# *Surfing the data wave*
# The surge in Asia Pacific's data centre market

pwc

# Contents

# *Foreword*

This is a period of rapid growth in demand for data centre services in Asia Pacific.

Our way of life is changing. More people are connected throughout the region, with an expected smartphone penetration of 66% by 2020. Coupled with the proliferation of rich media and digital solutions, the increased digital connectivity subsequently results in a sharp growth in the amount of data generated, consumed, stored and transferred.

Driven by economic factors (e.g. data transfer, labour and electricity costs), regulatory framework, and efforts to enhance consumer experience (by reducing latency), more businesses are storing their data locally.

As such, we believe significant investment opportunities lie ahead in the Asia Pacific data centre space.

That being said, there are a number of aspects to consider before investing in the market. Among the key questions investors need to ask are which market offer the most promising growth opportunities and returns, as well as where to play in the value chain?

Other aspects that have to be factored in include the level of maturity of the market and the current status of supply. Take for example the pipeline of greenfield data centre projects in Singapore, which is already high, and therefore we observe some overcapacity in the short term. In the meantime, looking at the digital growth and penetration opportunities within Asia Pacific, we remain positive that regional demand for data storage will continue to rise exponentially.

In this paper, we provide an overview of Asia Pacific's data centre services market outlook, the key growth drivers, and strategic factors to consider before making an investment decision.

## *Methodology*
Our comments and analyses are based on data provided by industry recognised sources, as well as insight from our subject matter experts. We supplemented these findings with independent research and triangulated them to provide a holistic view of the topic. Furthermore, we have also included case studies, where relevant, to illustrate the trends we observed.

# 1  *Significant demand for data centre services in Asia Pacific*
*Did you know that...*

Asia Pacific's data centre services market size will exceed the European market size by 2021

The region's data centre services market size in 2016 is **US$12 bn** and is expected to grow by **27%** per annum (p.a.)

Japan is the largest data centre services market in Asia Pacific

Its data centre services market size in 2015 is c. **US$6 bn**, which is **>2x** the next largest market in Asia Pacific

Indonesia is expected to be the fastest growing data centre services market in the region

Its data centre services market expects a **35% compound annual growth rate (CAGR)**

China's data centre services market is expected to experience the fastest absolute growth in the region

**US$1.2 bn** is the expected average absolute growth p.a. of China's data centre market between 2015 and 2022

## Overtaking Europe by 2021

While Asia Pacific's data centre services market is currently behind that of Europe and North America, it is forecasted to catch up with the European market by 2021, driven by a faster growth rate of 27% p.a. compared to Europe (13%) and North America (12%).

