Internet Landscape in APAC
from IXP perspective

Phillipine Peering Forum, 24 Jun 2021

Katsuyasu Toyama
Chair of APIX association
COO of JPNAP
Self-introduction: Katsuyasu Toyama

  – Representative Director, EVP

• Asia Pacific Internet Exchange (APIX) association
  – Chairperson (2010-2017, 2019-)

• Peering Asia
  – Peering Asia WG member (2017-)

• NTT
  – SVP of Internet and Mobile Services (2012-2015)
  – AS2914(GIN), AS4713(OCN)
247 IXPs in APAC
(1100 IXPs on the globe)
IXP associations in the world

*no IXP association so far
APIX

• An IXP association in Asia-Pacific region
  • Established in 2010, acting more than 10 years
  • One of the founders of IX Federation (IX-F)
    – with LAC-IX and Euro-IX
APIX Members

- 33 IXPs, from 18 countries and economies
  - Australia, Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, New Zealand, Philippine, Singapore, Taiwan, Thailand, Vietnam
APIX members: 33

AMR-IX (IN)  
AMS-IX Hong Kong (HK)  
BBIX (HK/JP/SG/TH/EU/US)  
BDIX (BD)  
BKNIX (TH)  
CHN-IX (CN)  – CNX (KH)  
CXC (ID)  
DE-CIX India (IN)  
DE-CIX Malaysia (MY)  
Dix-ie (JP)  
Equinix AP (AU/HK/JP/SG)  
HKIX (HK)  
IIX (ID)  
IX Australia (AU)  
JKT-IX (ID)  
JPIX (JP)  
JPNAP (JP)  
KINX (KR)  
MegaIX (AU/HK/SG)  
MM-IX (MM)  
MYIX (MY)  
NIXI (IN)  
NPIX (NP)  
NZIX (NZ)  
PHOpenIX (PH)  
Ryukyu-IX (JP)  
SGIX (SG)  
SOX (SG)  
TH-IX (TH)  
TPIX (TW)  
TWIX (TW)  
VNIX (VN)
• The largest internet exchange in Japan since 2001
• Operating in Tokyo and Osaka
  – opened Fukuoka and Sendai in 2021
  
  - JPNAP Tokyo: 180 AS
  - JPNAP Osaka: 80 AS

Total: 3.33Tbps
Total traffic of JPNAP = **3.33 Tbps**
Internet Landscape in APAC
From IXP perspective
Internet Landscape in APAC region

• Internet exchanges are reflecting current trend of its city or country/economy
  – Data is open to public
    • Number of connected networks (ASNs)
    • Capacity
    • Traffic graph (Daily, Weekly, Monthly, Yearly)
Comparing IXPs in APAC region

- **Number of ASNs** and capacities are from PeeringDB
- **Traffic data** (peak and average) is from the website of each IXP

<table>
<thead>
<tr>
<th>ASNs</th>
<th>Capacity</th>
<th>Peak traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>= 4</td>
<td>= 181G</td>
<td>= 90G</td>
</tr>
</tbody>
</table>
Disclaimer

• The comparison here may not reflect the reality
  – PeeringDB data
    • Not every connected network makes its info on PeeringDB
    • Even if an entry exists, some data is hidden; such as capacity and IP address
  – Traffic data on the web
    • Sometimes unrealistic peak traffic is shown

My suggestion:
Not for study, but for peering purposes, every AS holder would input its info on PeeringDB, because it’s very important database for peering with other networks
Compare APIX Member IXPs

- **33 IXPs**, from **18 countries and economies**
  - Excluded some IXPs as no data in PeeringDB or no traffic data on the web
Comparison points

