

# Hong Kong peering scene and network infrastructure

Peering Asia 1.0, 1<sup>st</sup> Nov, 2017

Kyoto, Japan

# Self-Introduction

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# Agenda

- Hong Kong Overview
- Hong Kong Telecommunications Overview
- Internet Exchanges
- Data Centers
- Submarine Cables & Cable Landing Stations
- Transit Carriers / Cloud Providers

# Hong Kong Overview

## Demography

- Population: 7.325 millions
- Households: 2.832 millions

## Area

- 1,106 square km

## Official Languages

- Chinese (Cantonese)
- English



# Hong Kong Telecommunications Overview

- Internet service providers
- Internet access
- Mobile services
- Local loop / metro network operators
- External telecommunications providers

# 226 Internet Services Providers

- Major fixed broadband providers
  - PCCW Netvigator
  - Hong Kong Broadband (HKBN)
  - Hutchison Global Communications (HGC)
  - i-Cable
- Major business broadband providers
  - WTT HK (formerly Wharf T&T)
  - PCCW Business Netvigator
  - Hutchison Global Communications (HGC)
  - Hong Kong Broadband (HKBN)

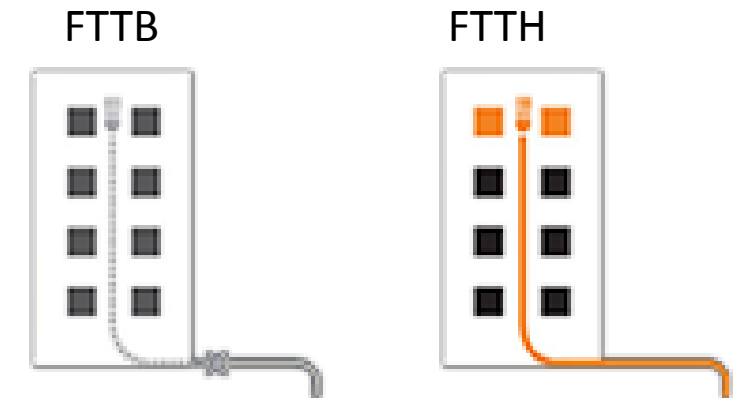
# Internet access

## Fixed broadband services

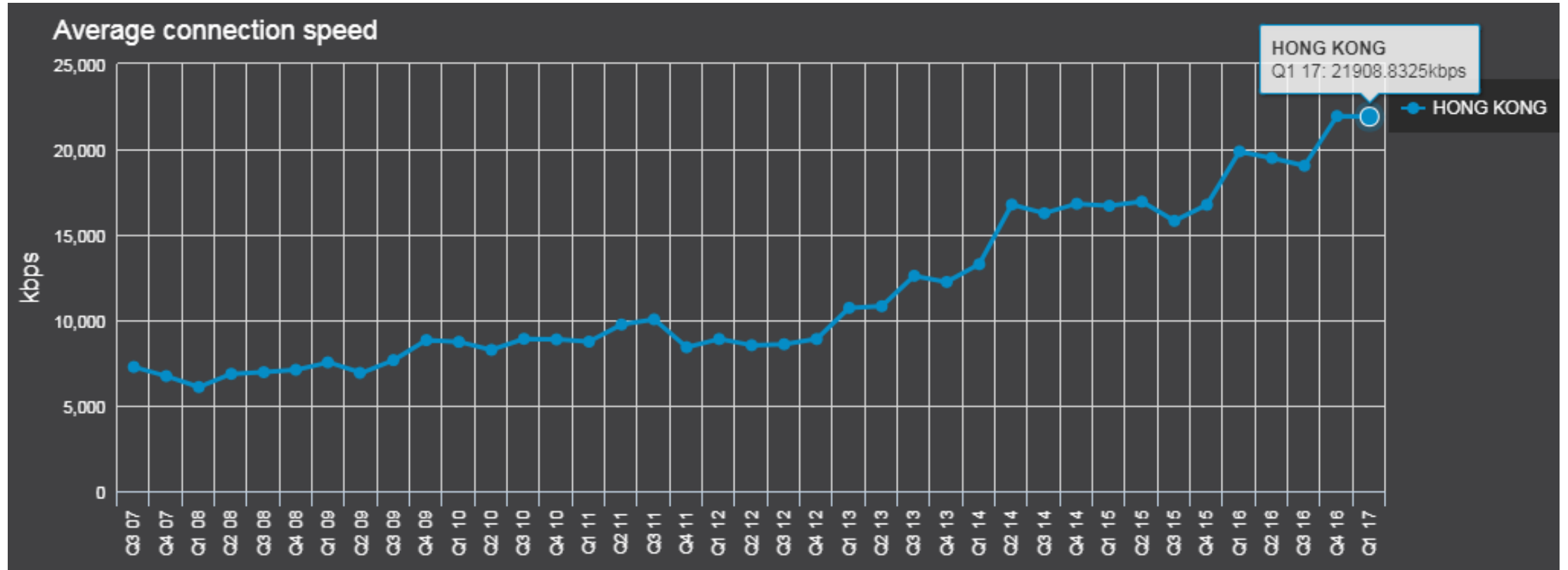
- 2.63 million, 93% of households
- 72.3% FTTH/B household penetration rate
  - 40.3% Fibre-to-the-home
  - 32.0% Fiber-to-the-building
- Up to 10G for fixed broadband services

