



HKNOG3.0

Data Centers in the Cloud Age - **Connectivity** and **Capacity**

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Over 15 years of proven track record in providing data center services

Operating 4 data centers of over 750,000 square feet

Committed to doubling our inventory in the coming 2 years



Technology arm of Sun Hung Kai Properties
SEHK: 8008 (Listed since 2000)



Satellite Broadcast Distribution & Security Surveillance



Data Center & Infrastructure Services



Intelligent Building Wireless & Broadband Solutions/Services



Which is the critical factor making Hong Kong so important in Cloud Age?



Major Consortium cables at Hong Kong

Cable System	Key Investors	Coverage	Cable Stations
A-A-G	Traditional incumbent Operators in the Region	Singapore, Malaysia, Thailand, Vietnam, Brunei, Philippines, Guam, Hawaii, US	Tong Fuk
APCN		Japan, Korea, Taiwan, Philippines, Malaysia, Singapore, Thailand, Indonesia, Australia	
APCN-2		Japan, Korea, Taiwan, Philippines, Malaysia, Singapore, Mainland China	
SMW-3		Asia – Middle East – Western Europe	Deep Water Bay
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
S-J-C	CT, CU, CMI, CHT-I, KDDI, Globe, SingTel, ToT, Telin, Google	Japan, Guam, Philippines, Thailand, Singapore	Chung Hom Kok

Major Private cables at Hong Kong

Cable System	Key Investors	Coverage	Cable Stations
ASE	NTT / TM / PLDT / StarHub	Japan, Philippines, Malaysia, Singapore	TKO
EAC-C2C	Pacnet	All Asian destinations	TKO, Chung Hom Kok
FEA	Global Cloud Exchange	Asia – Middle East – Western Europe	Tong Fuk
FNAL	Global Cloud Exchange	Taiwan, Japan, Korea	Tong Fuk
RNAL	REACH	Taiwan, Japan, Korea	Tong Fuk
TGN-IA	TATA / PCCW Global	Japan, Guam, Philippines, Vietnam, Singapore	Deep Water Bay