**Figure 1: Regional data centre services market growth rate, 2016 -2021**
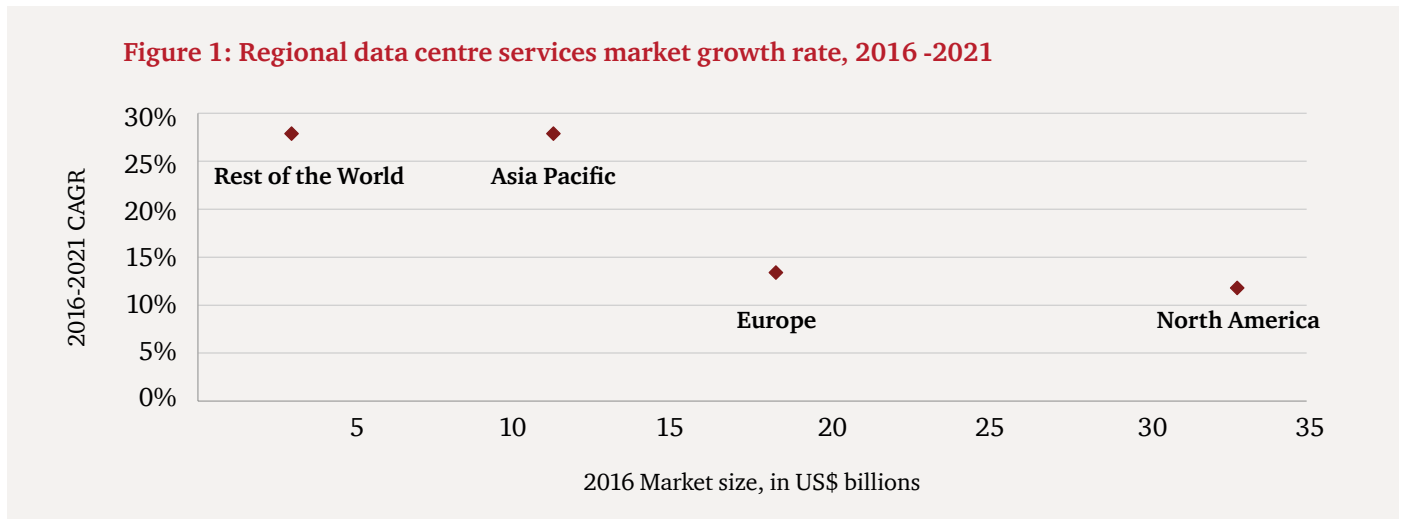


Source: Markets and Markets 2016

## Four drivers of Asia Pacific's data centre services market growth

### 1.  Surge in local data consumption

**Figure 2: Data consumption in select Asia Pacific countries**
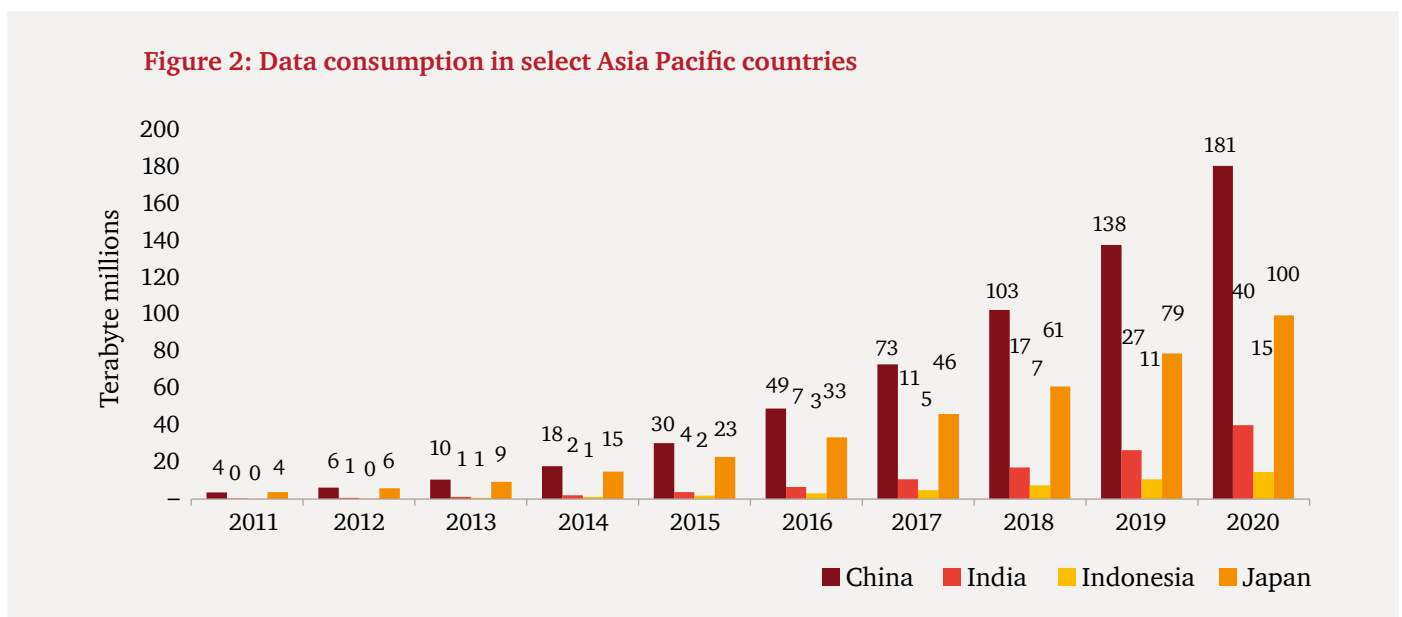


Source: PwC Global Entertainment & Media Outlook 2016-20

Growth in Asia Pacific's data consumption is forecast to be 30-60% p.a. between 2015 and 2020 (Figure 2). Even developed economies in the region, such as Japan, are expected to experience 30-40% growth per annum. Such growth will be driven by increased take-up of digital technologies among consumers as well as businesses, as illustrated in Figure 3. Simply put, more data will be digitally generated, exchanged, and stored moving forward.

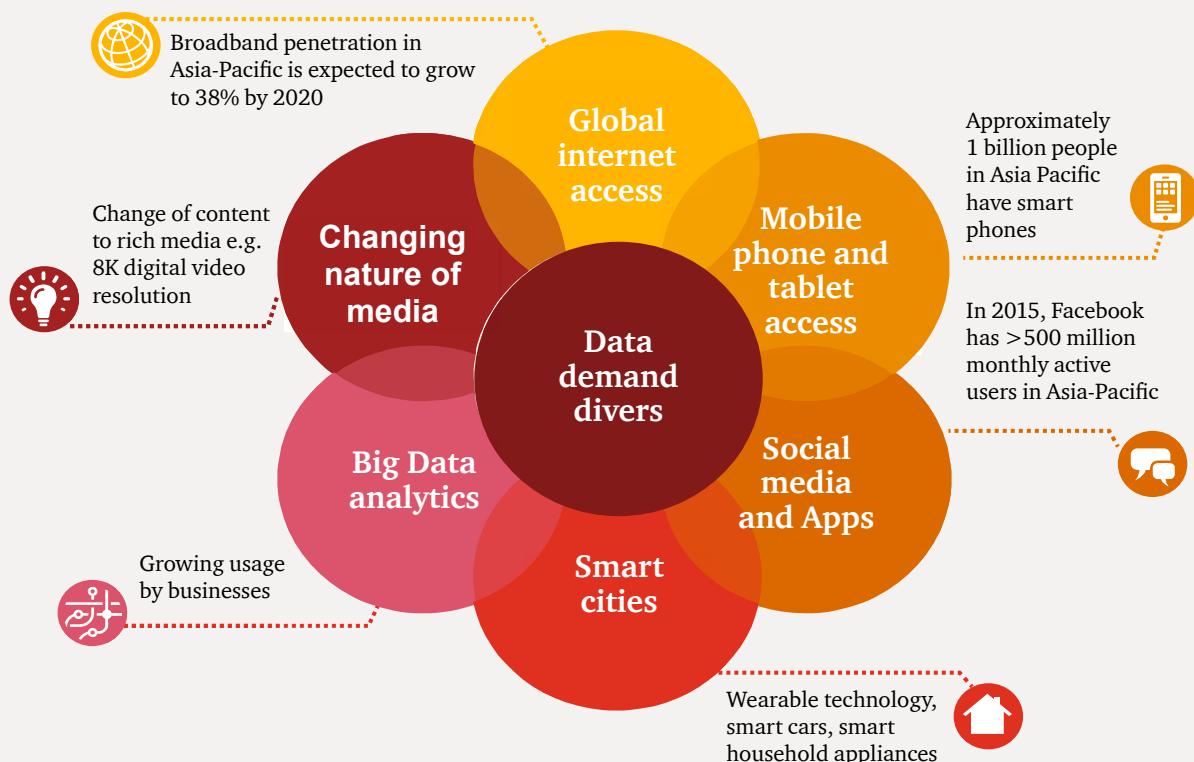The average broadband penetration in Asia Pacific is expected to reach 38% by 2020 compared to 33% in 2015[1]. More importantly, on average, smartphone penetration is expected to grow from 43% to 66% in the region between 2015 and 2020, driven by increased penetration in markets such as India and Vietnam[2]. Higher take-up of smartphones is thus indicative of a shift towards a digitally connected consumer lifestyle, where social media activities, usage of rich media and mobile applications is expected to proliferate; this translates to an increase in data consumption.

Because of this trend, businesses are progressively turning to data analytics to identify key consumer behaviours and preferences in order to enhance strategic decision making, and better target their clients. A survey of over 250 senior executives in China between 2014 and 2016 indicated that 56% of businesses expect to rely more on machine algorithms compared to human judgement over the next five years[3].

Additionally, growth in data consumption is also in part powered by government initiatives (i.e. smart cities) to build and/or elevate their country's digital ecosystem. All of this increase in data generation and consumption will ultimately drive the demand for data storage and servers.