## Wi-Fi

- 47,652 public Wi-Fi hotspots
- free Wi-Fi in 603 government premises

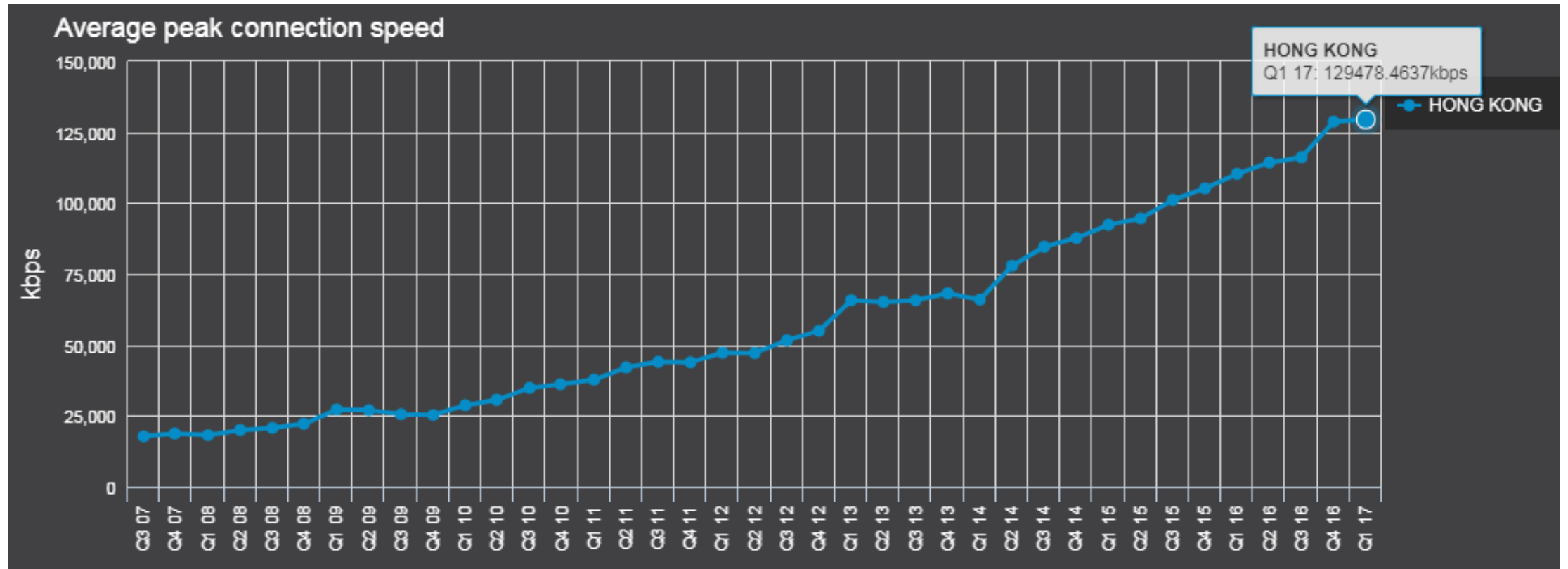


# Average Connection Speed: 21.9Mbps



- Source: Akamai Q1 2017 State of the Internet Report (SOTI)

# Average Peak Connection Speed: 129Mbps



- Source: Akamai Q1 2017 State of the Internet Report (SOTI)

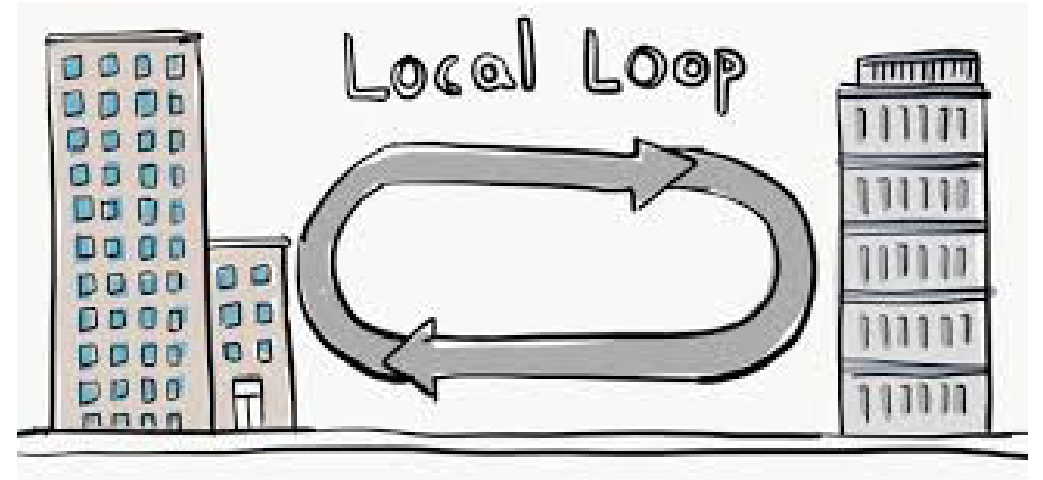
# Mobile Services

- 4 mobile network operators:
  - China Mobile Hong Kong (CMHK)
  - PCCW-HKT (csl/one2free)
  - Hutchison (3HK)
  - SmartToneMVNO: HKBN, Sun Mobile, etc
- 17.79 million mobile subscribers
  - 240.8% penetration rate
  - 16.46 million mobile broadband customers
- Average 1.358G data usage per mobile user per month