New / Planned cables at Hong Kong

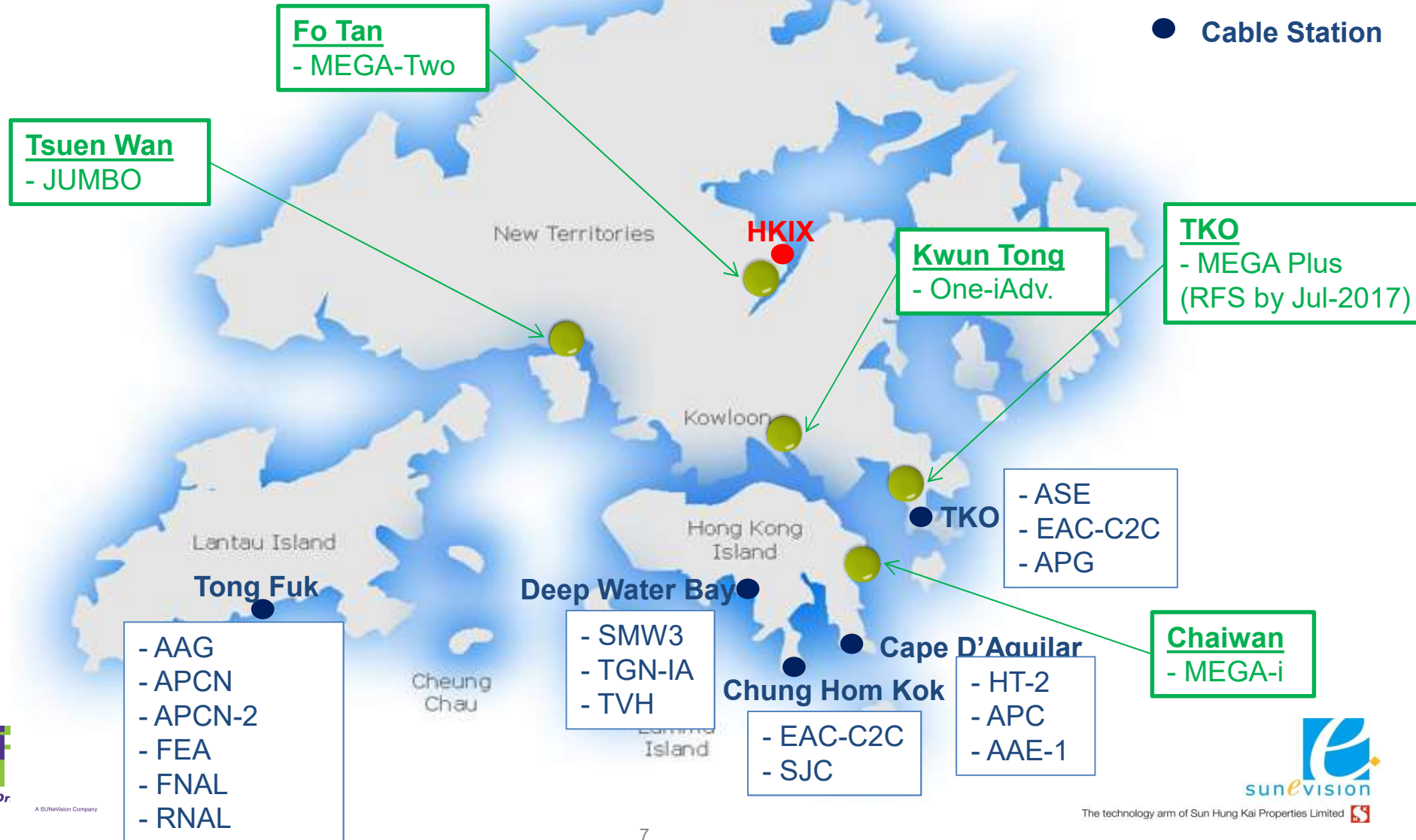
Cable System	Key Investors	Coverage	Cable Stations
AAE-1 <i>(Planned RFS by Q4-2016)</i>	BT, CU, Chuan Wei, Djibouti Telecom, Etisalat, PCCW, Mobily, Omantel, Ooredoo, PTCL, Telecom Egypt, Telecom Yemen, Vittel, OTEG, Reliance Jio , TT, TOT.	Hong Kong, Vietnam, Cambodia, Malaysia, Singapore, Thailand, India, Pakistan, Oman, UAE, Qatar, Yemen, Djibouti, Saudi Arabia, Egypt, Greece, Italy and France.	Cape D'Aguiar <i>(City POP at TKO and Telecom House)</i>
PLCN <i>(Planned RFS by May-2018)</i>	Pacific Light Data Communication Co. Limited, a subsidiary of China Soft Power Technology Holding Limited (CSPT), and TE SubCom <i>(Major Global OTTs are invited to join)</i>	Hong Kong and Los Angeles	Chung Hom Kok or TKO

In fact, Few More Submarine cables coming.....

Where are / shall be they landing at Hong Kong?

