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RISE OF DATA CENTRES in ASEAN



13 April 2023

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The Rise Of Data Centres In ASEAN

- At the cusp of hyper-growth.** This thematic report captures the dynamics of the data centre (DC) market across Malaysia, Singapore, and Indonesia. We believe the report is timely, considering the explosion of interest in the DC space, accelerated digital adoption, and the good valuation premiums fetched for strategic infrastructure assets. According to Frost and Sullivan, the three markets are expected to account for a combined c.74% of the USD5.7bn ASEAN DC market by 2025. The positive DC outlook resonates well with our preference for fixed line plays.
- Malaysia is seeing accelerated DC capacity plant-up, with hyperscalers making landfall.** Malaysia is seeing a raft of new/emerging DC investments with over 800MW capacity projected to come on stream in phases over the next five years, with lower land and energy costs as the key draws. Singapore's decision in early 2022 to calibrate new DC builds has been a blessing in disguise, with the likes of Equinix, AirTrunk, Yondr Group, and GDS Holdings locating their maiden facilities in Malaysia's southern state of Johor. More importantly, we view the setting up of cloud regions by Microsoft and Amazon Web Services (AWS) as a major coup with significant upsides for the domestic DC industry and the economy.
- Indonesia charting new leg of DC growth from greater digital adoption.** The Indonesian DC market is expected to grow at a 6% CAGR between 2022-2028 to USD3.1bn, according to Arizton Advisory and Intelligence's Mar 2023 report. Growth will be fuelled by rapid capacity expansion by hyperscalers, data localisation regulations, and as internet penetration closes the gap with its ASEAN peers. Indonesia is already home to multiple cloud regions by Google, Alibaba, Amazon, Huawei, and Microsoft with Batam Island emerging as the new DC economic zone.
- Singapore's calibrated DC growth is squeezing inventory resulting in overflow to neighbouring hubs.** While Singapore continues to be the epicentre of DC growth in South-East Asia, the more stringent conditions laid out for new builds have compelled investors to consider alternative sites/hubs in the region. The regionalisation of the DC business is a key focus area for Singtel, with c.70MW capacity to be added over the next 3-5 years from its Indonesia and Thailand JVs. The expansion will see its DC footprint expand to >170MW regionally from ~70MW in Singapore currently.
- DC stock ideas:** Singtel, Telekom Malaysia (TM), Telekomunikasi Indonesia (TLKM), Time dotCom (TDC), Indosat Ooredoo Hutchison (ISAT), YTL Power (YTLP), XL Axiata (XL) and DCI Indonesia (DCII). With the exception of DCII – an IDX-listed pure-play DC – the featured names are telco proxies providing managed and co-location services with ownership of large DC assets. Of these, Singtel, TDC, XL, and ISAT have partnerships with established DC investors and/or hyperscalers. Secondary beneficiaries include pure-play SREITS- Keppel DC REIT and Digital Core REIT. We feature MN Holdings and Sunway Construction as budding DC contractors in Malaysia.

Company Name	Rating	Target	% Upside (Downside)	P/E (x) Dec-23F	P/B (x) Dec-23F	ROAE (%) Dec-23F	Yield (%) Dec-23F
Indosat Ooredoo Hutchison	Buy	IDR7,580	13.1	27.6	1.9	7.4	2.6
Singtel	Buy	SGD3.30	32.5	15.2	1.3	9.0	4.9
Sunway Construction	Buy	MYR2.07	22.0	13.2	2.7	21.6	4.5
Telekom Malaysia	Buy	MYR6.20	23.0	13.3	1.9	15.9	3.6
Telkom Indonesia	Buy	IDR5,030	16.7	15.5	3.1	20.5	4.1
Time dotCom	Neutral	MYR5.60	1.3	19.9	3.4	16.6	4.0
XL Axiata	Buy	IDR3,140	71.1	16.2	0.9	5.8	1.9
YTL Power	Buy	MYR1.00	4.7	11.6	0.5	4.6	6.1

Source: Company data, RHB

Top Buys

	Target Price (local CCY)
Singtel (ST SP, BUY)	3.30
Telekom Malaysia (T MK, BUY)	6.20
Telkom Indonesia (TLKM IJ, BUY)	5,030
Indosat Ooredoo Hutchison (ISAT IJ, BUY)	7,580
YTL Power (YTLP MK, BUY)	1.00
XL Axiata (EXCL IJ, BUY)	3,140
Sunway Construction (SCGB MK, BUY)	2.07

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The nexus of Big Data



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Data Centre 101

DCs are physical sites/buildings that house mission critical data and information under strict security and redundancy protocols. A typical DC facility consists of racks, servers, and high-powered equipment used for the processing, storing, managing, and transferring of data and applications. DCs have evolved in recent years from privately owned, tightly controlled on-premises facilities housing traditional IT infrastructure to remote facilities or networks of facilities owned by cloud service providers (CSPs) housing virtualised IT infrastructure for the shared use of multiple companies and customers.

The core DC components include switches, servers, routers, storage systems, and application delivery controllers. They require significant infrastructure to support both hardware and software, which includes power subsystems, uninterruptible power supplies (UPS), cooling systems, back-up generators, and unparalleled connectivity.

There are four main types of DCs with varying service models:

- i. **Enterprise DCs** – these are facilities built, owned, and managed by companies and optimised for their end users and often housed on premises (on-prem);
- ii. **Managed services DCs** – the management of these DCs are outsourced to third parties (managed service providers) with companies leasing the equipment and infrastructure;
- iii. **Colocation DCs** – a company rents space within a third-party owned DC located off premises (off-prem). The colocation DC hosts the infrastructure while the company/customer manages components, including servers, storage, and firewalls;
- iv. **Cloud DCs** – Data and applications are hosted by a cloud services provider such as Microsoft Azure, Google Cloud, AWS, and Alibaba Cloud.

DCs are designed to handle high volumes of data and traffic with minimum latency, which makes it particularly useful for the following use cases:

- i. Private cloud – hosting in-house business productivity applications such as customer relationship management (CRM) and enterprise resource planning (ERP) solutions;
- ii. Processing big data, power machine learning, and artificial intelligence (AI);
- iii. High volume e-commerce transactions;
- iv. Powering online gaming platforms and communities.

Given the strict security and redundancy protocols, DCs are accredited and certified. A certification by the [Uptime Institute](#) has typically been used as the international standard for DC performance, with the application of a four-level tiering system that match a particular business function and define criteria for maintenance, power, cooling, and fault capabilities.

- i. **Tier I** – basic capacity level with infrastructure to support information technology for an office setting and beyond. The requirements for Tier I facilities include: a) A UPS for power sags, outages, and spikes, b) an area for IT systems, c) dedicated cooling equipment that runs outside office hours, and d) an engine generator for power outages. Tier I protects against disruptions from human error, but not unexpected failure or outage
- ii. **Tier II** – Tier II facilities cover redundant capacity components for power and cooling that provide better maintenance opportunities and safety against disruptions. Like a Tier I facility, an unexpected shutdown of a Tier II DC will affect the system
- iii. **Tier II** – A Tier III DC is concurrently maintainable with redundant components as a key differentiator, with redundant distribution paths to serve the critical environment. Unlike Tier I and Tier II, these facilities require no shutdowns when equipment needs maintenance or replacement. The components of Tier III are added to Tier II components so that any part can be shut down without impacting IT operations
- iv. **Tier IV** – A Tier IV DC has several independent and physically isolated systems that act as redundant capacity components and distribution paths. The separation is necessary to prevent an event from compromising both systems. The environment will not be affected by a disruption from planned and unplanned events. Tier IV facilities add fault tolerance to the Tier III topology. When a piece of equipment fails, or there is an interruption in the distribution path, IT operations will not be affected. All of the IT

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equipment must have a fault-tolerant power design to be compatible. Tier IV DCs also require continuous cooling to make the environment stable.

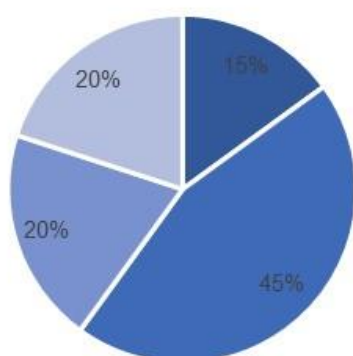
DC construction costs – a key consideration for hyperscalers

As servers within DCs are essentially computers, and DCs are in the business of selling/leasing capacity, megawatts (MW) are used as the key reference to denote the amount of power available to run the IT equipment (IT load capacity).