**Figure 3: Key data consumption drivers**



Broadband penetration in Asia-Pacific is expected to grow to 38% by 2020

Change of content to rich media e.g. 8K digital video resolution

Growing usage by businesses

Approximately 1 billion people in Asia Pacific have smart phones

In 2015, Facebook has >500 million monthly active users in Asia-Pacific

Wearable technology, smart cars, smart household appliances

Global internet access

Mobile phone and tablet access

Changing nature of media

Data demand divers

Social media and Apps

Big Data analytics

Smart cities

Source: Statista, PwC Entertainment & Media Outlook 2016-2020, Wall Street Journal

1  PwC Global Entertainment & Media Outlook 2016-2020
2  PwC Global Entertainment & Media Outlook 2016-2020
3  Big Decisions 2.0: How corporate decision making is changing in China

## 2. Corporate clients' growing inclination to outsource data centre services

**Figure 4: Proportion of data centres outsourced (%)**
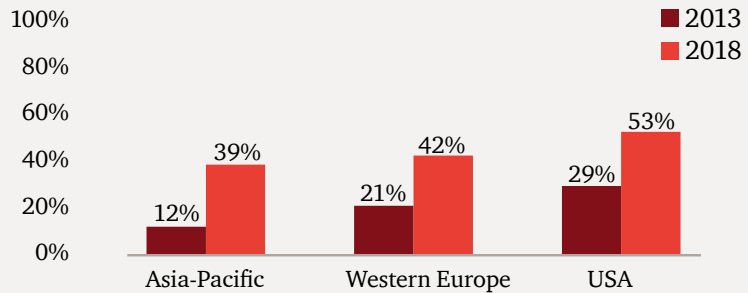


Source: BroadGroup

Data centres have historically been predominantly held in-house. Around 5% of companies in less sophisticated markets such as Indonesia outsource data centre floor space, while this number increases to 25% in more mature markets such as Singapore. However, this is expected to change as outsourcing becomes a more popular option driven by the following benefits:

• Flexibility in terms of capacity required (e.g. space, number of servers, etc)
• Lower upfront costs (as the infrastructure capex is incurred by the data centre owner)

Looking at industry verticals, it is likely that financial institutions will be a key consumer group for outsourced data centre services going forward. For example, DBS Bank contracted Amazon Web Services (AWS) in June 2016 to use its cloud services in part due to its flexibility to rapidly scale the capacity of its computing grid without needing to make provisions for permanent overcapacity[4].

## 3. Global content providers are embracing a more regional hosting strategy

### Case study: Netflix

The case of Netflix illustrates the trend towards the decentralisation of data centres. Netflix decided to opt for local caching through third-party servers (i.e. Amazon Web Services) in which content is disseminated from the US to local storage systems and refreshed every day.

Global content providers such as Google, Amazon and Netflix are increasingly opting for a decentralised content hosting strategy, which aims to reduce latency issues and ultimately enhance user experience, despite potentially incurring higher data centre costs. As a result, data centres operated by global content providers are mushrooming in strategic locations around the globe.

Overcoming latency is a major driver for this strategic approach. Given the growing number of end-users in Asia Pacific, it will be a strategic move for content providers to locate data centres that are closer to these end-users across the region.

**Figure 5: Latency Statistics (Jul-16), ms**
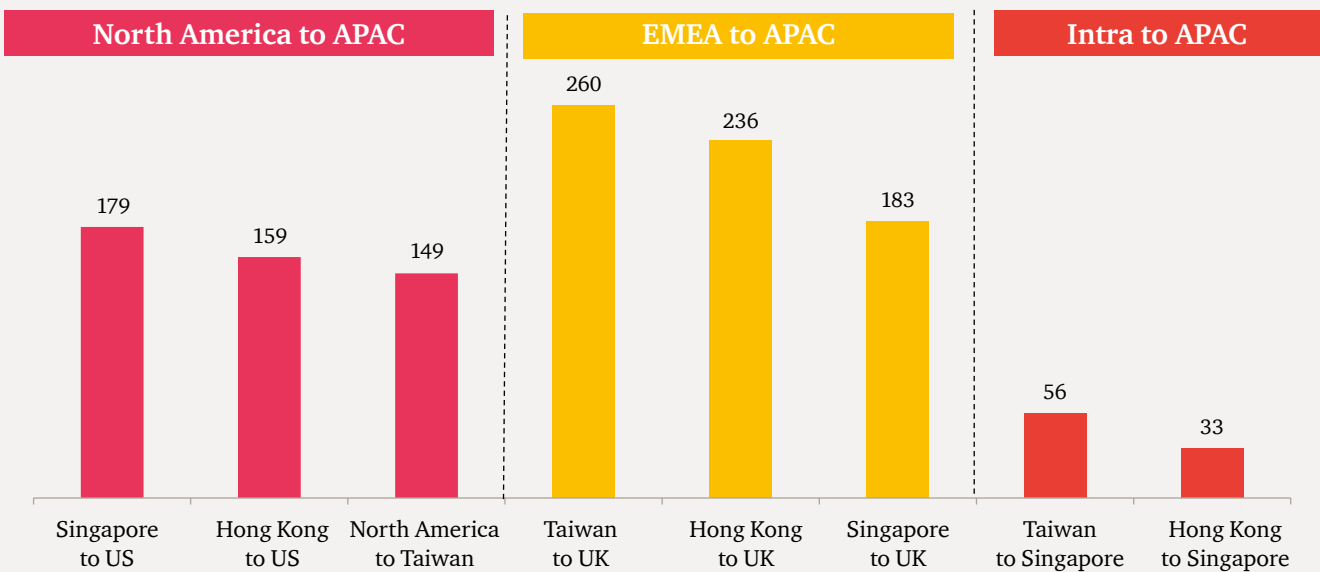


Source: Verizon Enterprise Solutions

As a result of data centres being decentralised into the various regions, inter-regional data traffic is growing and shifting, with more and more traffic coming to and out of Asia. For example, the Trans-Pacific international bandwidth is now almost as high as the Trans-Atlantic one (Figure 6).