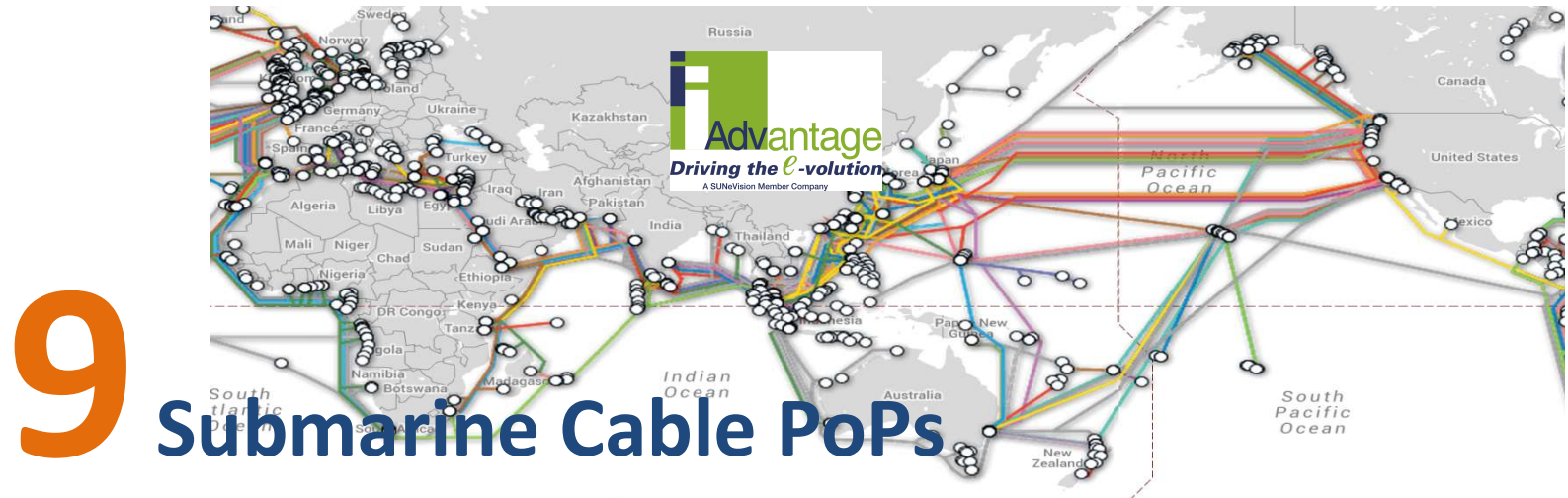
● MEGA Campus Data Center

● Cable Station



Why MEGA-i is so important?