As a general rule of thumb, the average cost to erect a DC ranges from USD7-12m per MW. According to Turner and Townsend's Global 2022 DC construction cost index, Malaysia's DC cost is comparatively lower than its ASEAN peers at USD0.92/Watt due to lower land, construction, and energy costs. This compares with Singapore's USD1.15/Watt and Jakarta's USD0.95/Watt. Power tariffs (industrial) for both Malaysia and Indonesia at USD0.10/kWh and USD0.08/kWh are also comparatively lower versus Singapore's USD0.27/kWh.

Figure 1: Cost components of a DC

■ Land & Shell ■ Electrical Systems ■ HVAC/Mechanical ■ Building Fit-Out



Source: Digital Infrastructure

Burgeoning demand for data and computing power

Demand for hyperscale DC facilities is being fuelled by strong investments and upgrades to new technologies and the transition to 5G networks. ASEAN has become a major hotspot for DCs, thanks to accelerated digitalisation, accommodative policies, and the lower cost of land and energy, with content and over-the-top (OTT) providers focusing on the region's population demographics and clamorous appetite for social media. Consequently, hyperscalers are compelled to move closer to end-users (edge computing) to reduce latency with the setting up of new cloud regions.

With cloud and enterprise applications generating vast amounts of data with different formats and protocols, DCs will enjoy secular growth, in our view. DCs allow AI to process massive datasets for training and inference, given their vast computing resources and storage. They accelerate complex calculations, supporting AI applications and workloads. As more organisations adopt AI into their operations, there is a corresponding rise in data generation. ChatGPT – the popular generative AI which has gone viral – employs extensive training data to generate contextually relevant and coherent content based on user inputs. The data is essential for training the machine learning (ML) models that power AI systems, necessitating storage, processing, and real-time analysis in DCs.

The road to Net Zero – a clean energy infrastructure

DCs are voracious consumers of energy. A staggering amount is needed to power servers, hard drives, and cooling systems. As DCs generate immense amount of heat, significant power is required for cooling systems. According to the [IEA](#), DCs consume 220-320 TWh (10,000 kWh per sqm) of power, or 0.9-1.3% of global electricity demand. Here, electricity used for cooling systems make up some 86% of total energy consumption. In terms of greenhouse gas (GHG) emissions, reports suggest that c.3% of global carbon emissions are from DCs, similar to the carbon footprint of the aviation industry.

Globally, DC players have pledged to achieve Net Zero emissions by 2030, with some also targeting absolute zero (no GHG emitted) through increased efficiency and the use of renewable energy (RE) and carbon capture, amongst others. There has been a growing focus on improving the design and construction of DCs, with measures adopted to reduce embodied carbon (CO₂ emitted during the construction phase). This involves sourcing for sustainable materials such as concrete laden with waste CO₂ and reducing the importation of raw materials with locally sourced inputs where available. Upgrading existing/legacy facilities can also go a long way in reducing the carbon footprint. Other notable sustainable innovations espoused by the industry include the use of hydrogen fuel cells and hydro-treated vegetable oils (HVO) as alternatives to fossil fuels to power DCs, and the use of advanced cooling technologies such as immersion cooling and airflow management.

A key benchmark applied to gauge the power efficiency of DCs is the power usage effectiveness (PUE) ratio, which measures the total facility power relative to IT usage. PUEs of 1.5x and below convey higher DC efficiency. Under Singapore's pilot DC – Call for Application (DC-CFA) exercise issued in Jul 2022, a design PUE of 1.3x and below has been listed as evaluation criteria for new and expanded DCs, with the Government looking at best-in-class efficiency and decarbonisation.

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MALAYSIA

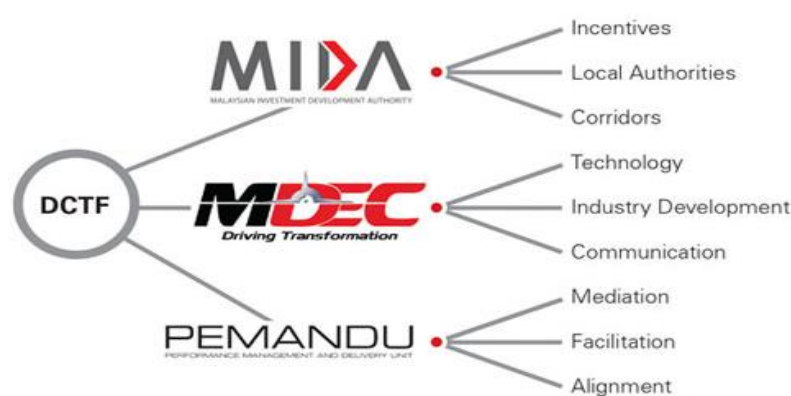
DC Market Overview

Malaysia – an emerging DC hub in the region

Malaysia has evolved into an attractive location for DC investments, thanks to abundant land and power resources, good international connectivity, and supportive government policies. According to Arizton Advisory and Intelligence, the domestic DC market is projected to grow at a CAGR of 7% to USD1.6bn by 2027 (c.MYR7bn) from USD1.1bn in 2021, driven by rapid hyperscale investments and strong co-location demands. The country is already home to some 41 enterprise DCs which include the likes of AIMS, Bridge Data Centres (BDC), GDS Services, Keppel, and TM ONE/VADS (a subsidiary of TM).

The development of the DC industry is overseen by the Malaysia Digital Economy Cooperation (MDEC), an agency under the purview of the Ministry of Communications and Digital, tasked with advancing the nation's ICT and digital economy. Together with the Malaysian Investment Development Authority (MIDA) and the Performance Management and Delivery Unit, they form the DC task force (DCTF) responsible for facilitating DC investments into the country. The DCTF acts as a one-stop shop to assist potential DC investors looking to establish their presence in the country. The task force works to understand investors' requirements and specifications, and to connect them with relevant stakeholders such as the utility providers, telcos, land owners, and relevant government agencies. Ultimately, the task force expedites the overall end-to-end process for DC investments in the country.

Figure 2: The role of the DCTF



THE DCTF COMPLEMENTS ONE ANOTHER'S ROLE IN ENSURING THE SUCCESS IN ATTRACTING MAJOR INVESTORS INTO THE COUNTRY

Source: MDEC

The shift towards a Cloud-First strategy with MyDigital

In Feb 2021, former Prime Minister Tan Sri Muhyiddin Yassin unveiled the Malaysia Digital Economy Blueprint (MyDigital), which outlined the plans to accelerate Malaysia's progress as a technologically advanced, digitally driven, high-income economy over the next decade. A key policy thrust in the blueprint is the building of enabling digital infrastructure to provide seamless and extensive digital connectivity, with DCs and submarine cable landing stations identified as strategic infrastructure assets.

Following the announcement, four global CSPs – Microsoft, Google, Amazon and TM – were appointed alongside four local managed service providers (MSPs) – Cloud Connect, Enfrasys Solution, Awantec Systems, and Radmik Solutions – to facilitate and drive DC investments. Conditional approvals were given for the CSPs to construct hyperscale DCs as part of the country's Cloud-First strategy, with the total investment value reported at MYR12-15bn over five years. On 9 May 2022, the Government, through the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), inked cloud framework agreements with the CSPs with the target to [migrate 80% of public data](#) to hybrid cloud systems by the end of 2022.

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Where are the DC hotspots?

The Cyberjaya township in Selangor has long been a focal point for DC investments in Malaysia with its coveted Multimedia Super Corridor (MSC) status attracting early investors. With superb infrastructure and unparalleled connectivity, Cyberjaya is home to almost half of all DCs and more than 70% of the combined DC land area in the country. Nippon Telegraph and Telephone (NTT), Japan's leading internet and telecommunications group was among the pioneers in Cyberjaya with its maiden facility (CBJ1) constructed in 2002. BDC, a subsidiary of NASDAQ-listed Chindata Group, is another key player in Cyberjaya with two facilities (MY01 and MY02) in operation, with a combined 20 MW capacity.

Figure 3: Key DC players in Malaysia



Source: MDEC

Figure 4: Key DCs in Cyberjaya



Source: MDEC

Outside of the Klang Valley, Johor is rapidly transforming as the next DC hotspot (24% of the total number of DCs) with its large swathes of industrial land designated as technology hubs. The state's proximity to Singapore – Asia's largest DC metro – is a key competitive advantage, with DC investors lured by the lower construction and connectivity costs. Johor's appeal as a fledgling DC hub received a major shot in the arm after the Singapore government issued a moratorium on new DC construction in 2019, over sustainability concerns. While the moratorium was lifted in early 2022, more stringent conditions were laid out for the construction of DCs, including a cap on capacity. This has compelled investors to scout for alternative locations, with Johor and the island of Batam in Indonesia emerging as alternative DC sites.