• Number of ASNs
  – 2021
  – 2018 to 2021

• Peak traffic
  – 2021
  – 2018 to 2021
Peak Traffic ranking

### Gbps

<table>
<thead>
<tr>
<th>Exchange</th>
<th>Traffic (Gbps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DE-CIX IN</td>
<td>4060</td>
</tr>
<tr>
<td>JPNAP Tokyo</td>
<td>2300</td>
</tr>
<tr>
<td>HKIX</td>
<td>2259</td>
</tr>
<tr>
<td>JPIX Tokyo</td>
<td>1560</td>
</tr>
<tr>
<td>IX</td>
<td>1388</td>
</tr>
<tr>
<td>MyIX</td>
<td>1100</td>
</tr>
<tr>
<td>JPNAP Osaka</td>
<td>1030</td>
</tr>
<tr>
<td>SGIX</td>
<td>928</td>
</tr>
<tr>
<td>JPIX Osaka</td>
<td>715</td>
</tr>
<tr>
<td>KIX</td>
<td>412</td>
</tr>
<tr>
<td>TH-IX</td>
<td>250</td>
</tr>
<tr>
<td>TPX</td>
<td>199</td>
</tr>
<tr>
<td>JKT-IX</td>
<td>114</td>
</tr>
<tr>
<td>TPIX</td>
<td>82</td>
</tr>
<tr>
<td>KDIX</td>
<td>80</td>
</tr>
<tr>
<td>AMS-IX Hong Kong</td>
<td>70</td>
</tr>
<tr>
<td>BDIX</td>
<td>60</td>
</tr>
<tr>
<td>PhOpenIX</td>
<td>40</td>
</tr>
<tr>
<td>NIX</td>
<td>38</td>
</tr>
<tr>
<td>NPIX</td>
<td>35</td>
</tr>
<tr>
<td>BKNIX</td>
<td>23</td>
</tr>
<tr>
<td>CNX</td>
<td>23</td>
</tr>
<tr>
<td>SOX</td>
<td>23</td>
</tr>
</tbody>
</table>
Peak Traffic ranking (2018 to 2021)

- Mumbai jumped up
- Tokyo and Hong Kong doubled
- PHOpenIX is 55% increase
Scatter graph (ASN x Peak traffic)

Peak (Gbps)

10000

1000

100

10

ASNs

10

100

1000

10000

AMS-IX Hong Kong

PhOpenIX

JPNAP Osaka

BKN...
Comparison on hub cities

Hong Kong
Singapore
Tokyo
(Osaka)
Asian Hub Cities
From ASN perspective (2018 to 2021)

- Tokyo: 297 to 416 (40%)
- Osaka: 72 to 140 (94%)
- Hong Kong: 346 to 277 (25%)
- Singapore: 283 to 412 (46%)

https://www.freemap.jp/itemDownload/asia/kouiki2/2.png
Asian Hub Cities

From Capacity perspective (2018 to 2021)

- **Tokyo**: 17.4T to 41.9T (+24.5T)
  - 2018: 17.4T
  - 2021: 41.9T
  - Growth: +24.5T
  - Index: 2.41

- **Singapore**: 7.9T to 26.7T (+18.8T)
  - 2018: 7.9T
  - 2021: 26.7T
  - Growth: +18.8T
  - Index: 3.39

- **Osaka**: 3.4T to 15.7T (+12.3T)
  - 2018: 3.4T
  - 2021: 15.7T
  - Growth: +12.3T
  - Index: 4.50

- **Hong Kong**: 7.1T to 20.5T (+13.4T)
  - 2018: 7.1T
  - 2021: 20.5T
  - Growth: +13.4T
  - Index: 2.89

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https://www.freemap.jp/itemDownload/asia/kouiki2/2.png
Comparison on growing IXPs in APAC

DE-CIX India (Mumbai, India)
MyIX (Kuala Lumpur, Malaysia)
IIX (Jakarta, Indonesia)
JKT-IX (Jakarta, Indonesia)
TPIX (Taipei, Taiwan)
Grown IXPs in APAC
From ASN perspective (2018 to 2021)

- DE-CIX IN: 130 to 355 (2.73)
- MyIX: 79 to 104 (1.32)
- JKT-IX: N/A to 111 (14.83)
- IIX: 18 to 267 (1.71)
- TPIX JKT: 41 to 70 (2.73)

https://www.freemap.jp/itemDownload/asia/kouiki2.png
Grown IXPs in APAC
From Capacity perspective (2018 to 2021)

- **MyIX**
  - 2018: 0.61T
  - 2021: 2.33T
  - Capacity range: 0.61 to 2.33T

- **TPIX**
  - 2018: 0.69T
  - 2021: 1.27T
  - Capacity range: 0.69 to 1.27T

- **DE-CIX IN**
  - 2018: 0.45T
  - 2021: 4.54T
  - Capacity range: 0.45 to 4.54T