True Carrier Neutral



100+ Carriers

10,000+ Cross Connects

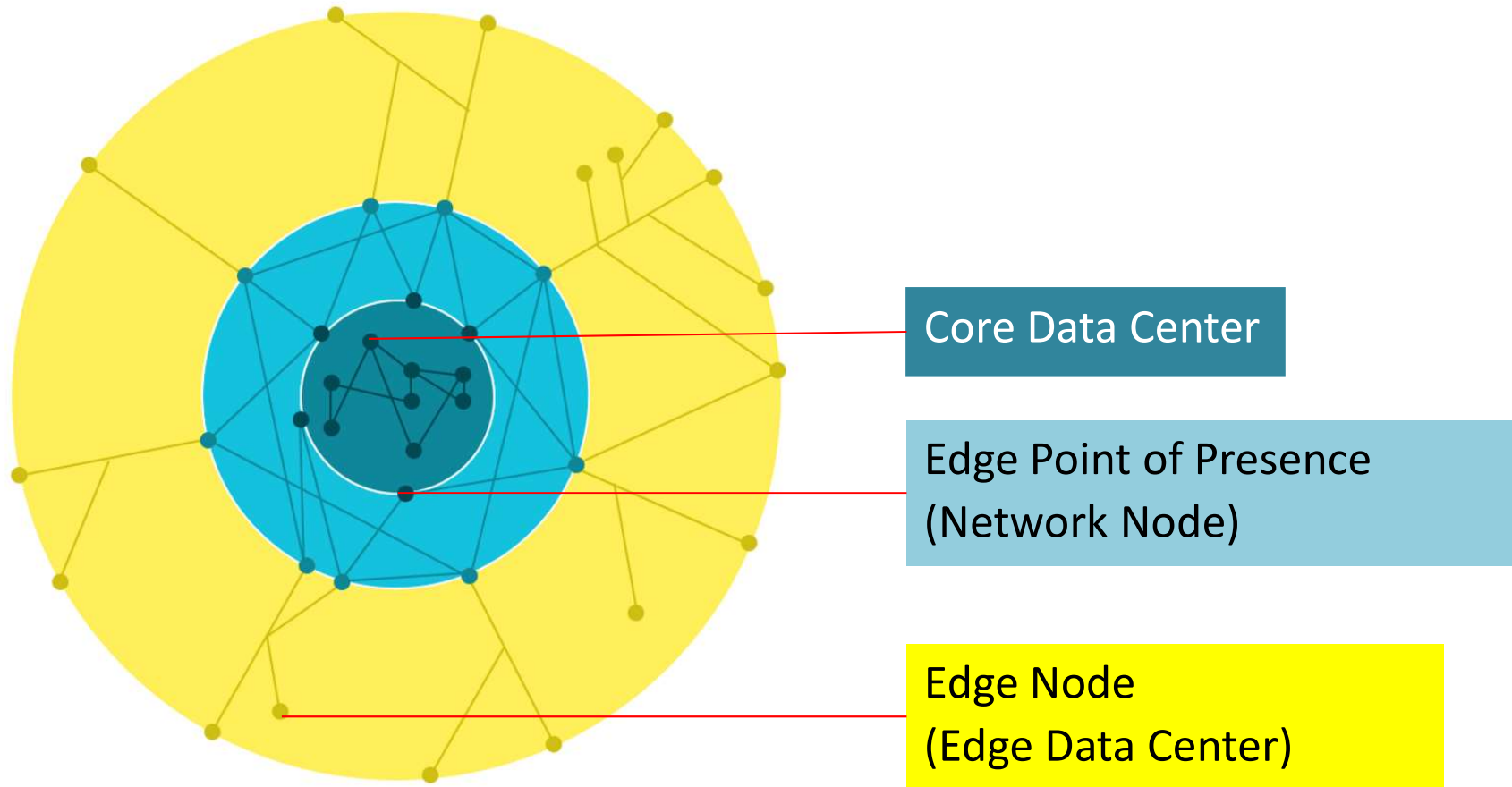
Data Centers in the Cloud Age

"Over 50% of servers in 2016 will be shipped to data centers providing cloud infrastructure services."

-- Michael Ball, Principal Analyst, Canalys

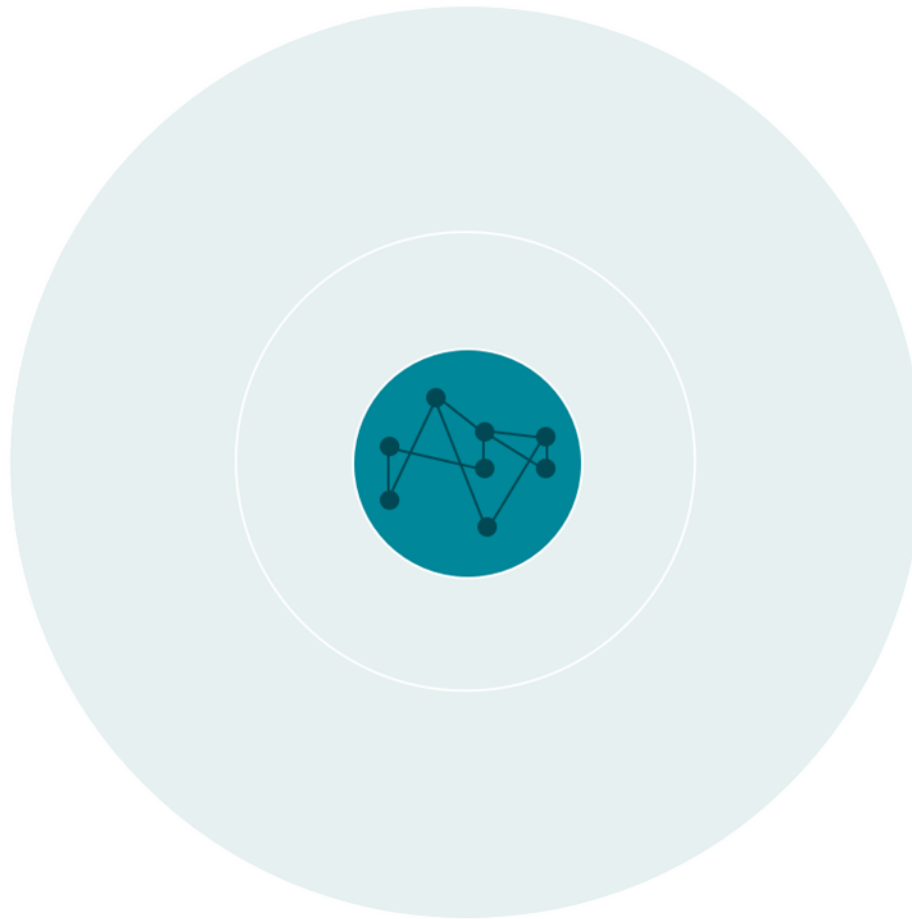
Data Centers in the Cloud Age have to serve the needs of Cloud Service Providers and the ecosystem supporting cloud infrastructure services