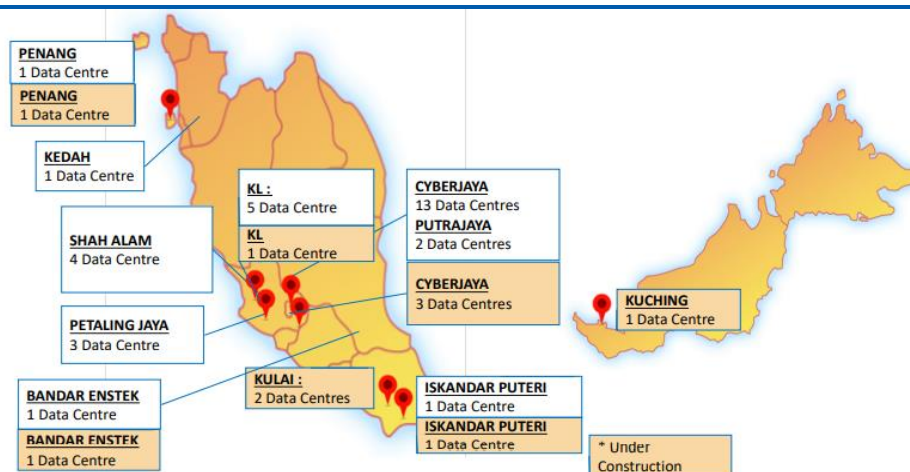
In 2015, the Johor state government announced the development of the Sedenak Technology Park (STP). Previously known as the Kulai Iskandar Data Exchange (KIDEX), STP sits on a 745-acre land in the Iskandar Region with access to at least 600MW of capacity, dark fibre connectivity, scalable utilities, and infrastructure. STP looks set to give

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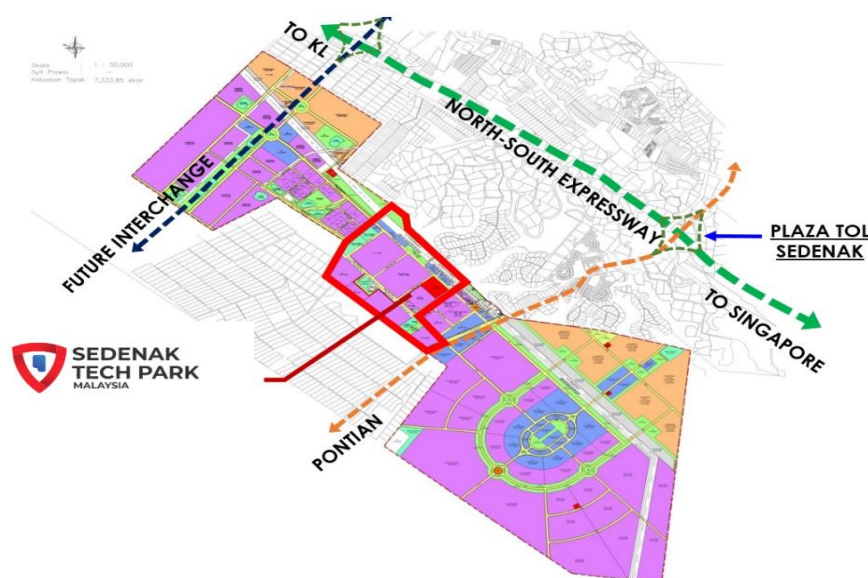
Cyberjaya a run for its money with DC investors such as BDC, Yondr Group, Equinix, and ByteDance System having committed to set up their DCs in the area.

Figure 5: Malaysia's DC hotspots



Source: MDEC

Figure 6: STP is one of three areas assigned for DCs in the Iskandar region, being in close proximity to Singapore



Source: TPM Technopark

Hyperscalers are making landfall

While the DC industry has grown steadily over the past decade, MDEC estimates that the overall industry capacity stood at c.100MW at the end of 2021. The figure is set to be dwarfed over the next decade, as upcoming hyperscale developments should see an additional 800MW capacity progressively come on stream.

In May 2022, former Senior Minister of International Trade and Industry, Datuk Seri Mohamed Azmin Ali said the Government had [given approval](#) in principal for AWS to invest in the country, and were studying requests made by the company.

In Mar 2023, AWS officially announced a [USD6bn](#) (MYR25.5bn) investment to set up a cloud region in Malaysia to meet the strong demand for cloud services in the country and in South-East Asia. To be staggered over 15 years, the sum represents the single largest international technology investment of its kind in Malaysia. The new AWS region will consist of three availability zones, adding to the 99 availability zones across 31 geographic locations globally (including in Singapore and Indonesia) with each availability zone having its own

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independent power, cooling, physical security, and connected through redundant, low latency networks. AWS's existing customers include Astro (ASTRO MK, BUY, TP: MYR0.84), Axiata Group (AXIATA MK, BUY, TP: MY4.37), Bank Islam Malaysia, CelcomDigi (CDB MK, NEUTRAL, TP: MYR4.32), Johor Corporation, PayNet, and Petronas. Malaysian startups and small businesses such as Carsome, Baba Products, Omesti, and StoreHub have also been building their businesses on AWS' cloud offerings.

Under the [Bersama Malaysia](#) initiative unveiled by the Perikatan Nasional (PN) Government in Apr 2021, Microsoft had committed to establishing its first DC region in the country with USD1bn invested over five years. Based on our checks with industry sources, Microsoft Azure is the anchor tenant for Keppel's maiden Tier-3 DC in STP ([Keppel DC](#)) which has a gross floor area of 100,495 sq. ft.

The state of Johor has also been the focal point of DC investments in recent years. This was likely catalysed by the moratorium imposed by the Singapore government in 2019 on DC construction. Johor Chief Minister Datuk Onn Hafiz Ghazi was previously quoted by media sources as saying that the state expects to attract some MYR15bn worth of DC investments over the next decade owing to rising demand for cloud services in the region.

We list down some of the more notable DC investments (including planned ones) reported in the media as follows:

- i. **BDC.** BDC is constructing its fourth hyperscale DC (MY06) on 40 acres of land in STP. The project, which carries an investment value of MYR2.5bn over five years will see rated capacity (IT load) of 110 MW when fully commissioned (first phase was commissioned in Oct 2022).

Figure 7: Artist impression of BDC's fourth DC at STP



Source: BDC

- ii. **Yondr Group.** In Mar 2022, the Yondr Group, a global leader, developer, owner, operator, and service provider of DCs announced its entry into Malaysia with a planned 200MW hyperscale campus to be built on 72.8 acres of land in STP. Yondr's campus will be progressively developed over a few phases and deliver 200MW capacity when completed. The first phase is scheduled to be ready for service (RFS) in 2024. In Dec 2022, Sunway Construction announced a MYR1.7bn contract for the construction of the DC for Yondr Group.
- iii. **GDS Holdings.** China's largest carrier-neutral DC broke ground on its maiden DC campus at Nusajaya Tech Park, Johor in Apr 2022. It plans to develop a 54MW hyperscale DC with the first phase (18MW) to be RFS in 2024.
- iv. **YTL Green DC campus.** In Apr 2022, YTL, through its subsidiary YTL Data Center Holdings Pte Ltd, announced the development of a 500MW DC campus in STP – the largest in Malaysia. The DC park will be the first in the country to be powered by on-site renewable energy (RE), with 275 acres of DCs to be built adjacent to 1,500 acres of land designated for solar farms. YTL is investing MYR1.5bn for the first phase of the Tier-3 facility, which is slated for completion in 1Q24. 72MW of the capacity has been taken up by SEA Ltd, as the anchor tenant. YTL also inked a partnership with GDS to co-develop 168MW of DC capacity at the same park.

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- v. **NTT.** In Sep 2022, NTT announced its sixth DC in Malaysia, in Cyberjaya (CBJ6), via a USD50m investment. This follows the completion of CBJ5 in 2021. Both facilities will have a design capacity of 22MW and cater to hyperscalers and high-end enterprises looking to accelerate their digital transformation.
- vi. **MN Holdings-DCS.** On 1 Apr 2023, a wholly owned subsidiary of MN Holdings, Mutu Nusantara SB entered into an MOU with Shanghai DC-Science Co Ltd. (DCS) to develop the latter's maiden DC in Malaysia at STP. Spanning 20 acres and an overall investment value of USD600m, the first phase of the DC is slated to commence operations in 1H24.