- **IIX**
  - 2018: 0.04T
  - 2021: 1.51T
  - Capacity range: 0.04 to 1.51T

- **JKT-IX**
  - 2018: N/A
  - 2021: 1.13T
  - Capacity range: N/A to 1.13T

- **Mumbai**
  - Capacity: 9.99T

- **Kuala Lumpur**
  - Capacity: 3.83T

- **Jakarta**
  - Capacity: 34.36T

- **Taipei**
  - Capacity: 1.84T

Source: https://www.freemap.jp/itemDownload/asia/kouiki2/2.png
Summary

• Internet in APAC is growing
  – Almost IXPs in APAC is expanding its ASNs, Capacity, and actual traffic
  – Hub cities
    • Growing, but Hong Kong looks slow down?
    • Singapore and Tokyo might have taken over the connections to Hong Kong?
  – Growing IXPs
    • DE-CIX India (Mumbai, India) and IXPs in Jakarta (IIX and JKT-IX) are rapidly growing ... due to population and penetration of the internet?

-> Need deeper study about them
Study on IXPs in APAC
ISOC published, supported by APIX
“Effective IXP strategies for the Asia-Pacific”

https://www.internetsociety.org/resources/doc/2021/effective-ixp-strategies-for-the-asia-pacific/
IXP case studies

In APAC region
- Hong Kong Internet Exchange (HKIX), Hong Kong. 1995
- Internet Exchange Australia (IX-Australia), Australia. 1997
- Korea Internet Neutral Exchange (KINX), Republic of Korea. 2000
- Japan Network Access Point (JPNAP), Japan. 2001
- National Internet Exchange of India (NIXI), India. 2003
- Bangladesh Internet Exchange (BDIX), Bangladesh. 2004
- Singapore Internet Exchange (SGIX), Singapore. 2010
- Bangkok Neutral Internet Exchange (BKNIX), Thailand. 2015
- Myanmar Internet Exchange (MMIX), Myanmar. 2017

In the other regions
- Deutscher Commercial Internet Exchange (DE-CIX), Germany. 1995
- Equinix, United States. 1996
- Kenya Internet Exchange Point (KIXP), Kenya. 2000
- Internet Exchange Brazil (IX.br), Brazil. 2002
The content

• Objectives/Motivations
  – “How do these vastly different exchanges fit into their local environment?”
  – “Where are they headed?”
  – “How do they compare with IXPs in other regions?”

• Key messages
  – “Rather than focusing only on the usual metrics used to compare exchanges (number of
    ASNs, total port capacity, peak/average traffic), case studies provide an opportunity for
    deeper insight into how those metrics reflect the history, business model, current
    operations, and future directions of an Internet exchange.”

Good to read in order to understand how an IXP grows and evolves in a country/economy; and to arrange strategies for your country/economy.
Peering Asia

An opportunity for peering community to get together
Do you know Peering Asia?
Peering Asia is an open and neutral peering event (forum)

• Similar open and neutral events in the world:
  – Global Peering Forum (GPF) in April, North America
  – European Peering Forum (EPF) in September, Europe
  – LAC-IX Peering Forum in May, Latin America
  – African Peering and Interconnection Forum (AfPIF) in August, Africa

  – Asia Peering Forum (APF) is the event by Equinix
    • We always respect their great contribution to peering/interconnection community
Overview of Peering Asia

- **Peering meetings**
  - 30 minute meeting between two organizations to negotiate about peering, interconnection, use of an IX and/or a Datacenter, and so on
  - approximately 10 slots per day

- **Conference & Peering Personals**
  - Presentations and panel discussions mainly regarding to peering and interconnection
  - 1 minute self-introduction of peering/interconnection managers
  - In 90 minutes per day

- **Lunch, Social party, Coffee break**
  - Socializing between attendees (and sponsors)
Peering Asia 1.0 @ Kyoto, Japan

2017

114 AS / 239 attendees

Hosted by
BBIX / Equinix Japan / JPIX / JPNAP
Peering Asia 1.0 @ Kyoto, Japan

“Internet Landscape in Philippine”

presented by Achie
Peering Asia 2.0 @ Hong Kong
149 AS / 328 attendees
Hosted by HKIX / HKNOG
Peering Asia 3.0 @ Kuala Lumpur

177 AS / 364 attendees

Hosted by
MyIX / MYNOG
2020

Peering Asia 3.5v (virtual)

128 AS / 267 attendees

Hosted by
Peering Asia WG + APNIC
2021

Peering Asia 4.0
@ Bangkok, Thailand

Hosted by
Thailand IX / BBIX Thailand

Postponed to 2022
2021

No “Peering Asia” in 2021??

Please do not release your time on 3-4 Nov 2021

Stay tuned!
Thank you very much!
Any questions or comments?