Anatomy of Hyperscale Cloud Service Providers



Source: <https://peering.google.com/#/infrastructure>

Anatomy of Hyperscale Cloud Service Providers

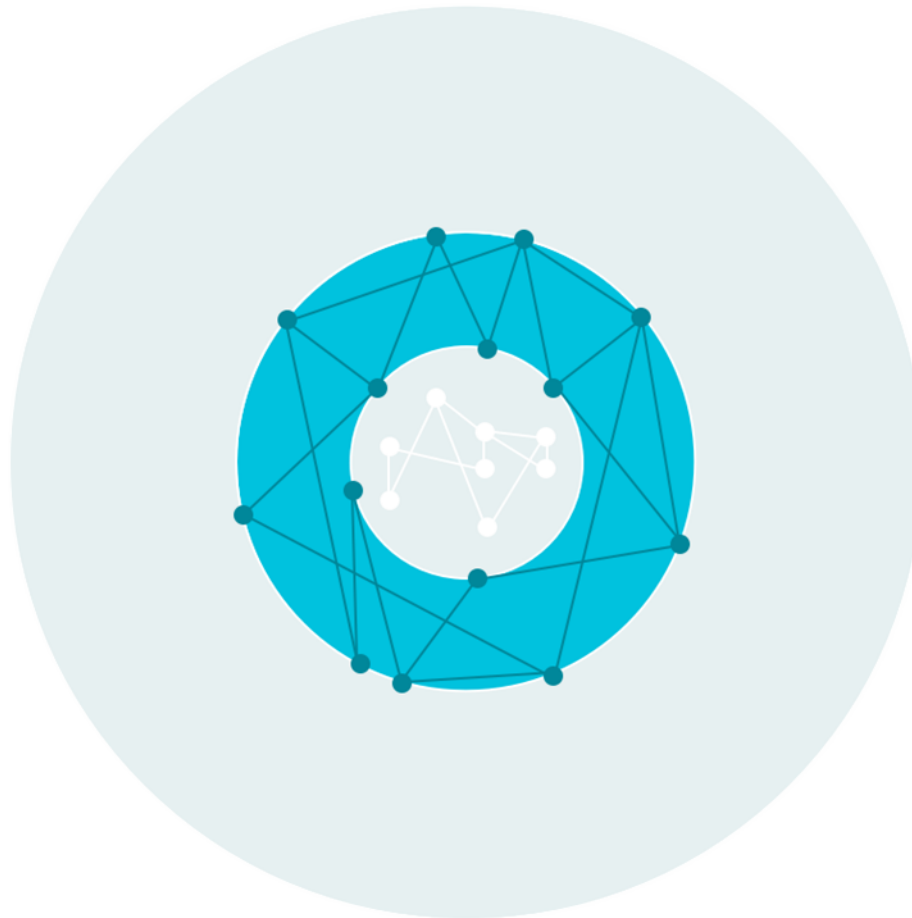


Source: <https://peering.google.com/#/infrastructure>

Core Data Center

- Mega-sized data centers providing **massive compute and storage resources**
- Located strategically where **capacity is abundant**, and operating cost and risk are low
- Data are normally replicated among sites to provide the needed resilience
- Supported by **high-capacity, low-latency fiber backbone** with diversity