Figure 8: Pipeline of incoming DCs (list not exhaustive)

Company/Investor/ Partner	Location	Total Power (MW)	Size (sq.ft.)	Est. launch	Comments
YTL Power	Kulai, Johor	500	530k	1Q2024	Largest green DC in Malaysia. First phase to be ready in 1Q24 with SEA Ltd as the anchor tenant
Yondr Group	STP, Johor	200	n.a.	2024	First DC in Malaysia
AirTrunk	Johor Bahru, Johor	150	235k	2024	Maiden investment. Initial phase to provide 50MW
MN Holdings	STP, Johor	120	n.a.	1H2024	Maiden investment In collaboration with Shanghai DC Science Co. Ltd.
GDS Holdings	Nusajaya Tech Park, Johor	54	242k	1Q2024	First phase will be 18MW
NTT	Cyberjaya	22	200k	n.a.	6th DC (CBJ6) to complement CBJ5
Equinix	Nusajaya Tech Park, Johor	n.a.	21k	1Q2024	Equinix's first DC in Malaysia
Open DC	Delapan Economic Zone, Perlis	n.a.	n.a.	2024	A Tier 3 DC

Note: Est. launch refers to the initial phase and capacity while total power refers to the expected full capacity when all phases are commissioned
Source: Media sources

Figure 9: NTT's CBJ5 was commissioned in 2021

Source: NTT

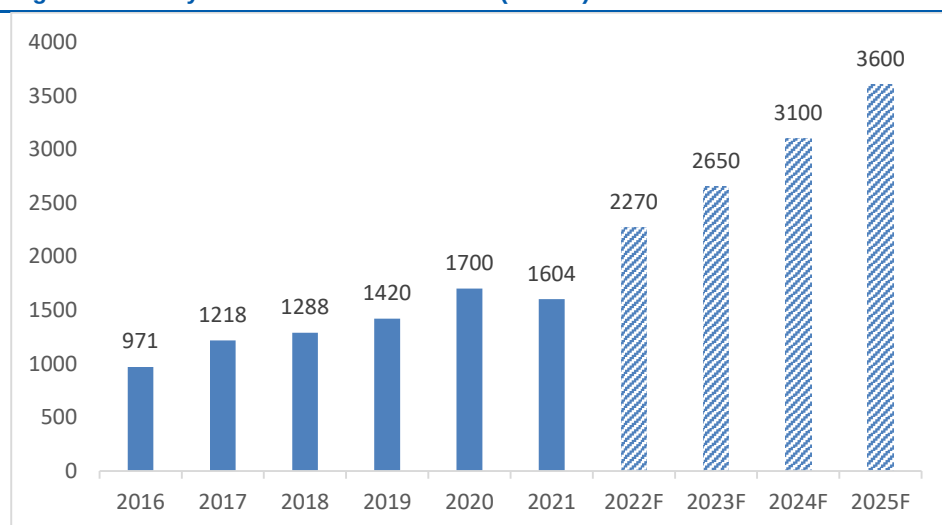
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Figure 10: Notable DCs in Cyberjaya

Facility	Size (sq ft)	Power (MW)
Bridge Data Centres Cyberjaya MY02	570k	15
Bridge Data Centres Cyberjaya MY01	296k	5
AIMS Cyberjaya	240k	n.a.
TM Cyberjaya Klang Valley (KVDC)^	90k	n.a.
NTT Cyberjaya 4	n.a.	3

Note: ^ TM has a twin core site in Iskandar Puteri, Johor (IPDC)
Source: BDC, AIMS, NTT, various media

Figure 11: Malaysia's DC revenue forecast (MYRm)

Note: Only include those that provide data centre services. Data centres for own use (e.g. banks) not included
Note 2: Forecasted numbers does not take into account the latest announcements
Source: MDEC

SWOT Analysis

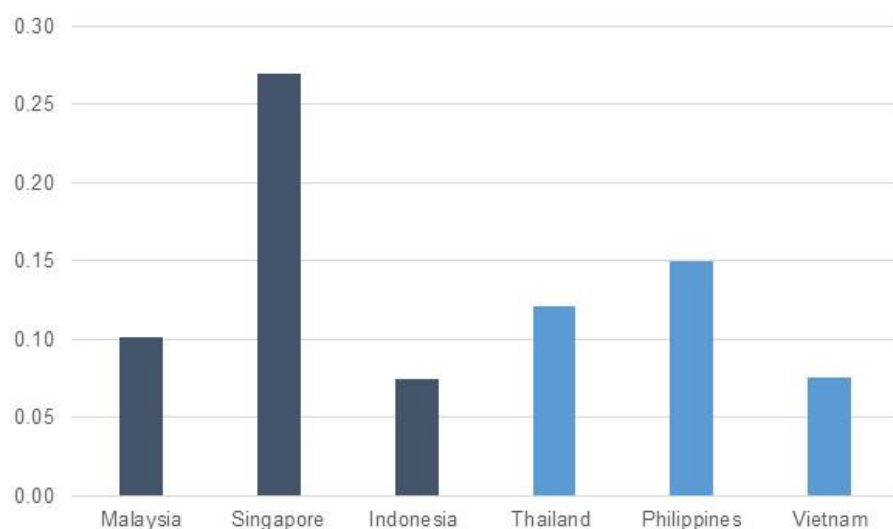
Strengths and merits

MDEC believes the following are key merits for investors to locate their DC hubs in Malaysia:

- i. Ample and lower cost of land;
- ii. Reliable power infrastructure with low electricity tariffs;
- iii. Ready access to skilled workforce, and;
- iv. Pro-business and favourable government policies

With the growing importance placed on the sustainability agenda and the target for RE (RE to make up 31% of the power capacity mix by 2025 (2035: 40% target), the country looks to be a choice location for hyperscalers, which are large consumers of power.

Figure 12: Electricity tariffs in USD/kWh (Sept 2022)



Source: Global Petrol Prices

Singapore DC constraints present an opportunity

In 2019, the Singapore Government enforced a ban on the construction of new DCs due to concerns over sustainability. The moratorium was lifted in early 2022, with the focus shifting from 'quantity' to 'quality' or best in class energy efficient investments. Stringent new conditions were imposed for DC construction, including a cap of 60MW pa on construction and a PUE of 1.3 or less. The calibrated growth approach would allow Singapore to meet its decarbonisation targets in the medium to longer-term, albeit at the expense of DC growth, in our view, as DC demand continues to flourish in the region. This looks to be a blessing in disguise for Malaysia and Indonesia, which are capitalising on the influx of DC investments by positioning their countries as alternative DC hubs with vast land and energy resources. Based on our discussions with MDEC, the current generation of DCs are only able to achieve design PUEs of 1.6 at best, with significantly higher capex needed to improve PUE levels – this may not be feasible. We gather that the majority of DCs in Malaysia and Indonesia have design PUEs ranging from 1.6-1.8.

Connectivity and policy issues have been stumbling blocks

According to [Telegeography](#), Malaysia is connected via 25 international submarine cables. This still lags that of Singapore (39) and Indonesia (59). Some major sub-sea cable investments in recent years have reportedly bypassed Malaysia due to the ongoing cabotage ruling which prohibits foreign-flagged support vessels from undertaking subsea cable repairs in local waters. The move has been largely viewed as regressive, considering that Malaysia aims to have the highest number of submarine cable landings in South-East Asia by 2025, a key policy thrust in the MyDigital blueprint.