**Figure 6: Change in international internet bandwidth between 2004 and 2014, Tbps**

International Internet Bandwidth (2004), Tbps
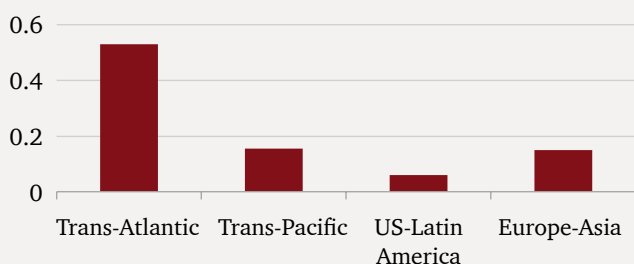
International Internet Bandwidth (2014), Tbps
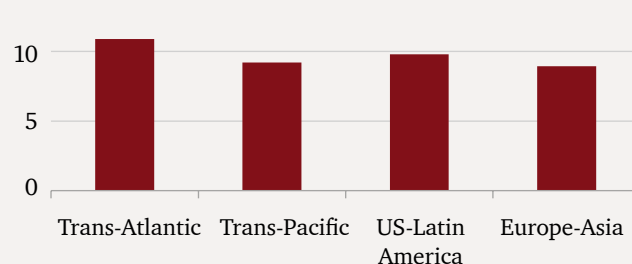
Source: Telegeography 2015

*"We now have Open Connect Appliances in close to 1,000 separate locations around the world. In big cities like New York, Paris, London, Hong Kong, and Tokyo, as well as more remote locations – as far north as Greenland and Tromsø, Norway and as far south as Puerto Montt, Chile, and Hobart, Tasmania."*

*Ken Florance*
Vice President of Content Delivery at Netflix[5]

## 4. Impact of recent government regulations

Aside from data consumption trends and technologies, government regulations have been playing a role in shaping the data centre services market, more often with the intention to safeguard their business environment's cybersecurity and privacy. The three case studies below highlights how regulatory requirements are prompting businesses in Asia Pacific to store their data locally.

**Case study 1:
Indonesia's banking industry regulation**

- Government regulation in Indonesia stipulates that customer data of Indonesian banks must be stored domestically by October 2017

- This has inevitably driven demand for data centres from the financial services sector, which is now the largest consumer group (c. 30% market share of the data centre services market)

- As a result, operators have begun increasing their investment in Indonesia's data centre market. For example, Equinix and DCI Indonesia doubled their capacity from 400 to 800 cabinets at its JK1 data centre in Jakarta

*"Market demand from the cloud and financial sectors for world-class data center services [in Indonesia] is flourishing (Equinix, 2016)"*

**Case study 2:
Singapore's Personal Data Protection Act (PDPA)**

- Singapore's Personal Data Protection Act (PDPA) prohibits the transfer of personal data outside of Singapore, unless the overseas company gives assurance that it will comply with the country's PDPA regulations

- There are restrictions/ limitations to outbound data transfer. For example, it is only permitted when consent has been provided by the relevant individuals

- However, it will be interesting to see how this regulation reconcile with sector-specific regulations (eg. from the Monetary Authority of Singapore) which states that encrypted data can be stored overseas.

**Case study 3:
China's five-year plan**

- Back in 2011, the Chinese government included their initiative to develop the country's cloud computing capabilities in their five-year plan, which has been extended into their current five year plan (2016-2021)

- Apart from setting up cloud computing zones and exhibitions, some municipal governments also provided tax breaks and incentives, amongst other initiatives, to promote the construction of data centres

- This has led to the boom in China's data centre services market, which is expected to have the largest absolute growth per annum in APAC going forward

Source: MAS, Frost & Sullivan 2016, MOST, PwC: What China plans to do in 2016 and the next five years

## As a result we foresee investment opportunities in Asia Pacific's data centre market

Historically, the upsurge of demand for data centres has outstripped supply in Asia Pacific, leading to increasing utilisation rates within established data centre markets

### Figure 7: Demand for data centre services in Singapore

Singapore data centre demand, sqft

Singapore data centre utilisation, %
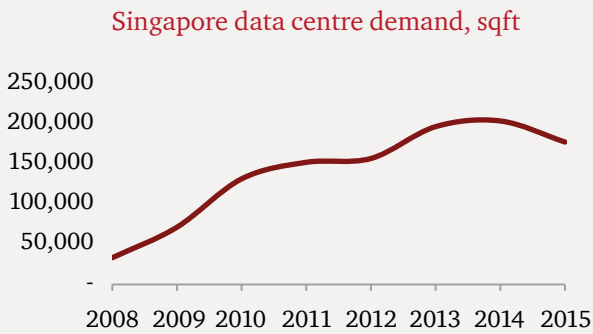
Source: Cushman & Wakefield
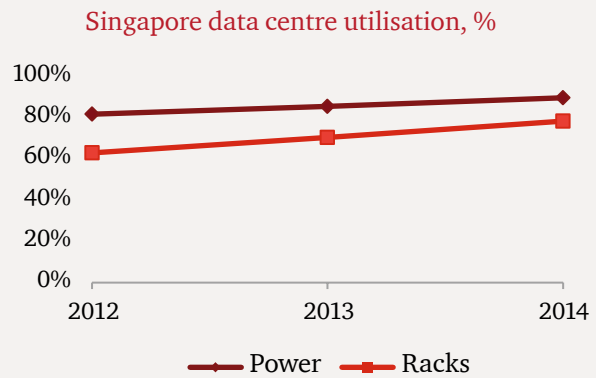
Source: Structure Research, Cushman & Wakefield

### Figure 8: Recently opened data centre facilities in Singapore (2016)

| Operator | IT Load Capacity (MW) |
|---|---|
| ST Telemedia/Starhub | 14 |
| DRT Loyang | 13.2 |
| 1-NET | 12 |
| Telin | 12 |
| **Total** | **51.2** |

Anecdotally, Singtel and Keppel T20 are expected to open new data centre facilities this year, bringing an additional 50MW in IT load capacity.

Source: Cushman & Wakefield, Channel NewsAsia, Telin

While the increase in capacity may cause an oversupply in certain markets in the short term, we are confident that demand for more data centre services will continue to grow followed by the need for additional capacity in the medium term. This is in part due to supply of data centre services has yet to catch up with emerging demand in some markets within Asia Pacific. Take Indonesia for example, in addition to its financial institutions, its manufacturing and transportation companies will also gradually increase their demand for data centre services as they start to adopt more information and communication technology (ICT) applications/solutions[6].

6  Data Centers: What to Do in the Face of Public Cloud (DBS)

# Know the market: Key factors to consider before investing

There are a number of considerations that needs to be taken into account when making investment decisions in the data centre services market, such as local dynamics, competitive landscape, value chain positioning, etc.

The Global Information Technology Report 2016 by World Economic Forum is a good indicator of ICT maturity, as it assesses several aspects of the ICT network readiness. For the purpose of this benchmarking analysis, we have selected a few key parameters that are integral to data centre operations.