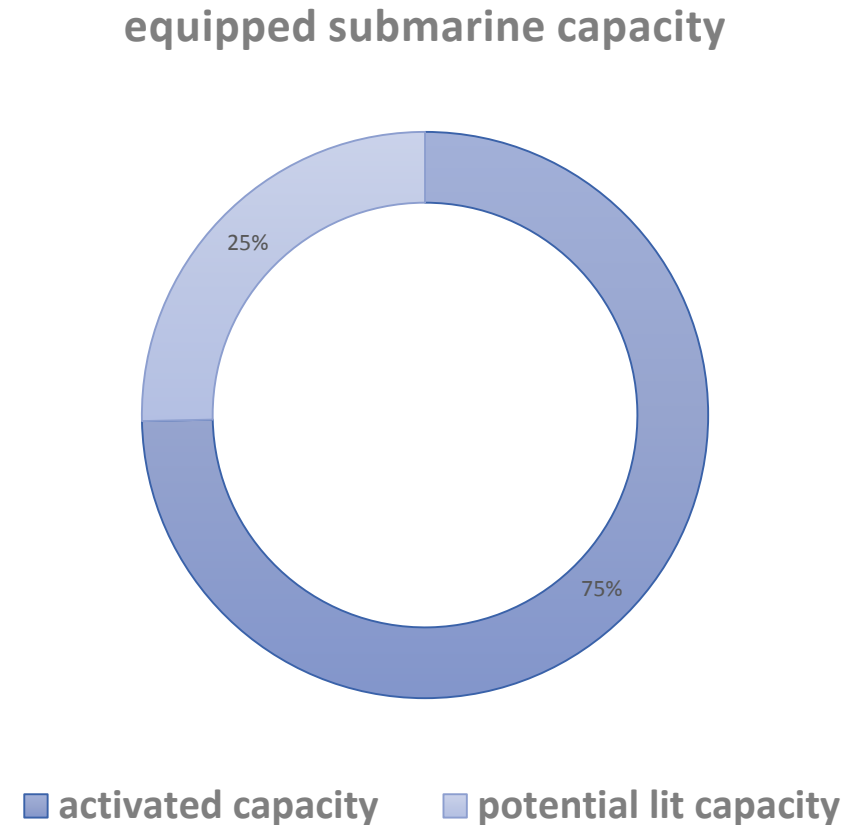
# 27 Local loop / Metro network operators

- Major operators
  - PCCW-HKT
  - HGC
  - WTT
  - HKBN
  - Traxcomm
  - Towngas Telecom (TGT)
- Others operators
  - Superloop, Megaport, Equinix, etc



# 42 External Telecommunications Providers

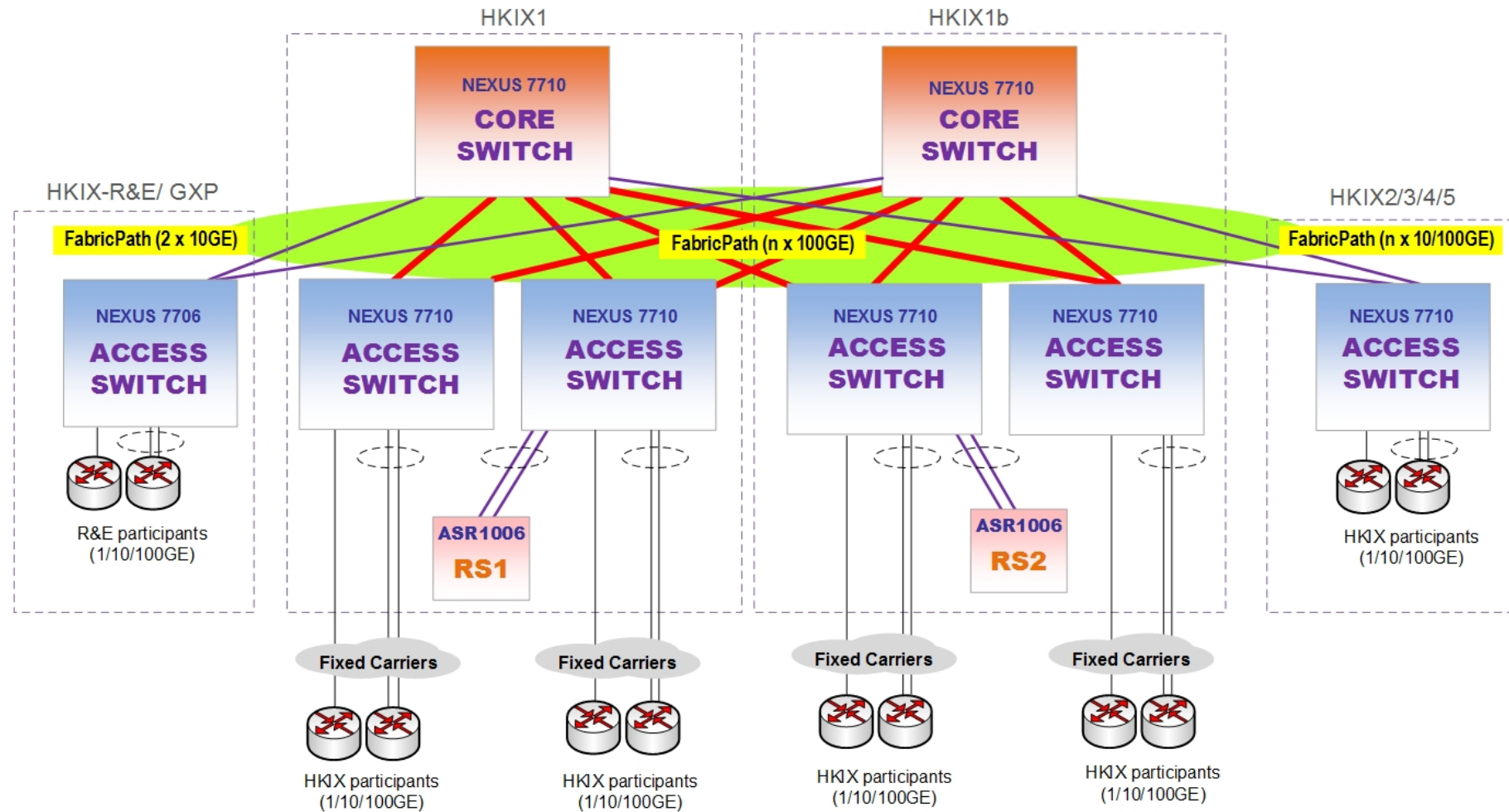
- 220 satellite earth station antennas
- 8 submarine cable landing stations
- 10 submarine cable systems
- 52,789Gbps equipped capacity
  - 52,784Gbps by Submarine Cable
  - 4.57Gbps by Satellite
- 39,411Gbps activated capacity
  - 39,409Gbps by Submarine Cable
  - 1.69Gbps by Satellite



