWGate 9505, emome(CHT mobile) 17421
- Other groups
 - TWM Group, FET Group, APT group, and Chief group





Taiwan

- Peering Scene
 - Changhwa Telecom (CHT) is giant, so they request "paid peer" with other groups
 - TWIX is CHT's "IX" which does not seem to neutral L2 IX
 - TPIX operated by Chief is a neutral L2 IX in Taiwan





Trend of Paid peer price to CHT



Vietnam

- VNPT and Viettel are two big ISPs in Vietnam
- They also connected to VNIX, an neutral Internet Exchange in Vietnam, which is operated by VNNIC



India

- Fixed Line
 - BSNL and MTNL --- stateowned
 - Bharthi and Tata --- private





- Mobile
 - Bharti, Vodafone, Idea, Reliance Jio --- private
 - BSNL --- state owned

Access Service Provider-wise Market Shares in term of Wireless Subscribers as on 30th April, 2017



http://www.trai.gov.in/sites/default/files/PR_No_43_Eng_13_06_2017_0.pdf



Summary

- Internet in Asian countries are growing in various ways country by country
 - Regarding fixed line broadband, old carriers are relatively stronger
 - Regarding mobile broadband, newly established companies have substantial share in the market
 - Old and big ISPs in each country has restrictive policy of peering, and sometimes require paid peer to other providers
 - In rare cases, they asked global OTTs to accept paid peers and won



Grazie!

Grazie per l'attenzione.

Domande e commenti?





One more information

Peering Asia 1.0

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New Open Peering Event in APAC Peering Asia 1.0

Peering Asia

- Nov. 1st 2nd, 2017 (Wed. – Thu.)
- Westin Miyako Hotel Kyoto, Japan
 - Hosts: (4 IXPs in Japan)
 - BBIX
 - Equinix Japan
 - JPIX
 - JPNAP
- Web:
 - www.PeeringAsia.com
- Contact:
 - contact@PeeringAsia.com