## Local dynamics

**Figure 9: Network readiness index of selected economies (2016)**
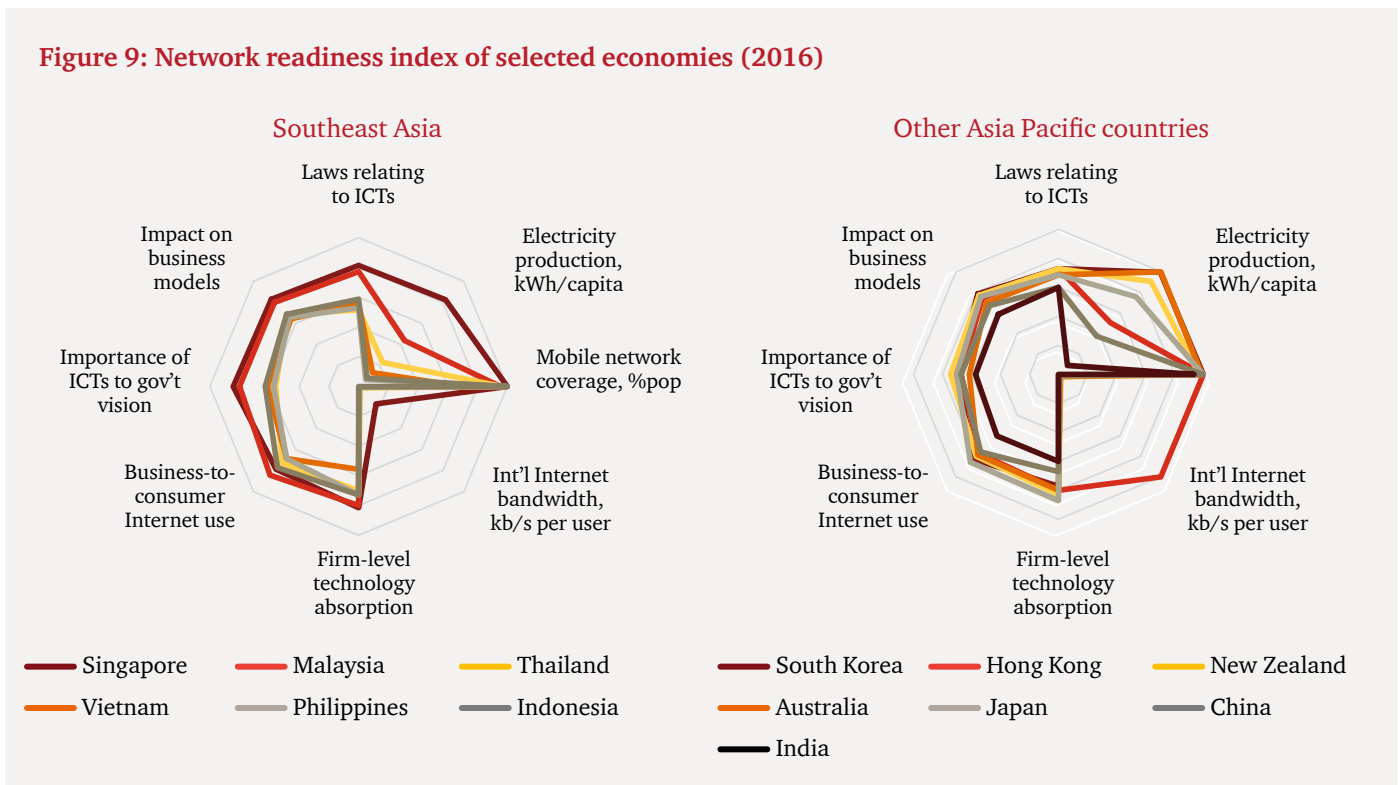


Source: World Economic Forum 2016

Singapore and Malaysia dominate in most indices when compared to other Southeast Asian market, although Singapore edges out Malaysia on electricity production and international internet bandwidth (Figure 9). However, some other countries in Asia-Pacific, although not true for all, also scored equally or higher on most indices when compared to Singapore. For example, Hong Kong is a clear leader in the region when looking at international internet bandwidth.

Among the key factors data centre players consider when assessing the prospects/attractiveness of a particular market include, but are not limited to):

- Environmental conditions (e.g. seismic and volcanic activity)

- Regulatory factors (e.g. foreign ownership restrictions)

- Political stability

- Macroeconomic conditions

These factors will be critical to determine the most suitable type of data centre to develop. The Singapore market, for example, offers viable conditions to develop green data centres in part due to the Singapore Standard for Green Data Centre introduced by its government. According to the city state's Infocomm Media Development Authority (IMDA), there are already 13 certified green data centres in Singapore.

A strong understanding of customers' requirements and the users' level of sophistication will be important to help developers determine the tier of the data centre best suited for targeted markets. The tiers range from level one to level four, and they reflect the data centre's availability/performance capability (eg. Tier 4 = 99.995% availability).

## *Major players*

Looking at the regional competitive landscape, there is no clear regional leader. Furthermore, competitive dynamics are relatively country specific, despite the presence of global players such as Equinix, Global Switch and NTT.

There are usually one or two strong local players in each market, such as Singtel in Singapore and China Telecom in China.