# Internet Exchanges in Hong Kong



## HKIX Network Diagram (Jun 2017)



1. **HKIX1** and **HKIX1b** are the two core sites of HKIX at CUHK while **HKIX2/3/4/5** are HKIX satellite sites outside of CUHK.
2. HKIX participants are encouraged to connect to multiple sites for site resilience.

# New HKIX Satellite Sites

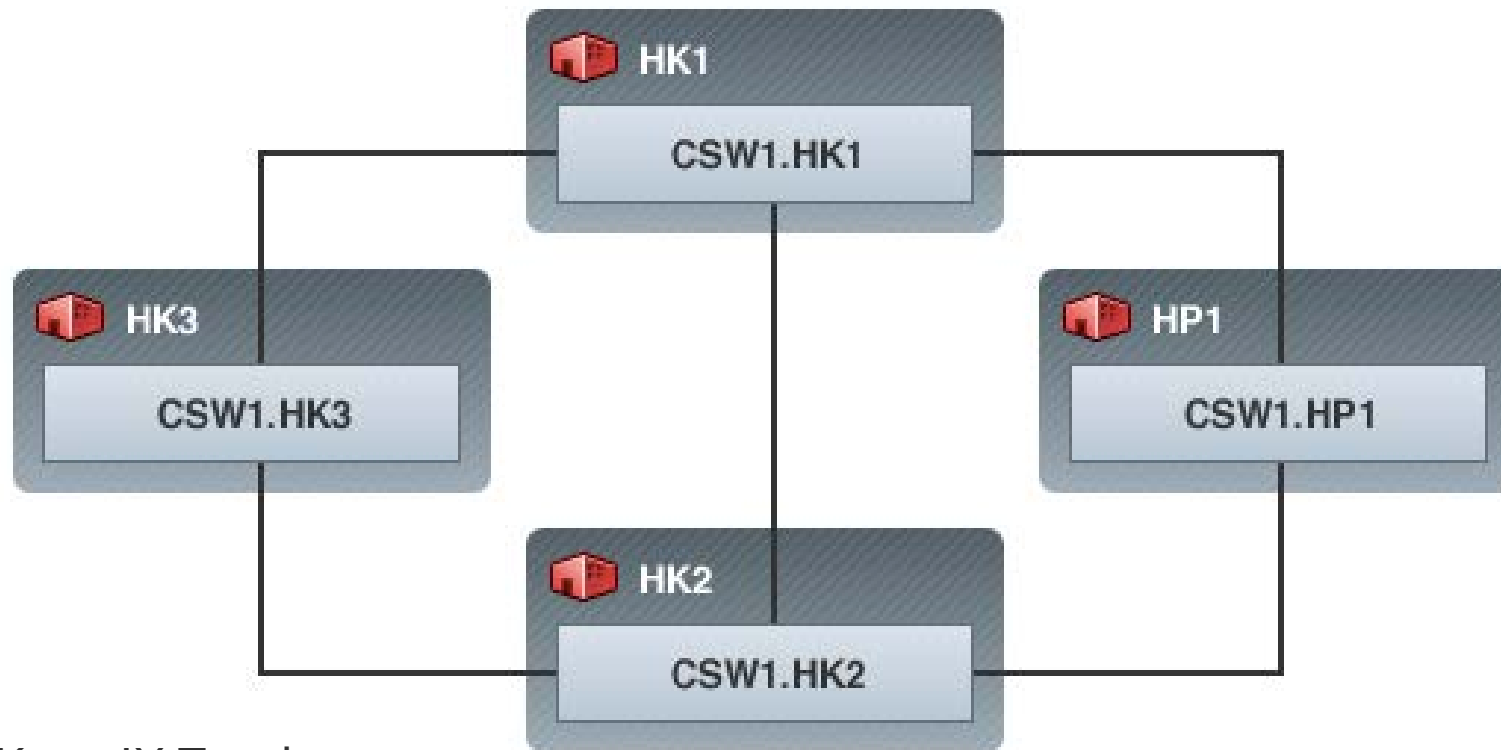
3 new satellite sites were established in collaboration with 3 commercial data centres which provide colocation services as well as easy connections to HKIX.

