DATA CENTER CLOUD TRENDS IN ASIA
WHO WE ARE

Established 2002

Data Center / Cloud Consulting –
Commercial due diligence - M&A, IPOs, financial analysis
Market entry, competitive analysis, market data, vertical opportunities, positioning and strategy
Emerging markets research and evaluation
Strategic advice for regional governments, telcos

Publishing –
Market reports and studies
CMQ – Colocation Markets Quarterly
www.data-economy.com

Events –
Datacloud conferences – Oslo, Monaco, Dublin, Singapore
Finance & Investment Forum – London, Sydney, Hong Kong
Conferences: Singapore, KL. Johor, Shanghai, Hong Kong & Sydney

Consulting Customers include:
Data Centers Global %

- APAC: 3%
- EMEA: 15%
- N AMERICA: 59%
- LATAM: 23%

Source: BroadGroup Consulting
WHY IS THERE SO MUCH OPTIMISM ABOUT DEMAND?

Source: Cisco Global Cloud Index 2015-2020

Zettabyte also equates to 250 billion dvds worth of information
NOT JUST THE SCALE, BUT THE DIVERSITY AND GROWTH

77.6 million page views per minute
Source: Akamai
NOT JUST THE SCALE, BUT THE DIVERSITY AND GROWTH

Video Views per day (billion)

- **Facebook**: 75% via Mobile

Source: Facebook/KPCB/Forbes
GROWTH DRIVERS THAT MATTER

Mobile – 5G, growth of mobile data, **55% of all mobile traffic is video** - Source: KPCB

Virtual Reality, Artificial Intelligence

Enterprise increased use of outsourcing – does it make sense to build a large, in-house data center? continued outsourcing parts of IT to data centers, re-evaluation of space requirements

Co-location trend - moving from ‘carrier hotel’ to ‘cloud hotel’

Analytics - "Big Data" new vertical growth market (eg Retailers/mobile ad targets)

Content/Media - Eg: Netflix streaming (35% all US internet traffic) and Xfinity (TV) on-demand services

Cloud – now representing significant percentages of revenues in some data center businesses

Social Media – driving huge storage requirements video/photo/user generated content

Specific vertical market factors – eg: life sciences and auto industries
**GROWTH DRIVERS: OUTSOURCING**

**Increased complexity** in running in-house Data Center— and recruitment of personnel to manage, sourcing power etc

**Large upfront costs** to construct – especially high spec facilities

**Not a core competency** - owning and managing data centres are not core competencies for many organisations – need to focus on business

**Organisation needs can change and grow quickly** - and third party providers are able to provide flexible, on-demand, agile infrastructure at scale

**Growing data centre compliance** - and regulatory requirements especially data privacy, environmental legislation

+ Potential in-country growth following EU decision on Safe Harbor

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**Projected Increase in Outsourcing (%)**

<table>
<thead>
<tr>
<th>Region</th>
<th>2013</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Pacific</td>
<td>12.1</td>
<td>38.5</td>
</tr>
<tr>
<td>W Europe</td>
<td>21.1</td>
<td>42.3</td>
</tr>
<tr>
<td>USA</td>
<td>29.4</td>
<td>52.5</td>
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Source: BroadGroup Consulting
7-year process of transition from a data center-based infrastructure model to one cloud

Netflix today has 8x more customers using its video streaming service than in 2008, when started using AWS

Now in more than 130 countries – use AWS

Operating costs found to be less – mainly because of flexibility to adjust capacity used
Toyota – building Big Data Center (TBDC): Toyota Smart Center

Hyundai – building big data hub in Guian New Area [Guizhou Province] linked to its domestic Big Data Center in Uiwang, South Korea.

Eg: provide an emergency notification when an airbag is deployed during a traffic accident.

25Gb per hour
A lot of hype - many industry predictions:

- 50 billion “devices” connected by 2020 – about 10 billion of them in Asia
- IoT generated data – cars, homes, security, wearables, city installations, etc.
- IoT US$10-20 trillion market by 2020 (Source: KPCB)

Main point here – how will IoT impact the data center?