**Figure 10: Major players in APAC's data centre services market by raised floor space (2015)**
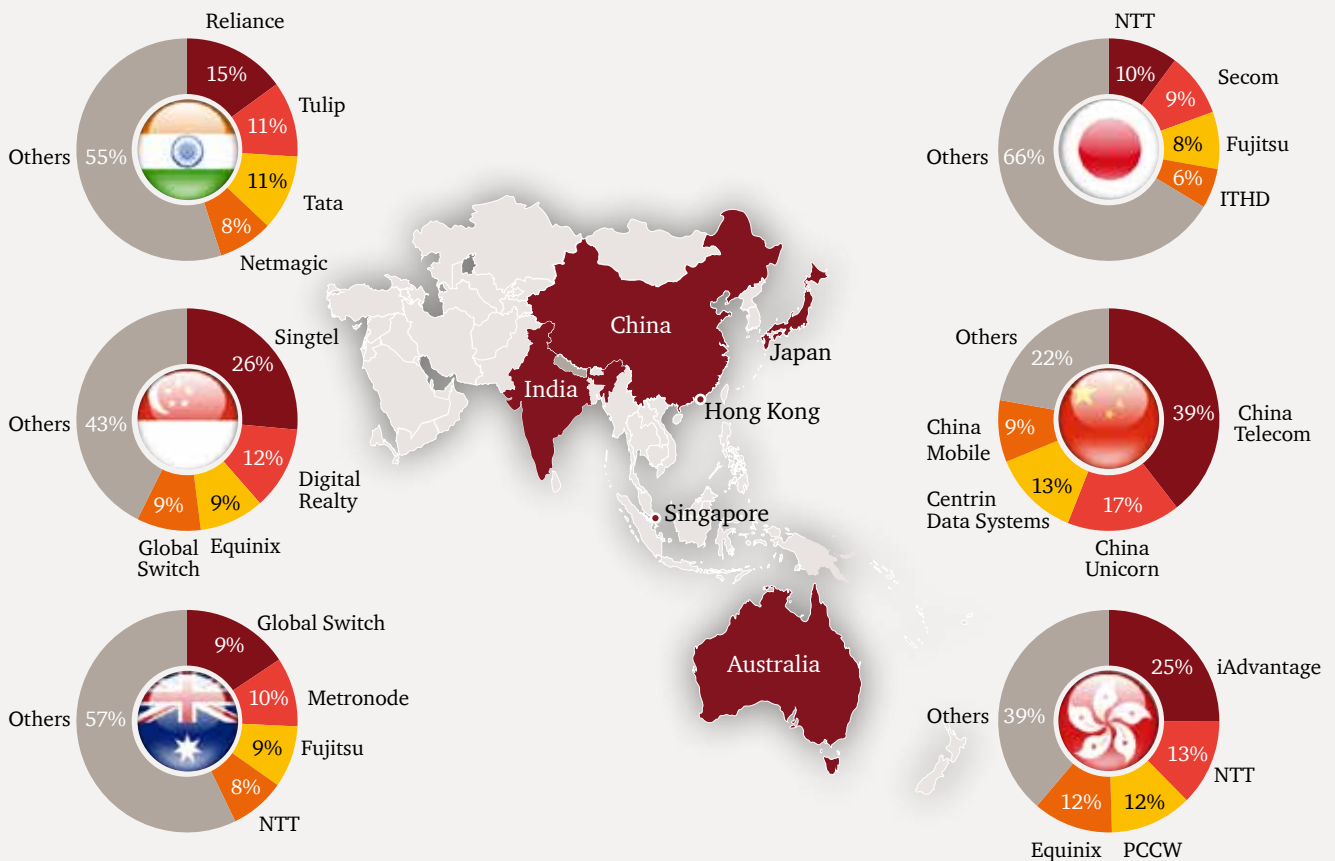


Source: Frost & Sullivan 2016

## *"Where to play" in the value chain?*

Depending on investors' existing set of capabilities, there are various parts in the value chain where they can enter. It is therefore important to take note that each segment of the value chain (Figure 11) has its own attractiveness and dynamics, as well as competition.

**Figure 11: Value chain of the data centre services market**

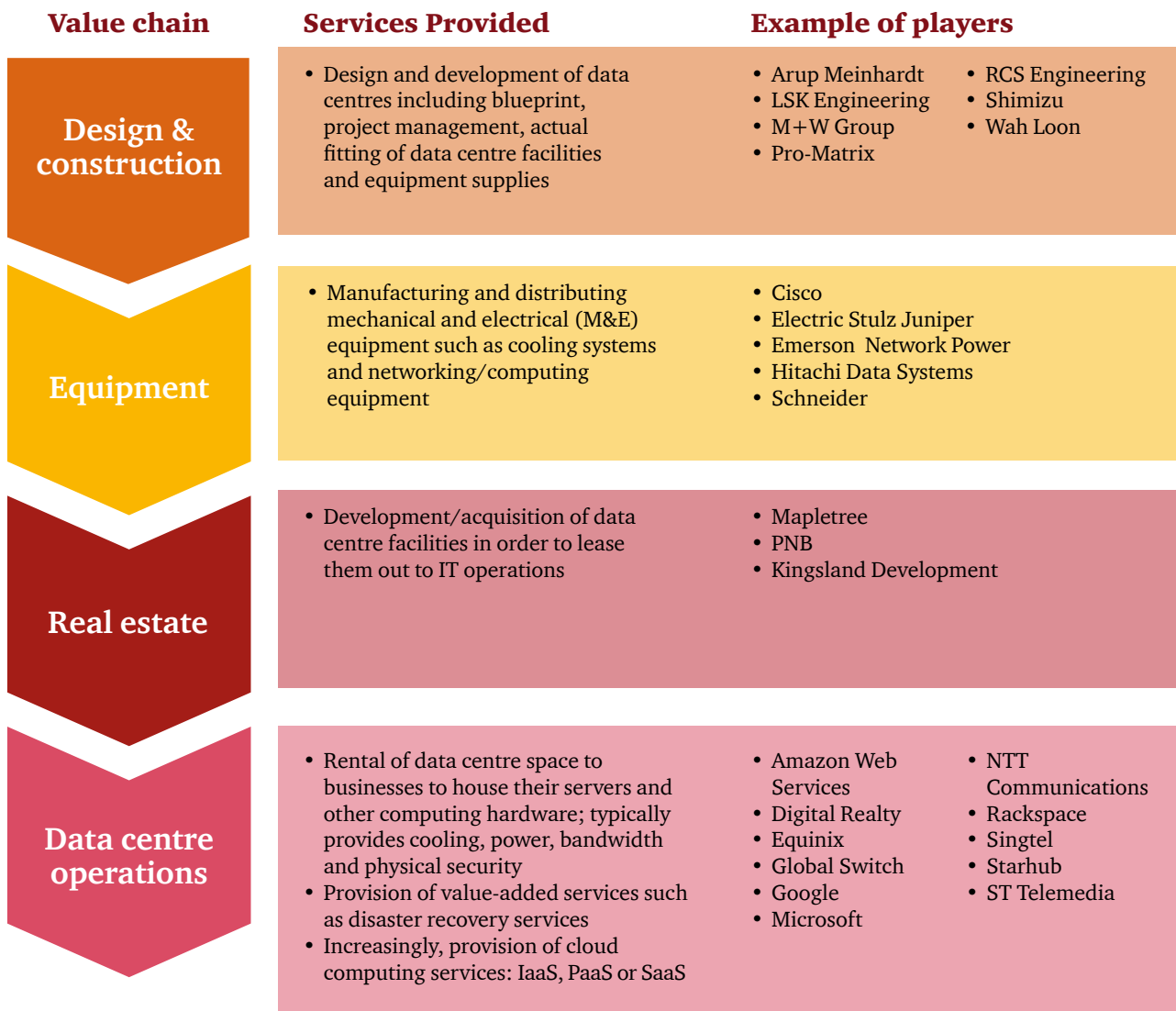| Value chain | Services Provided | Example of players | |
|---|---|---|---|
| **Design & construction** | • Design and development of data centres including blueprint, project management, actual fitting of data centre facilities and equipment supplies | • Arup Meinhardt<br>• LSK Engineering<br>• M+W Group<br>• Pro-Matrix | • RCS Engineering<br>• Shimizu<br>• Wah Loon |
| **Equipment** | • Manufacturing and distributing mechanical and electrical (M&E) equipment such as cooling systems and networking/computing equipment | • Cisco<br>• Electric Stulz Juniper<br>• Emerson Network Power<br>• Hitachi Data Systems<br>• Schneider | |
| **Real estate** | • Development/acquisition of data centre facilities in order to lease them out to IT operations | • Mapletree<br>• PNB<br>• Kingsland Development | |
| **Data centre operations** | • Rental of data centre space to businesses to house their servers and other computing hardware; typically provides cooling, power, bandwidth and physical security<br>• Provision of value-added services such as disaster recovery services<br>• Increasingly, provision of cloud computing services: IaaS, PaaS or SaaS | • Amazon Web Services<br>• Digital Realty<br>• Equinix<br>• Global Switch<br>• Google<br>• Microsoft | • NTT Communications<br>• Rackspace<br>• Singtel<br>• Starhub<br>• ST Telemedia |