| Satellite Site | Satellite Site Collaborator                   | District      | Ports Supported |
|----------------|-----------------------------------------------|---------------|-----------------|
| HKIX2          | <a href="#">CITIC Telecom International</a>   | Kwai Chung    | GE/10GE         |
| HKIX3          | <a href="#">SUNeVision / iAdvantage</a>       | Fo Tan        | GE/10GE/100GE   |
| HKIX4          | <a href="#">NTT Com Asia</a>                  | Tseung Kwan O | GE/10GE/100GE   |
| HKIX5          | <a href="#">KDDI / Telehouse / HKCOLO.net</a> | Tseung Kwan O | GE/10GE/100GE   |

- For connections to HKIX at Satellite Sites, [special connection charges](#) will be charged by relevant operators, in addition to the [port charges](#) charged by HKIX.
- For HKIX participants not co-located at HKIX satellite sites, they can still connect to any of the two HKIX core sites, i.e. HKIX1 and HKIX1b sites by local loops via local loop providers.



# Equinix IX Hong Kong



Hong Kong IX Topology

# AMS-IX Hong Kong

## Current AMS-IX HK stats:

City: HKPOPs: Sinofavor, Mega-I, Equinix, HKColo

Peak traffic: 36 Gbps

Route server peers:31

Total number of customer ports:41

Total connected:38

IPv6 peers:29

Remarks: IPX service is live. Currently BICS, Hutchison & Tata connected.

Sources: [https://ams-ix.hk/connected\\_parties](https://ams-ix.hk/connected_parties)



# BBIX Hong Kong



## A Softbank Group company

- Web site
  - <http://www.bbix.net/en>
- Peering DB
  - Exchange Points
    - BBIX Tokyo
      - NTT Data Otemachi
      - Comspace
      - TY2
      - TY4
      - @Tokyo
      - SoftBank's Maruyama Cable Landing Station
    - **BBIX Hong Kong**
      - **Mega-i Advantage 13F**
    - BBIX Singapore
      - Equinix's SG1

### Quick Facts (2017/October)

- 29 connected member ASNs

### Service

- Internet Exchange
- Roaming Peering eXchange
  - L2 peering for mobile data roaming
  - Introducing “Peering Culture” to the old-fashioned mobile operators.

# A distributed Internet Exchange



## Smart IX Node Location



- Hong Kong : Mega-i 13<sup>th</sup> Floor
- Singapore : SG1 Equinix 4<sup>th</sup> Floor
- Tokyo:
  1. NTT Data Otemachi
  2. Comspace
  3. TY2 Equinix
  4. TY4 Equinix
  5. @Tokyo
  6. SoftBank's Maruyama Cable Landing Station

# Data Centers in Hong Kong

## Carrier hotels

- Major carrier hotels: Mega-iAdvantage, Equinix HK1

## Data Centers

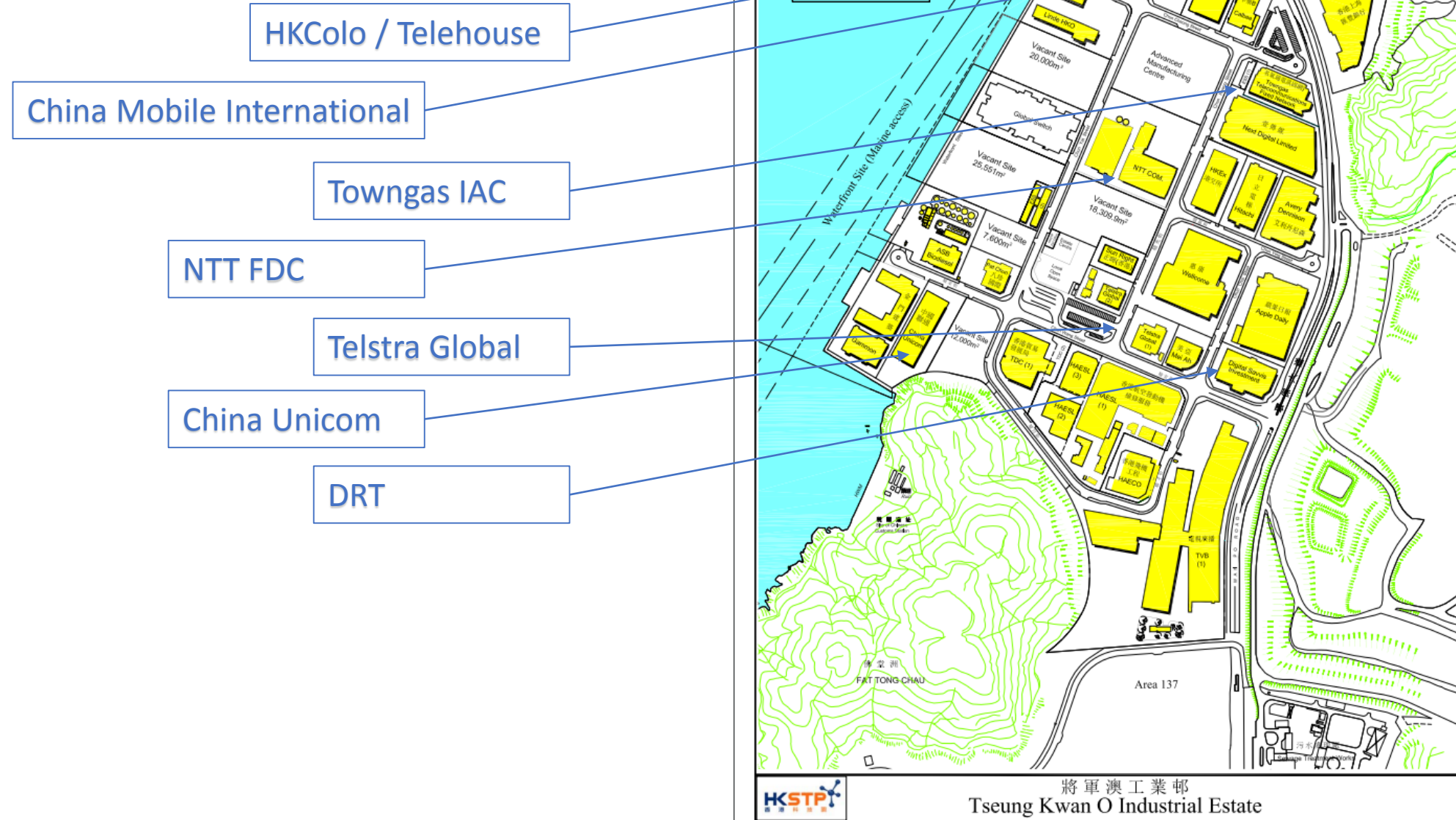
- NTT FDC, HKColo, DRT, CMI GNC, China Unicom, Telstra Global, PCCW SkyExchange, Towngas IAC, TM Billion Center, etc