Anatomy of Hyperscale Cloud Service Providers

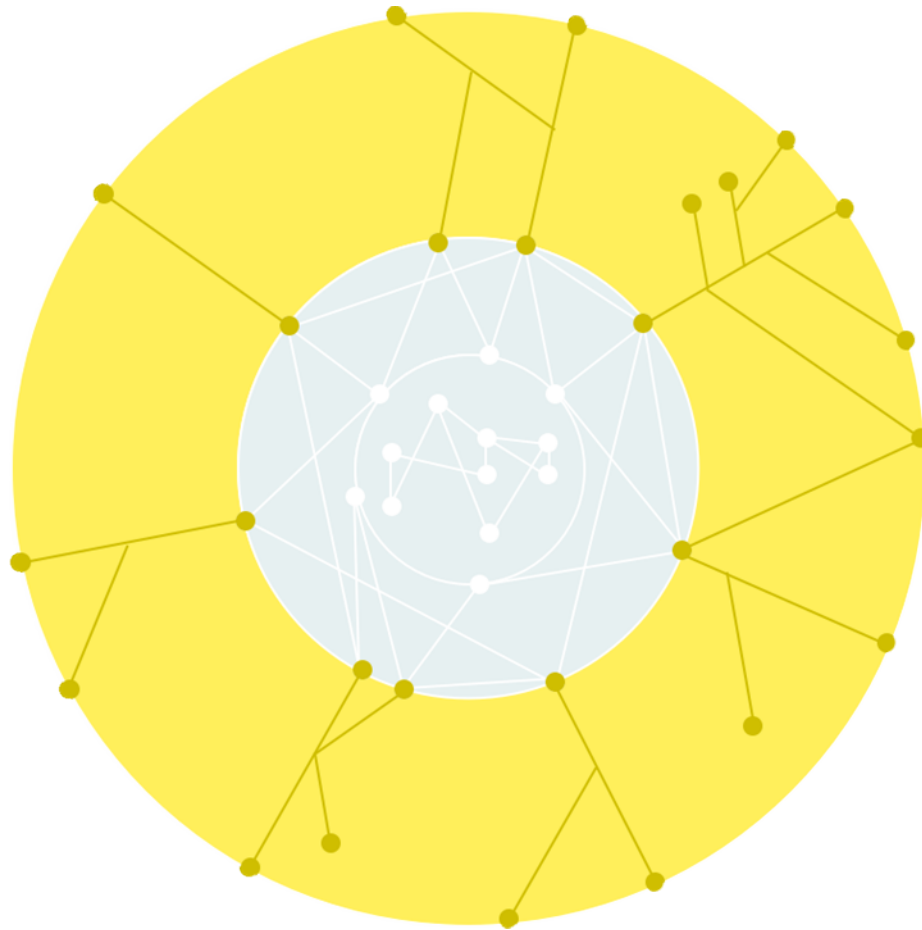


Source: <https://peering.google.com/#/infrastructure>

Edge Point of Presence (Network Node)

- **Network nodes** or **Points of Presence (PoP)** connecting the core data centers to the rest of the Internet
- **Peering** with **NSP, ISP, IXP, etc.** via cross-connects
- Mostly located in **network-dense, carrier-neutral data centers** in major cities with connection to submarine cables (e.g. MEGA-I in HK)
- **Direct connection** to end customers to provide fast, secure and reliable access without going through the public Internet