We have noted a number of trends impacting this value chain:

### Design & construction

- Players in this field have started to move along the value chain. For example, design & build specialists such as Pro-Matrix are also distributing specialised equipment

- On the other hand, construction companies such as Wah Loon are also backward integrating as they develop their capabilities in the design of facilities
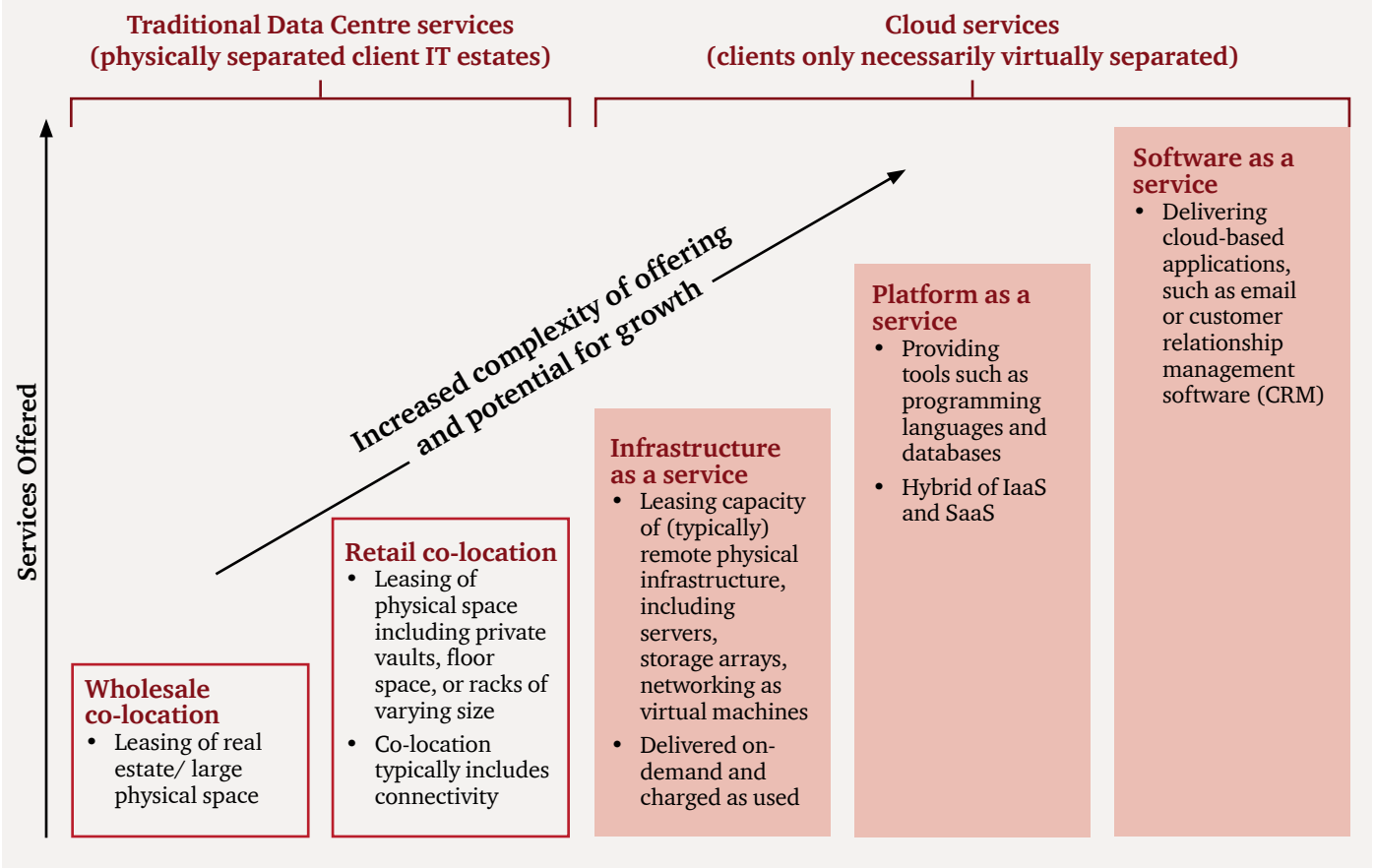
## Real estate

- We observe a growing trend of separation between the ownership and the operation of data centre assets

- Real estate operators are engaging in long-term leasing arrangements (e.g. build and lease or sale and leaseback) with data centre operators to operate on their asset. For example, Mapletree built a development with a total of 385,000 sq. ft in gross floor area for Equinix in 2013; 1-Net and DataCentre One (a joint venture between CitySpring and Shimizu) also have a similar arrangement whereby 1-Net has contracted a long-term lease from DataCentre One

- Going forward, we expect to see more sale and leaseback agreements between data centre operators and real estate players

## Data centre operations

- There's a growing trend to move away from pure wholesale services to offering managed services, as well as value-added and cloud services to customers (Figure 12)

**Figure 12: Evolution of data centre services**

**Traditional Data Centre services (physically separated client IT estates)**

**Cloud services (clients only necessarily virtually separated)**

*Increased complexity of offering and potential for growth*

Services Offered

**Wholesale co-location**
- Leasing of real estate/ large physical space

**Retail co-location**
- Leasing of physical space including private vaults, floor space, or racks of varying size
- Co-location typically includes connectivity

**Infrastructure as a service**
- Leasing capacity of (typically) remote physical infrastructure, including servers, storage arrays, networking as virtual machines
- Delivered on-demand and charged as used

**Platform as a service**
- Providing tools such as programming languages and databases
- Hybrid of IaaS and SaaS

**Software as a service**
- Delivering cloud-based applications, such as email or customer relationship management software (CRM)

## "Which market to play in"?

The trend of moving from pure wholesale services to offered managed services varies between markets as they are at different stages of maturity. For example, the Singapore market is relatively mature and is increasing its offering of cloud services. Meanwhile, other Southeast Asian markets are presently too nascent and still focused on basic co-location services.