## Upcoming data centers in TKO

- Mega+, Equinix HK5, Global Switch, etc

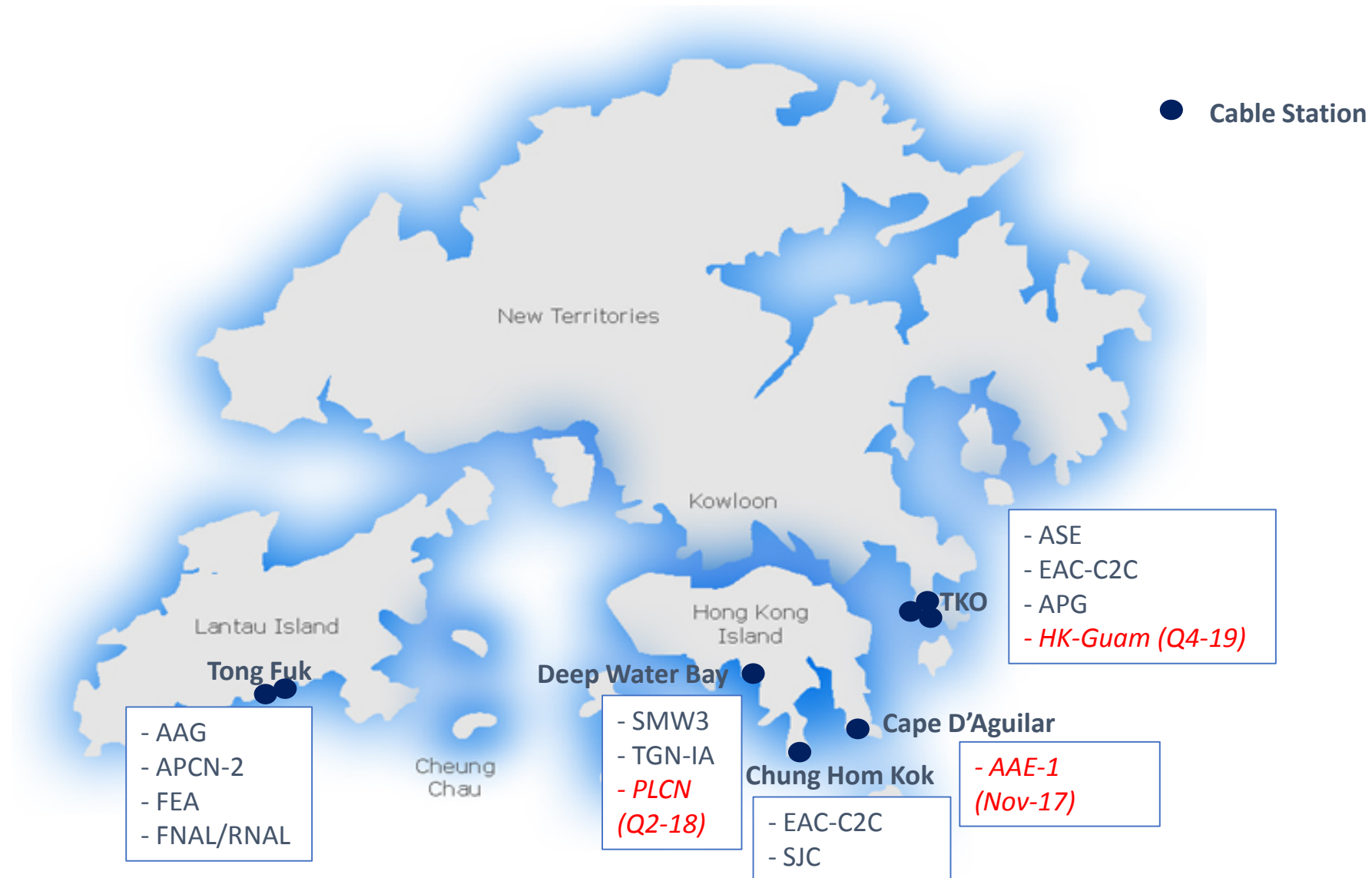
# TKO Data Center map

Sources: <https://www.hkstp.org/media/1803/tkoie.pdf>



# Submarine Cables & Cable Landing Stations

# Cable stations in Hong Kong



# Major Consortium cables at Hong Kong

| Cable System | Key Investors                                                               | Coverage                                                                      | Cable Stations | Design Capacity |
|--------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------|-----------------|
| A-A-G        | Traditional incumbent Operators in the Region                               | Singapore, Malaysia, Thailand, Vietnam, Brunei, Philippines, Guam, Hawaii, US | Tong Fuk       | 5.2Tbps         |
| APCN-2       |                                                                             | Japan, Korea, Taiwan, Philippines, Malaysia, Singapore, Mainland China        |                | 2.56Tbps        |
| SMW-3        |                                                                             | Asia – Middle East – Western Europe                                           | Deep Water Bay | 4.6Tbps         |
| A-P-G        | CT, CU, CMI, CHT-I, NTT, KT, LG, PLDT, StarHub, TT, Viettel, VNPT, Facebook | Japan, Korea, Taiwan, Mainland China, Malaysia, Thailand, Vietnam, Singapore  | TKO            | 54Tbps          |
| S-J-C        | CT, CU, CMI, CHT-I, KDDI, Globe, SingTel, ToT, Telin, Google                | Japan, Guam, Philippines, Thailand, Singapore                                 | Chung Hom Kok  | 28Tbps          |

# Major Private cables at Hong Kong

| Cable System | Key Investors             | Coverage                                     | Cable Stations     | Design Capacity |
|--------------|---------------------------|----------------------------------------------|--------------------|-----------------|
| ASE          | NTT / TM / PLDT / StarHub | Japan, Philippines, Malaysia, Singapore      | TKO                | 15Tbps          |
| EAC-C2C      | Telstra                   | Major Asian destinations                     | TKO, Chung Hom Kok | 30Tbps          |