Anatomy of Hyperscale Cloud Service Providers



Source: <https://peering.google.com/#/infrastructure>

Edge Node

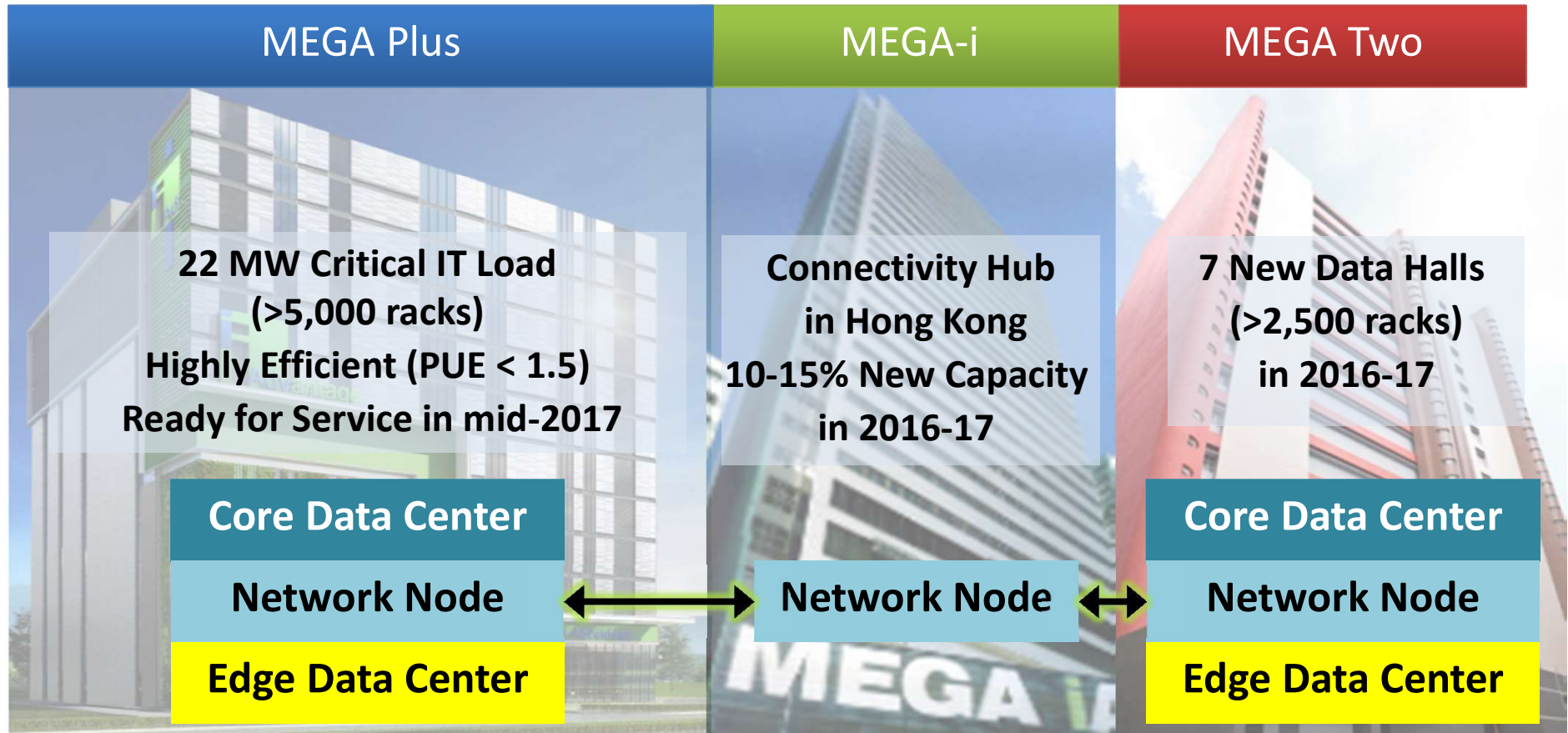
(Edge Data Center or CDN Node)

- Infrastructure closest to the end users, and with good connectivity to **local ISPs** and **mobile operators**
- Housing cache or edge servers for **Content Delivery Network (CDN)** and other distributed services (e.g. IoT).
- Examples: AWS CloudFront, Azure CDN (via Akamai and Verizon)

Capacity and Connectivity Requirements

Facility	Capacity Requirements	Connectivity Requirements
Core Data Centers	<ul style="list-style-type: none"> • Self-owned or long-term leased, multi-MW facilities • Support of high power density racks • Energy efficient (low PUE) 	<ul style="list-style-type: none"> • Low-latency dark fibers • Connectivity to backhauls and submarine cables • Connectivity to Network Nodes
Network Nodes	<ul style="list-style-type: none"> • Network dense, carrier neutral colocation facilities 	<ul style="list-style-type: none"> • Presence of all major carriers • Ecosystem of an active peering community of carriers, ISP, OTT, etc. • Meet-me facilities and pre-laid structured cables for fast setup of cross-connects
Edge Data Centers	<ul style="list-style-type: none"> • Readily available cages or data halls • Support of high power density racks 	<ul style="list-style-type: none"> • Connectivity to local ISP and mobile operators • Connectivity to Network Nodes

Our Cloud Age MEGA Data Centers



Thank You!

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