The Edge Weekly reported that Meta, Google, Microsoft, Amazon, and the Malaysia Internet Exchange (MylX) had officially written to the Prime Minister in Sep 2022 for the reinstatement of the cabotage exemption instituted by the Pakatan Harapan Government

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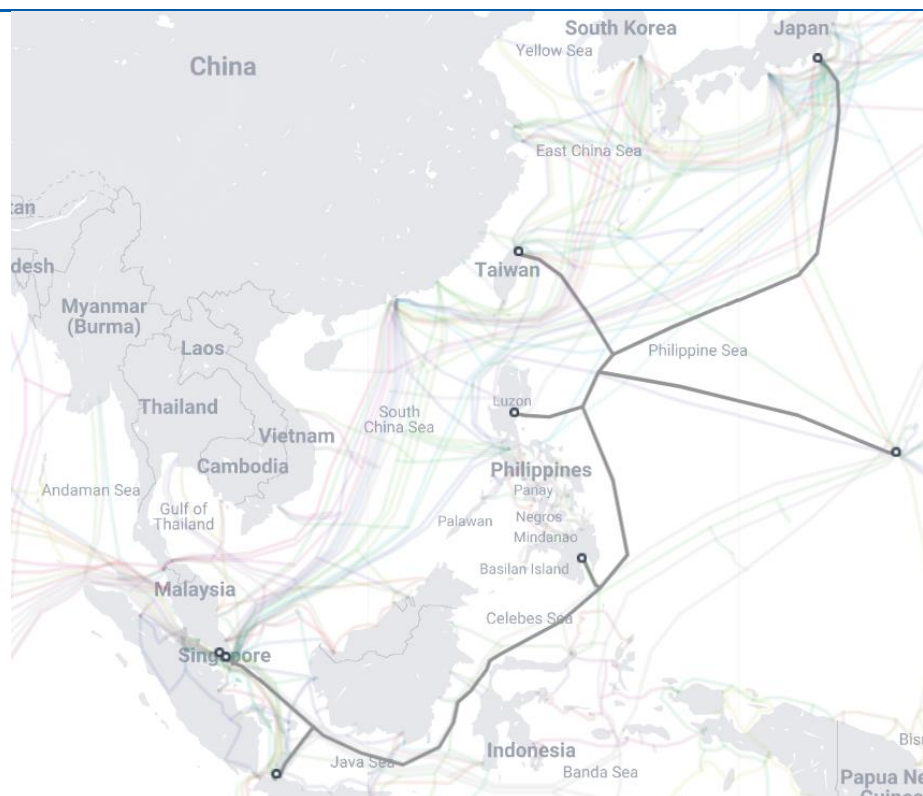
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back in 2019. Among the key points raised in the letter were that “The 48 national initiatives and 28 sectoral initiatives that the Government intends to implement over the next nine years under MyDigital are predicated upon having fast and reliable internet connectivity. Creating a supportive regulatory environment that encourages investment in digital connectivity infrastructure is therefore an important enabler for the MyDigital agenda and the tremendous economic benefits that stand to be gained”. The parties contend that the exemption would greatly speed up repair works for undersea cables, which can take up to 27 days in Malaysia vs 20 days in the Philippines, 19 days in Singapore, and 12 days in Vietnam.

In early March, the current Minister of Transport, Anthony Loke (who was also the Minister that enforced the cabotage exemption in 2019) said the Ministry is working on reinstating exemptions previously approved to non-Malaysian vessels conducting undersea cable repairs, and a formal announcement will be made once all the necessary [processes are finalised](#).

Within Malaysia, connectivity is also hampered by the lack of dark fibres, which makes it challenging for larger DC players. Dark fibre are typically unused optical fibres in the ground with no service or traffic running through. The fibre can be purchased from network/bandwidth owners or a telecoms provider. Larger DC operators utilise greater lit fibres which are costly, with dark fiber proving to be cost-effective solutions in the long haul to meet redundancy demands and for disaster recovery. According to MDEC, dark fibre is only localised in a few locations including Cyberjaya. Technavio, a global tech research outfit projects Malaysia’s dark fibre market will grow at a CAGR of 11% from 2021 to 2025, driven by the exponential rise in data traffic.

Figure 13: The Apricot submarine cable investment led by Meta and Google



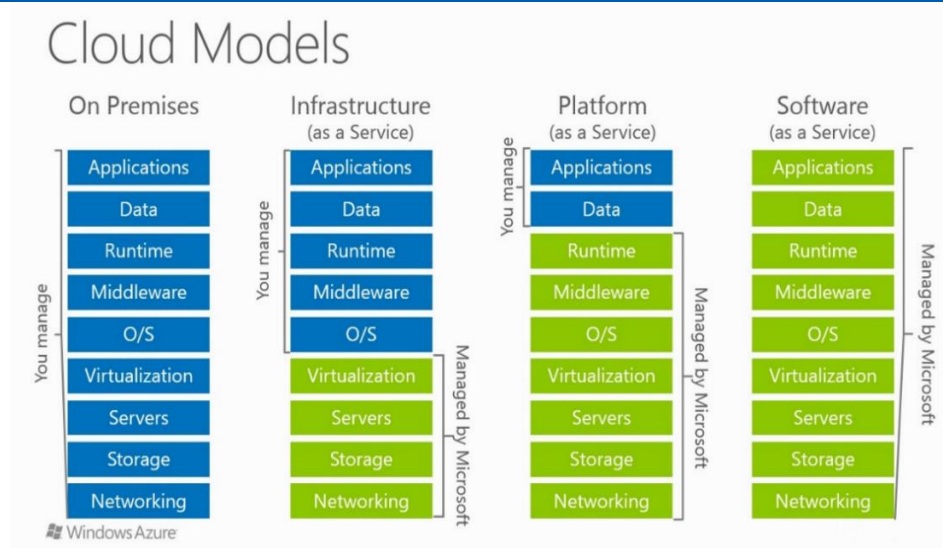
Source: TeleGeography

DC services driving demand

Cloud computing. The on-demand delivery of IT services over the internet accounted for some 27% of Malaysia’s DC revenue in 2021. Cloud services are increasingly the go-to choice for enterprises looking to circumvent the prohibitive costs associated with buying, owning, and maintaining physical assets (servers). Instead, access services such as computing power, storage, and databases are procured via a flexible cost-effective opex model from the CSPs. The variable costs here are significantly lower due the economies of scale enjoyed by the cloud providers.

Without cloud computing, companies typically over-provision resources up front to handle peak levels of business activity, leaving capacity unutilised most of the time. The ease provided by cloud computing allows for flexible scaling to grow or shrink capacity as and when the business needs changes. CSPs offer a broad range of services that can also help companies innovate faster, including machine learning, data lakes and analytics, databases and more. This allows enterprises to deploy their technologies rapidly and move from idea to implementation. With the cloud, enterprises can also expand to new geographic regions quickly, as the larger CSPs operate multiple cloud regions. This puts the applications in close proximity of end-users, with reduced latency, and thereby raises the overall experience for customers/users.

Figure 14: Cloud model comparison



Source: Microsoft Azure

There are three major types of cloud computing models – Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

- i. **IaaS** bears the closest resemblance to existing IT resources and offers the highest level of flexibility and control over resources. The model provides customers with a range of virtual computing infrastructure, ie servers, storage, memory, and computing as a service. Customers are tasked with installation, running, and managing the operating systems, software, and data, while the vendor is responsible for hardware infrastructure. The customers can have a virtual infrastructure available on demand with IaaS as opposed to setting up and deploying physical hardware for an on-premise (on-prem) IT environment. This model is ideal for enterprises looking to exercise control and administration over their applications and data.
- ii. **PaaS** provides the full suite of the application development environment, allowing customers to focus on developing and managing applications without reinventing the wheel and building a development environment. The model is suited for applications that need to be deployed quickly and streamlines workflows when multiple developers are working together on the same application. However, developers would be giving up a certain degree of flexibility due to vendor lock-ins when using their environment.
- iii. **SaaS**. Companies outsource the entire technology stack. The vendor handles everything related to the delivery of the product, whereas the company simply pays a subscription fee to access the application services over the internet. With the model, companies can spend time focusing on and growing their underlying businesses, with a key downside being the relinquishing of control over the software. These controls are not only limited to the updates or appearance of the software.

It is important to understand that the different models target different companies and industries. For companies with established IT structures, IaaS is an attractive option to shift away from on-prem infrastructure, or a viable option for start-ups with qualified staff. PaaS is suitable for software developers working in large teams and remote workers, offering solutions for creating, testing, and deploying applications. Meanwhile, SaaS targets end-users needing reliable and straightforward software solutions. According to Gartner, SaaS solutions command the largest market share, followed by IaaS and PaaS.