| FEA          | GCX                       | Asia – Middle East – Western Europe          | Tong Fuk           | 5Gbps           |
| FNAL / RNAL  | GCX / Reach               | Taiwan, Japan, Korea                         | Tong Fuk           | 1.92Tbps        |
| TGN-IA       | Tata / PCCW Global        | Japan, Guam, Philippines, Vietnam, Singapore | Deep Water Bay     | 3.84Tbps        |

# New/Planned cables at Hong Kong

| Cable System                              | Key Investors                                                                                                                                                          | Coverage                                                                                                                                                        | Cable Stations                                       | Design Capacity |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------|
| AAE-1<br><i>(Planned RFS by Nov-2017)</i> | BT, CU, Chuan Wei, Djibouti Telecom, Etisalat, PCCW, Mobily, Omantel, Ooredoo, PTCL, Telecom Egypt, Telecom Yemen, Vittel, OTEG, Reliance Jio , TT, TOT.               | Hong Kong, Vietnam, Cambodia, Malaysia, Singapore, Thailand, India, Pakistan, Oman, UAE, Qatar, Yemen, Djibouti, Saudi Arabia, Egypt, Greece, Italy and France. | Cape D'Aguilar<br><i>(City POP at Telecom House)</i> | 40 Tbps         |
| PLCN<br><i>(Planned RFS by H1 2019)</i>   | Pacific Light Data Communication Co. Limited, a subsidiary of China Soft Power Technology Holding Limited (CSPT), and TE SubCom<br><i>(Google, Facebook also join)</i> | Hong Kong and Los Angeles in the shortest path, with branch out to Philippines and Taiwan                                                                       | Deep Water Bay                                       | 120Tbps         |
| HK-Guam<br><i>(Target by Q4-2019)</i>     | RTI Connectivity Pte. Ltd. (RTI-C) and NEC Corporation                                                                                                                 | Hong Kong and Piti, Guam (subsequently connected to US, Philippines and Indonesia via SEA-US)                                                                   | TKO<br><i>(Under planning)</i>                       | 48 Tbps         |