- Increased workloads
- Security, capacity, analytics challenges
- Any centralization of IT use in the enterprise will need to be processed by the data center
- In turn will impact bandwidth
- Data will be bursty or “chatty”

Trends like augmented reality, the Internet of Things and with more organisations shifting to hybrid cloud models are driving the demand for reliable and robust data center infrastructure.
<table>
<thead>
<tr>
<th>Business Model</th>
<th>Number of 3rd party Data Centers</th>
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<tbody>
<tr>
<td>Hyperscales</td>
<td>297</td>
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<tr>
<td>REITs</td>
<td>&gt;300</td>
</tr>
<tr>
<td>Colocation</td>
<td>&gt;2k</td>
</tr>
<tr>
<td>Telcos</td>
<td>&gt;3k</td>
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**GLOBAL CONTEXT – DIFFERENT BUSINESS MODELS**
Both Equinix and Digital Realty in the S&P500 Index

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<th>Data Centers</th>
<th>Cities/Markets</th>
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REITs that own and operate data centers have risen more than the S&P Index this year

Percentage change to Sept 7 2016 – Source: Bloomberg
CoreSite Realty Corporation, Iron Mountain Inc, Dupont Fabros Technologies, CyrusOne Inc, Digital Realty, Equinix, QTS Realty Trust Inc
## Market Cap

### Data Center REIT Market Cap (US$ B)

- QTS Realty Trust Inc
- Dupont Fabros Technologies
- CoreSite Realty Corporation
- CyrusOne Inc
- Iron Mountain Inc
- Digital Realty
- Equinix

Market Cap at 26 October 2016 – Source: Yahoo! Finance
How important are Hyperscales:

By end 2016:

- 24 hyperscale operators
- 297 data centers
- North America 51%
- Asia Pacific 29%
- Western Europe 17%
- Latin America 3%

Criteria for a Hyperscale could include:

- More than US$1 billion in annual revenue from infrastructure as a service (IaaS), platform as a service (PaaS), or infrastructure hosting services (for example, Amazon/AWS, Rackspace, Google)
- More than US$2 billion in annual revenue from software as a service (SaaS) (for example, Salesforce, ADP, Google)
- More than US$4 billion in annual revenue from Internet, search, and social networking (for example, Facebook, Yahoo!, Apple)
- More than US$8 billion in annual revenue from e-commerce/payment processing (for example, Amazon, Alibaba, eBay)
After North America, Asia gains lion’s share of hyperscale data center build: around 70 data centers from now to 2020

Source: Cisco Global Cloud Index 2015-2020
GROWTH: HYPERSCALES – ARGUMENTS FOR CAUTION

How good and for how long?

Pricing

Flexibility

Terms

Move to edge/Tier 2 locations

Move to emerging markets

Move to control spend

Move to in-house?
• Customer
• Partner
• Competitor
Players across the region establishing their own international data center portfolios

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<th>Company</th>
<th>Home base</th>
<th>Data Center expansion 2016</th>
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<td>Keppel Data Centers Holding</td>
<td>Singapore</td>
<td>Frankfurt: 40% of 20k sqm, 4.8 MW dc</td>
</tr>
<tr>
<td>Keppel DC REIT (public)</td>
<td>Singapore</td>
<td>Milan: 15.3k m2 for €37.3m**</td>
</tr>
<tr>
<td>PCCW and KDCH/Keppel T&amp;T</td>
<td>HK/Singapore</td>
<td>JV: International Carrier Exchange (HK) Colocated with POP new Asia-Africa-Europe-1 (AAE-1) submarine cable (25k metre cable Asia-MEA-Europe due 4Q16)</td>
</tr>
<tr>
<td>Keppel DC REIT (public)</td>
<td>Singapore</td>
<td>Acquired Intellicentre 2 in Sydney from Macquarie (2/2016) A$45.2m</td>
</tr>
<tr>
<td>Keppel T&amp;T</td>
<td>Singapore</td>
<td>DC4 – 18.3k m2 under construction Singapore; 25% dc space committed</td>
</tr>
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*excluding maincubes Data Center which is under construction by the vendor in Germany and slated for completion in 2018