Figure 15: Key differences between managed hosting and colocation

	Managed Hosting	Colocation
	Differences	
Cost	monthly leasing and managing fees	higher start-up cost to purchase servers
Ownership	lease the server	own the server
Control	less control	full control
Hardware upgrades	vendor upgrades	customer upgrades
Software choice	vendor installs	customer installs
Expertise	no technical expertise required	technical expertise required
Dedicated servers	yes	yes
Off-site location	yes	yes
Downtime protection	power and internet backups	power and internet backups
Scalability	lease more space	purchase another space

Source: RHB

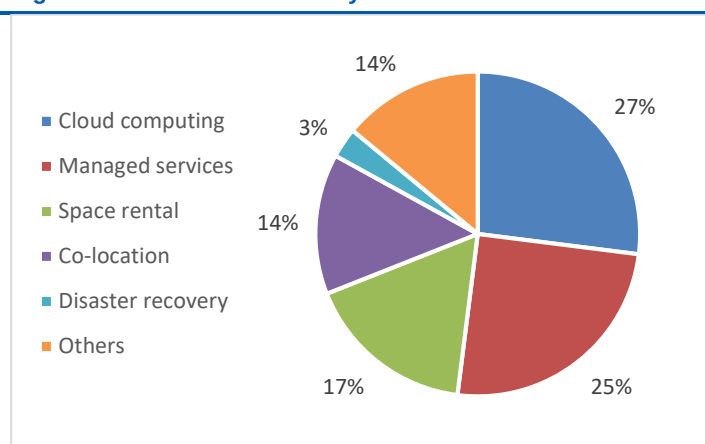
Managed hosting vs colocation. Two of the most popular hardware models for IT infrastructure are managed hosting and colocation, with the main difference the ownership structure of the servers. In the colocation model, the client gets a dedicated rack of servers in the vendor's DC, and the client is fully responsible for the administration and management of the system.

With managed hosting, the client simply leases the server with the vendor responsible for all technical work, such as monitoring, hardware replacement, and software updates. Cloud services can also fall under the category, as long as it has the main feature, which is professional support. The managed hosting model offers trained service administrators, support staff, and customer care operators as services. This is one of the main strengths of managed hosting, as it allows companies to focus on their business. Cost is another strength as the company can avoid paying for hardware, software licenses, data security, and IT overheads.

The colocation model essentially provides a dedicated space in the vendor's DC for the client's exclusive use. The client rents the space, power, cooling, and physical security at the DC and the vendor assists with equipment and/or connectivity. The advantage for companies, compared to building their own servers, is clear, as DCs are often built with military-grade security, optimum power, and fibre cables, as well as advanced cooling systems while providing the same benefit of equipment ownership.

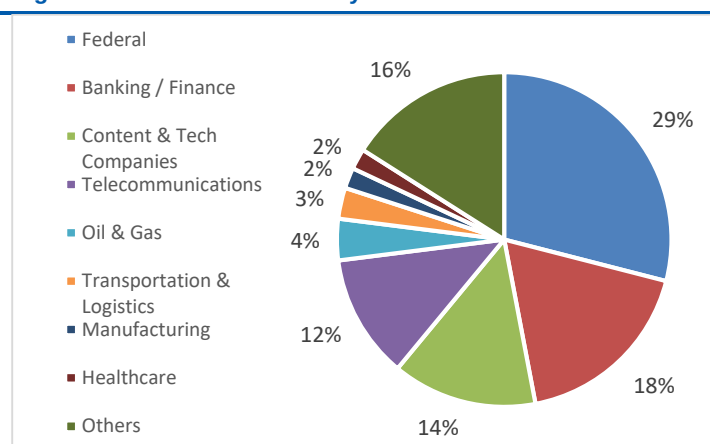
Having full ownership of the hardware allows companies to configure their systems however they see fit, especially if their project requires more functionality than standard setups from managed hosting services. However, due to the absence of professional support, companies need dedicated IT overhead to manage the services full time. Colocation solutions are costlier, and therefore are often only chosen by large enterprises that require full control over their hardware.

Figure 16: 2021 DC revenue by services



Source: MDEC

Figure 17: 2021 DC revenue by sector



Source: MDEC

Based on statistics from MDEC, the public sector contributes the largest proportion of local DC industry revenues at 29%. This is followed by banking and finance (18%) and telecommunications (16%). In terms of services, cloud computing makes up the biggest mix at 27%, followed closely by managed services (25%), space rental (17%) and co-location (14%). Space rental is similar to colocation, with the only difference being control over a dedicated space within a DC in the colocation model, or leasing the whole data centre facility.

Key risks

Key risks for the DC industry include energy costs and availability, internet bandwidth, the ease of doing business, political stability, and natural disasters. Increasing competition in the region is a growing risk, as it could reduce investments in the individual countries. Therefore, government incentives and regulations form a key part of investment decisions. For DC players, sustainability will be a key issue in the long term, with the growing emphasis on energy efficiency. New innovations present in newer DCs may reduce the demand for older, less efficient DCs.

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Featured Stock Ideas

We see Malaysia as an emerging DC hub in Asia, with supportive pro-business policies to attract and retain DC investors. The unity government under Prime Minister Dato Seri Anwar Ibrahim is committed to further accelerating digital adoption in the country, which augurs well for the domestic DC industry. The positive outlook of the DC sector is also supported by the New Investment Policy unveiled by the Ministry of International Trade and Industry (MITI) in Oct 2022, where the Government is looking to boost economic complexity to spur high-value job opportunities. The country's large pool of knowledge and skilled workers portends a significant competitive advantage in catalysing greater foreign direct investments, which is crucial for the DC space, in our view. Aside from AWS and Microsoft, which have committed to setting up cloud regions in the country, the likes of global DC names such as GDS, Equinix, and Yondr Group are pouring in significant capital to construct their maiden facilities in the country.

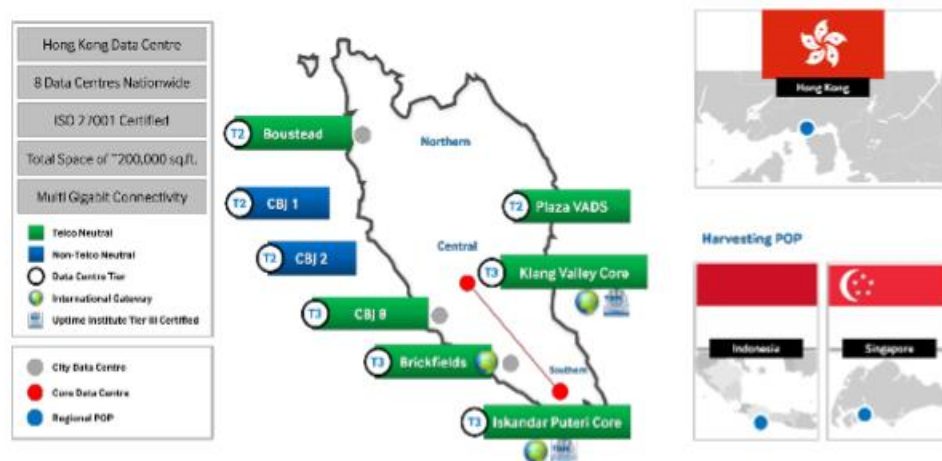
Investment ideas in the DC fold naturally gravitate towards the traditional fixed line telcos, given that DCs are lynchpin assets for enterprise-related services and solutions that complement the vast sub-marine cable assets owned. While there are no pure-play DC companies on Bursa Malaysia, a play on the DC theme should also include construction-related and/or services-type companies that form part of the broader value chain, in our view. We highlight three stocks that we believe are core beneficiaries of the DC boom.

TM (T MK, BUY, TP: MYR6.20) – the industry stalwart

Apart from offering fixed line and fiber broadband services nationwide as the incumbent, TM offers a wide array of managed and DC services with the largest portfolio of infrastructure assets under ownership in the country. The DC business is parked under its enterprise division (TM One) which serves both the public and private sectors. The group currently has eight DCs in Malaysia and one in Hong Kong, with combined white spaces of c.268,000 sq ft (total gross floor area: 750,000 sq ft) and rated capacity of about 46MW.

The flagship DC assets are its twin-core Tier-3 rated facilities in Cyberjaya (KVDC) and Iskandar Puteri (IPDC). Both KVDC and IPDC have white spaces of 90,000 sq ft each, with rated capacity of 20MW. According to media reports, TM is set to launch its 10th DC in 3Q22 with a capacity of 3MW. The latest DC will include enhanced DC security capabilities through TM One's Cyber Defence Center (CYDEC), addressing the Government's potential risk areas including cybersecurity, compliance, privacy, ethics, and social responsibility. While TM does not disclose the revenue contribution from the DC segment, we believe it has been rising steadily over the years, driven by enterprise digitalisation initiatives and the higher demand for cloud-related and managed services, with the pandemic further bolstering take-up. Management is looking to expand its DC capacity with the utilisation at KVDC and IPDC having surpassed 80% and 50% respectively. TM's enterprise business made up c.29% of FY22 group revenue, up a marginal 0.5% YoY following the 9.8% decline recorded in FY21 from project delays and deferments due to the pandemic.