EAC-C2C



APCN-2



FNAL/RNAL



SJC



ASE



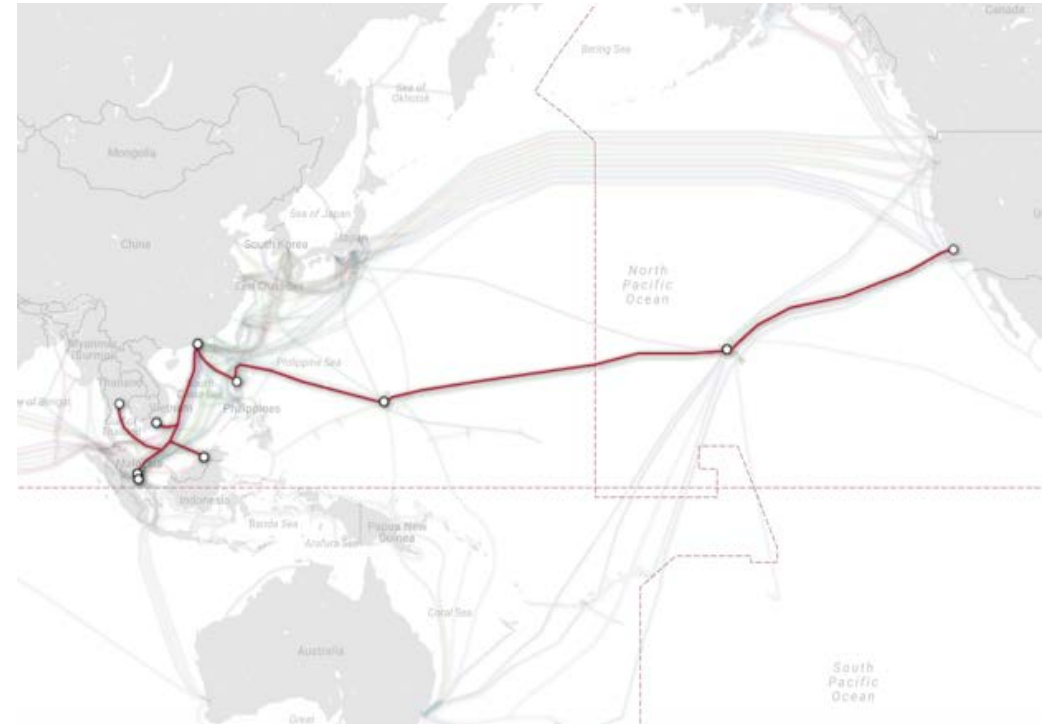
APG



TGN-IA



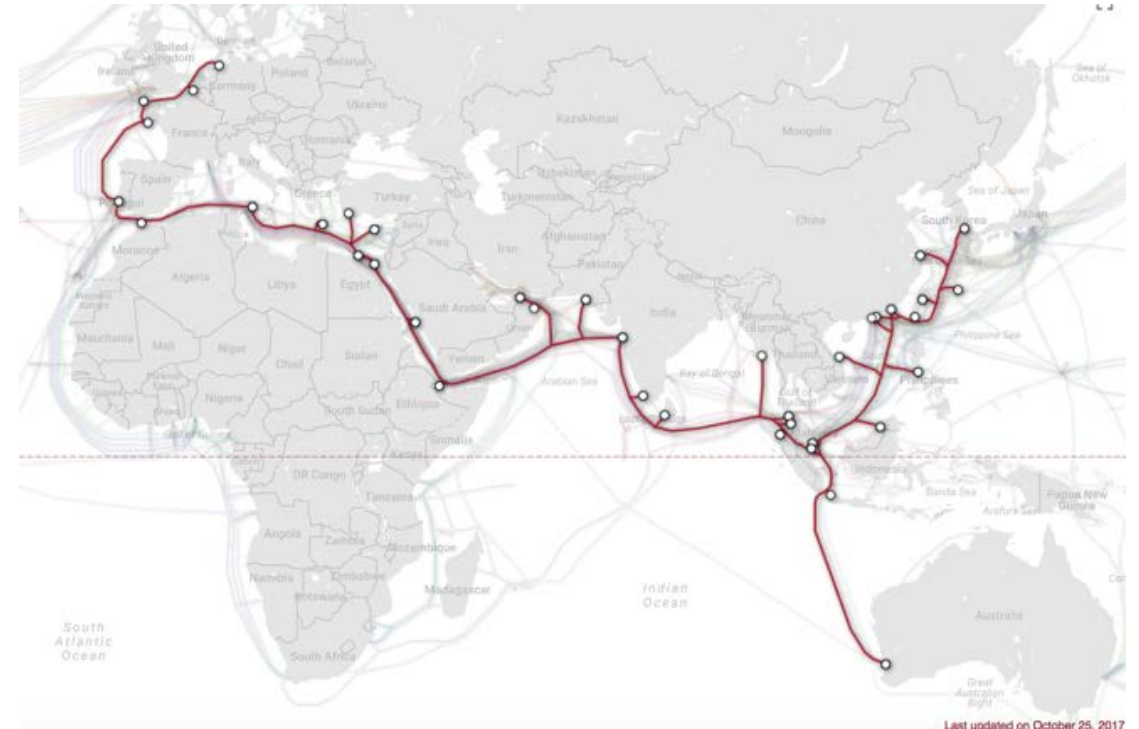
AAG



FEA



SMW3



# Transit carriers and Cloud providers

## Transits carriers

- Major players: PCCW Global, Telstra, NTT, Tata
  - Gateway to China: China Telecom (CT), China Unicom (CU), China Mobile (CM)

## Cloud providers

- Microsoft Azure, Alibaba Cloud, Tencent Cloud
  - Upcoming: Amazon AWS (2018)



One more thing...

# Internet Events in Hong Kong

## Capacity Asia 2017

- 12<sup>th</sup> & 13<sup>th</sup> Dec, 2017



## HKNOG 6.0

- 2<sup>nd</sup> Mar, 2018
  - right after APRICOT 2018



# Summary

- High-speed Internet access
- Excellent broadband and mobile penetration rate
- Central location in Asia, one of major Internet hubs
- Neutral and open markets
- Well-connected Internet Exchanges
- A lot of new data centers
- More and more cloud providers

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