**Italy CAGR 15% from 2016 to 2020; demand growth outstrip supply growth (source BroadGroup Consulting)
Alibaba deploying IT assets globally

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<td>Alibaba/Alicloud</td>
<td>PR of China</td>
<td>Has data centers in Hong Kong, Singapore and USA</td>
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<td>Plans data centers in Japan, Europe, Australia, Middle East by year end</td>
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<tr>
<td>Alibaba</td>
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<td>Assessed Ireland for new build (€5m per MW of capacity to build data center)</td>
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<td>Alibaba</td>
<td>PR of China</td>
<td>Plans to open a data center in India this year</td>
</tr>
<tr>
<td>Alibaba</td>
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<td>Launched 2 self build/self designed data centers in Zhangbei County in Zhangjiakou – Hebei Province (part of going north strategy)</td>
</tr>
</tbody>
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Looking for 1.2b more customers outside of China.
August - 20% stake in Thailand’s Ascend Money, an e-payment firm
Expansion of its data center footprint is critical for its globalization plans
### ST Telemedia

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<td>ST Telemedia</td>
<td>Singapore</td>
<td>Acquired 40% stake in GDS China (now IPO)</td>
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<td>ST Telemedia</td>
<td>Singapore</td>
<td>Acquired 49% Virtus Data Centres UK (price not disclosed)</td>
</tr>
<tr>
<td>ST Telemedia</td>
<td>Singapore</td>
<td>Acquired 74% of Tata Telecoms (44 data centers) ? USD675m</td>
</tr>
<tr>
<td>ST Telemedia</td>
<td>Singapore</td>
<td>JV with StarHub Singapore - USD28m for 70% stake in Shine Systems Assets (SSAPL), which holds the MediaHub data center</td>
</tr>
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INTER-ASIA AND INTERNATIONAL EXPANSION TREND

**NTT acquisition stake in e-Shelter GmbH**
Transaction value US$830m (86.7% of company)

**CenturyLink disposal of data centers**
Sells to consortium BC Partners and Medina Capital Advisors, Longview Asset Management (1Q17)
(57 data centers) US$2.5 billion cash + US$150m minority
Stake in consortium global infrastructure company
Top 10 Players in South East Asia – m2 space at end of 2017

Source: South East Asia Data Centers 6: BroadGroup
ASIA m2 capacity increases from 1.2m to >2m across forecast period

Source: BroadGroup Consulting
11 countries – Australia, New Zealand, Indonesia, Singapore, Thailand, Malaysia, Hong Kong, Philippines, Japan, Taiwan, South Korea
ASIA colocation market value increases from ~US$6bn to ~US$10.8bn by 2020

Source: BroadGroup Consulting
SUMMARY

Key drivers mobile, video, IoT present in Asia

Government investment agencies, and local demand

Telco data centers still dominant

Hyperscale investment in region will bring possibly another 70 large scale facilities

Investment being sustained in expansion and growth with Keppel, ST Telemedia in particular

Singapore maintains lead (size) but expect Indonesia to evidence further growth

China - GDS listing, 21Vianet partnership with Warburg, Chayora – demonstrates changing structures underway

Cloud service expansion will bring regional competition (Alibaba, AWS, Microsoft....)

Expect some consolidation but M&A may not be as large as thought

Future prospects for each data center operator relates to business models selected
Data center providers need to be aware of the impact and opportunities around

- 5G
- Virtual Reality
- Artificial Intelligence
- Niche verticals

Adapt and incorporate to expand your market

For Cloud fundamentally changes not just technology but business models, channels and procurement
THANK YOU AND KEEP IN TOUCH WITH US

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