*"We are thinking about Cloud services in Malaysia. Indonesia and Vietnam are not mature enough yet."*

Data Centre operator, Malaysia, Vietnam, and Indonesia

*"We are launching Cloud services soon."*

Data Centre Operator, Singapore

*"We have started to offer cloud services to our client a while ago."*

Data Centre Operator, Singapore

Source: PwC Interviews

Cost is also an aspect to consider when contemplating a data centre investment as cost vary widely across the region (Figure 13 and 14), as well as transactional yield – for example, under the current macro environment and market conditions, industrial spaces/property typically generate higher yield than that of office and retail (Figure 15).

## Figure 13: Operating cost of data centres in Southeast Asia (latest available)

| | Singapore | Philippines | Thailand | Indonesia | Malaysia | Vietnam |
|---|---|---|---|---|---|---|
| Average industrial electricity prices US¢/kWh | 20 | 18 | 9 | 8 | 8 | 6 |
| Average data operations manager annual salary, US$ | 84,000 - 102,000 | 35,000 - 55,000 | 33,000 - 50,000 | 40,000 - 51,000 | 25,000 - 30,000 | 25,000 - 50,000 |

Source: Frost & Sullivan, Enerdata

## Figure 14: Rental of industrial sector in Asia Pacific (latest available)

| | Singapore | Tokyo (Japan) | Sydney (Australia) | Melbourne (Australia) | Hong Kong | Beijing (China) | Shanghai (China) |
|---|---|---|---|---|---|---|---|
| Average industrial rental, US$/ sq. ft./month | 2.69[1] | 1.12[2] | 0.67[3] | 0.51[3] | 1.65[3] | 0.46[4] | 0.53[4] |

1 Gross effective rent on NLA
2 Gross on NLA
3 Net on GFA
4 Net effective on GFA
Source: Jones Lang LaSalle Research 2016,Oanda

## Figure 15: Transactional yield (%) in Asia Pacific (latest available)

| Transactional yield ranges (%) | Singapore | Seoul (Korea) | Tokyo (Japan) | Sydney (Australia) | Melbourne (Australia) | Hong Kong | Shanghai & Beijing (China) | Mumbai & Delhi (India) |
|---|---|---|---|---|---|---|---|---|
| Industrial | 6.0 to 7.0 | 6.5 to 7.5 | 4.2 to 5.5 | 5.25 to 7.25 | 5.5 to 7.5 | 3.5 to 3.8 | 5.5 to 6.5 | 10.0 to 1.0 |
| Retail | 4.0 to 5.0 | 4.0 to 5.0 | 2.6 to 3.5 | 4.5 to 7.0 | 4.75 to 7.5 | 2.8 to 3.2 | 3.9 to 5.0 | 9.0 to 11.0 |
| Office | 2.5 to 4.0 | 4.0 to 4.7 | 2.6 to 3.0[1] | 4.9 to 5.75 | 5.25 to 6.5 | 2.5 to 3.0 | 3.6 to 5.0 | 8.5 to 10.5 |

1 Grade A Office
Source: Jones Lang LaSalle Research 2016

## Market entry and expansion approach

There are a number of approaches to enter and expand in Asia Pacific's data centre space. In recent years, we have observed a number of greenfield investments in the region. Tech giants such as Alibaba and Google have begun ramping up their investment in building data centres across the region, such as in Singapore.

**Examples of greenfield investment in Singapore:**

- Digital Realty opened its second data centre in Singapore - 2016

- Alibaba established a data centre - 2015

- Google invested in building its second data centre in Singapore - 2015

- Equinix rolled out the phase 2 expansion of its data centre - 2015

Mergers and acquisitions (M&A) have also been considered as one of the faster expansion approaches (Figure 16). Several global players such as Digital Realty have looked at M&A as a way to grow in the region. We expect M&A activity to ramp up going forward with local/regional players requiring funding to grow and expand.

## Figure 16: Data centre M&A activities within and into Asia Pacific

### Data centre M&A activities within APAC

**2012** Japanese NTT acquired 74% stake in India Net Magic Solutions terms undisclosed

**2013** Japanese NTT acquired 74% stake in Thailand's Digital Port terms undisclosed

**2014** Japanese NTT acquired Singapore's Pro-Matrix Pte Ltd terms undisclosed

Singapore Technologies Telemediaacquired 40% stake in China's GDS Services terms undisclosed

**2015** Singapore Technologies Telemediaacquired 74% stake in India's Tata Communications ~ USD 600 –650 mn

Japanese NTT acquired Indonesian PT Cyber CSF terms undisclosed

Singapore Keppel DC REIT acquired IC2 from Macquarie Telecom in Sydney ~ USD 32 mn

### Data centre M&A activities into APAC

**2012** US Equinix acquired HK-based Asia Tone USD 230 mn

**2013** US Digital Realty acquired Japan facilities USD 10.5 mn

US Digital Realty acquiredfully leased data centre, Sydney USD 12.3 mn

**2014** UK Colt acquired Tokyo-based KVH USD 160 mn

FR GDF Suez Energy acquired Singapore-based SMP Pte Ltd terms undisclosed

**2015** US Equinix acquired Japan-based Bit-isle USD 275 mn

China · India · Japan · Hong Kong · Singapore · Australia

■ Key target market for M&A into APAC
■ Key target market for M&A within APAC

Source: Telecom Review Asia, Datacentres.com, Kingsland Development, Cofely News Release

# **3** ◃ *Concluding remarks*

For data centre service providers, significant growth opportunity lies ahead.

At the heart of the investment and expansion strategy should lie a strong understanding of the macro-economic conditions impacting the market dynamics. As part of strategic decision-making, investors need to weigh the projected costs, risks and returns of investing in a prospective economy and/or a particular segment within the data centre value chain. They will also need to carefully consider which market entry strategy would help them in realising their business objective.

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