Figure 18: TM has eight DCs nationwide and one offshore facility in Hong Kong



Source: Company

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Time dotcom (TDC MK, NEUTRAL, TP: MYR5.60) – aiming high with AIMS

TDC's DC business is parked under the AIMS group of companies, and contributed 20-21% of TDC's FY22 and FY21 group revenue. The company witnessed an acceleration in DC growth in recent years, with greater demand from over-the-top (OTT) customers shifting their focus to the Asia-Pacific region, coupled with stronger enterprise digitalisation efforts. Growth was further augmented by AVM Cloud (AVM), a cloud solutions provider acquired in Jan 2021. Including AVM, TDC's overall DC revenue grew 16% YoY in FY22 (FY21: +87% due to the acquisition of AVM).

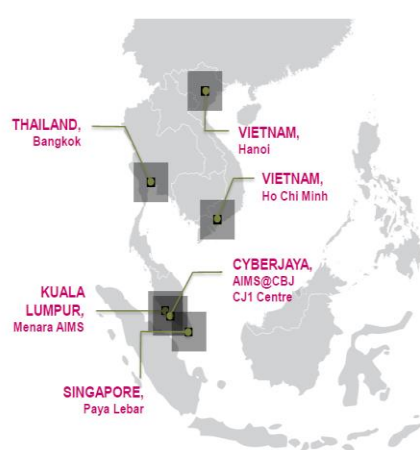
In Nov 2022, TDC announced a divestment of up to 70% of its DC businesses to Digital Bridge, a global strategic investor of infrastructure assets for MYR2bn (see our report- [Time dotCom: Crossing The Bridge](#)). This follows a strategic review of the DC business in late 2021 to grow the business regionally with a strategic partner/investor. TDC's DC assets are located in the Kuala Lumpur Central Business District (Menara AIMS), Cyberjaya, and Thailand (via a JV with associate, Symphony Communications (SYM TH, NR). Menara AIMS' utilisation is already at an optimum level with the downtown location favored by customers, being the host site of MyIX. With interconnection to all domestic mobile network operators and 80% of foreign-based carriers, the location provides the most flexible peering options. Unlike its Cyberjaya facilities which are purpose-built, Menara AIMS faces energy and space constraints, which limits the potential for expansion (maximum 10MW capacity).

In Jan 2022, TDC acquired a 13-storey commercial building (formerly owned by the Employees Provident Fund or EPF) for MYR62m to expand its downtown DC capacity. The building, which is adjacent to Menara AIMS, is currently undergoing retrofitting and rectification works with a single floor (c. 8000 sq ft) to be ready for service in 1Q23. A recent update from management suggests that the additional capacity has been committed to by existing and new customers.

TDC's newly commissioned Tier-3 DC in Cyberjaya (AIMS@CJ) has a total combined floor space of 240,000 sq ft and rated capacity of up to 50MW. Phase 1, which involves 60,000 sq ft was commissioned in 3Q21, and has since registered an >70% take-up. The group has kick-started its Phase 2 expansion (60,000 sq ft), which is slated for completion by the end of 2023.

Figure 19: AIMS@CJ Phase 1 has been fully taken up since its launch in 3Q21

AIMS Data Centre Location



Menara AIMS
 - 18-storey office block
 - Start operation in 2000
 - 12 floors (65,000 sqft of white space)



AIMS @ Cyberjaya
 - AIMS 1st purpose built DC
 - Start operation in July 2021
 - Phase 1 (60,000 sqft of white space)



AIMS @ CJ1
 - Anchor tenant since 2013
 - Occupying 20,000 sqft of white space



Source: TDC

Sunway Construction (SCGB MK, BUY, TP: MYR2.07) – the up-and-coming DC contractor

The prospects of DCs in Malaysia commensurate with the construction sector's involvement in building such facilities. To illustrate this, Yondr Group announced – back in Mar 2022 – plans to develop a hyperscale DC campus with a power capacity of around 200MW on approximately 72.8 acres in STP, Johor. On 31 Dec 2022, Sunway Construction was the contractor appointed by Yondr (via Yellowwood Properties SB) to provide general contractor services for the said DC in STP. The contract value awarded to Sunway Construction was MYR1.7bn with a 21-month timeline (estimated completion by 3Q24) for the first phase of the said DC. This is Sunway Construction's first job award related to DCs. PBT margins for the project is estimated to be on the high end of the company's normal range of 5-8%. Should Sunway Construction deliver the construction of the DC's first phase in STP for Yondr, it may clinch contracts pertaining to the upcoming phases of the DC as STP itself is a flagship DC complex that spans across 700 acres.

We also understand that Sunway Construction's active tenderbook of >MYR10bn as at 31 Dec 2022 includes other DC jobs within the Klang Valley, aside from normal construction job tenders. Future tendering opportunities may arise from new entries of other multinational companies related to DCs. For example, AirTrunk, one of the biggest hyper-scale DC companies in Asia Pacific and Japan announced in Jan 2023 that it plans to develop a 150MW data centre in Johor Bahru – this would be its first facility in Malaysia. Premised on Sunway Construction's involvement in Yondr Group's DC in STP, Johor, we do not discount the possibility of the group clinching construction jobs related to AirTrunk's DC. All in, Sunway Construction's foray into DC construction provides a buffer in the scenario that the group is not able to secure any job awards from upcoming mega projects in Malaysia, such as the Mass Rapid Transit 3 project.

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SINGAPORE

DC Market Overview

Singapore is at the epicentre of DC growth, with 60% of the Asia-Pacific's DCs located within the island state. The country's attraction as a DC hub lies in:

- i. Having top-notch infrastructure with abundant supplies of power and water (some 7% of total energy consumed within Singapore are from DCs – higher than 1-2% globally);
- ii. Being a focal point for undersea cables with more than 16 sub-sea cables connected to every continent;
- iii. Having a stable political environment, amongst others.

There are currently 23 unique third-party DC providers in the country with some 40 co-location DCs with built out capacity of over 600MW. The major co-location players are Equinix, ST Telemedia Global Data Centres (STTGDC) and Keppel Data Centres.

Figure 20: The biggest DC clusters in Singapore are in the Loyang and Tai Seng areas



Source: Cushman & Wakefield

Singapore's DC market is projected to grow at a CAGR of 12% during 2020-2025

According to Frost & Sullivan, the Singapore DC market is projected to grow at a CAGR of 12% to USD2.2bn in 2025 from USD1.3bn in 2020. Growth will mainly be underpinned by a combination of:

- i. Accelerated enterprise digitalisation initiatives;
- ii. Exponential growth in data consumption led by data-savvy internet users (for online content and applications – this includes new consumer 5G use cases like virtual and augmented realities);
- iii. Demand from hyperscale DCs relocating closer to their customers while meeting data residency standards.

Lifting of moratorium will spur new but selective development opportunities

In Jan 2022, the Singapore Government lifted a 3-year moratorium on the construction of new DCs. The ruling was imposed in response to the high energy consumption needs of the industry and concerns over their economic impact on the environment.

There are still opportunities for new and existing DC players to recalibrate their investments, as demand for DC space remains high – driven by rapid growth in e-commerce, content apps, AI, IoT, crypto-trading, etc. The proposals for new and additional DC capacities will be evaluated in a sustainable manner and in line with Singapore's 2030 Green Plan. As part of a pilot programme, the Government is limiting new builds to 60MW of IT load capacity (20MW per player).

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A Data Centre-Call for Application (DC-CFA) exercise by the Infocomm Media Development Authority (IMDA) and Economic Development Board (EDB) was launched on 20 Jul 2022 for parties seeking new DC capacity with the following evaluation requirements in place (see IMDA and EDB's [joint release on DC-CFA](#) for more details):

- i. **Sustainability: Best-in-class resource efficiency and decarbonisation.** Applicants selected are required to certify their new-build or existing DC seeking expanded capacity under the prevailing BCA-IMDA Green Mark for new DC criteria and obtain platinum certification. In addition to achieving a PUE of 1.3 or better, ie less than 1.3, applications have to demonstrate optimisation of IT energy efficiency with proposals on the use of renewable energy – eg hydrogen fuel cells, solar, etc – to offset their carbon emissions footprint;
- ii. **Strategic: Strengthening Singapore as a regional and/or international connectivity hub.** Applicants should indicate how their proposals will strengthen the country's value proposition as a key DC and technology hub for the region, as well as Singapore's regional/international digital connectivity;
- iii. **Economic: Broader contributions to Singapore's economic objectives.** Applicants need to state the capex and opex involved for their DC(s), and how they can contribute to the island republic's broader economic value and outcome.

The DC-CFA application closed on 5 Dec 2022 with the IMDA and EDB expected to announce the results in 1H23.

Figure 21: Ongoing and recent DC projects

Operator	Location	GFA Size (sq.m.)	Total power (MW)	Timeline
Meta	Tanjong Kling	170,000	150	Under construction/expected delivery in 2023
STT GDC	Defu 3	14,500	15	Commissioned in 3Q22

Source: Cushman & Wakefield

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Singtel's regional DC expansion strategy will see more than 100MW of capacity added over the next 3-5 years

As part of its strategic business reset announced in May 2021, Singtel aims to be a leader in DC services regionally with the best interconnectivity in South-East Asia by 2026. The group is already the market leader in Singapore, having started DC operations more than two decades ago. Singtel currently owns and operate seven DCs nationwide with a rated capacity of more than 70MW. Its prime Tiers-3 and -4 DC assets are DC West (41MW) and Kim Chuan (c.21MW), which have design PUEs of 1.4 and 1.6.

Figure 22: Singtel currently owns seven DCs in Singapore with >70MW capacity



Source: Singtel

In building a regional DC (RDC) platform, Singtel is planning a third-generation DC next to its current cable landing station in Tuas, which would have a design PUE of 1.3 and capacity of more than 30MW. The group is capitalising on the strong growth opportunities – to address the accelerating digital needs of ASEAN enterprises and CSPs – by entering into strategic partnerships with key partners within its current mobile footprints in Thailand and Indonesia.

Figure 23: Singtel is building a RDC platform as part of its strategic business reset...



Source: Singtel

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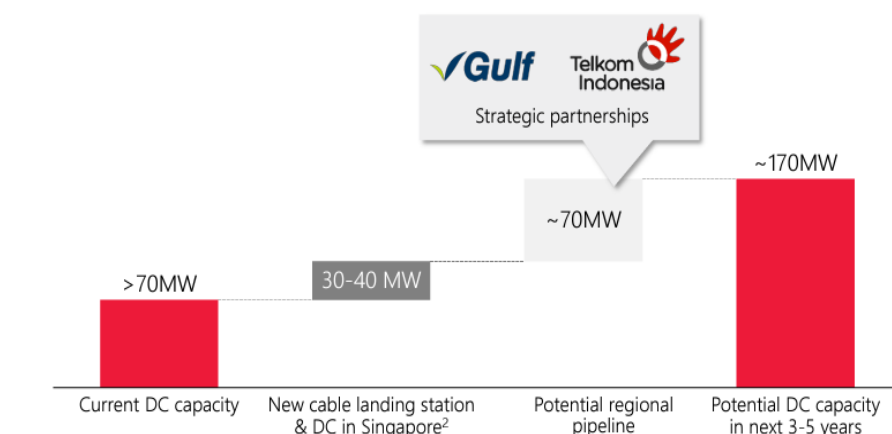
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In Feb 2022, Singtel – together with its 23.3%-owned mobile associate Advanced Info Services (ADVANC TB, NEUTRAL, TP: THB233) – entered into a joint development agreement with power producer Gulf Energy (GULF TB, NR) for the construction of a DC at Bang Phli, Samut Prakarn, near Bangkok (see this [release](#) for more details). The DC, which is slated for commissioning in 2025 with an initial 20MW capacity, will be operated by GSA Data Centre (GSA). GULF, Singtel and AIS hold equity stakes of 40%, 35%, and 25% in GSA.

In Dec 2022, the group entered into a strategic partnership with state-owned incumbent operator Telkom Indonesia (TLKM IJ, BUY, TP: IDR5,030) – the parent of Singtel's 25%-owned mobile associate Telekomunikasi Selular or Telkomsel – and Medco Power Indonesia to develop a [DC on Batam Island](#). This facility will mark the group's first foray into Indonesia's DC market and is its second regional DC expansion after Thailand. This DC will have a rated capacity of 51MW when fully completed (it will have a 20MW capacity when the initial phase is completed in 2025).

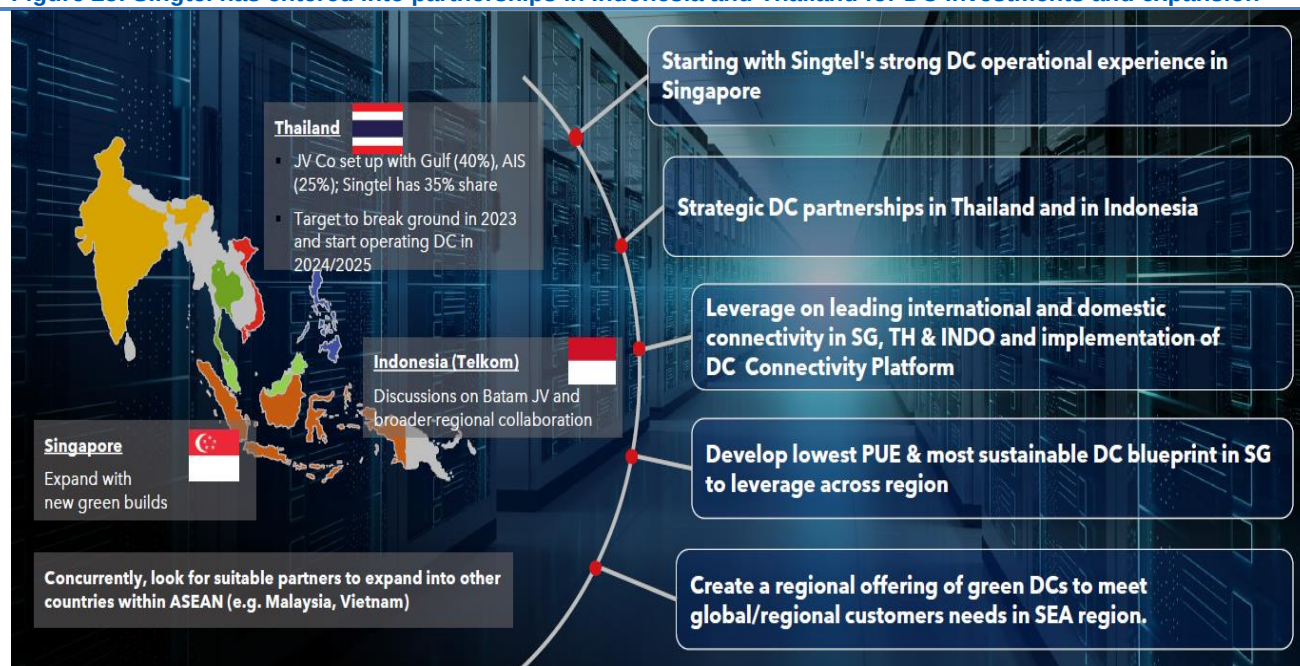
Overall, the expansion of Singtel's DC footprint across the region will see the group's DC capacity (including JV capacity) rise by more than 4x, ie to more than 200MW over the next 3-5 years.

Figure 24: ...with plans to add some 100MW capacity over 3-5 years



Source: Singtel

Figure 25: Singtel has entered into partnerships in Indonesia and Thailand for DC investments and expansion



Source: Singtel

We note that there have been steady increases in cross-border DC-type M&A in recent years involving the telco players. Part of the consideration for DC investments by the telcos is to also drive the expansion and growth of the enterprise segment – this is given the fact that DC assets are at the forefront of cloud and co-location services.

Some of the more notable cross-border deals in recent years include StarHub's (STH SP, NEUTRAL, TP: SGD1.11) purchase of an 88% stake in Malaysia-based digital services and DC provider Strateq in 2020 for SGD82.1m. Meanwhile, in Dec 2021, YTLP acquired Singapore start-up Dodid, which owns a 12.5MW Tier-3 DC in Tagore Lane, for an undisclosed sum. This marked YTLP's maiden DC foray outside of Malaysia.

At its 2022 Investor Day, Singtel said it does not rule out expanding its DC presence in Malaysia and Vietnam via partnerships and/or asset acquisitions. The expansion would be largely aimed at meeting pent-up demand and to address the more stringent conditions laid out by the IMDA and EDB for new DCs in Singapore following the lifting of the DC moratorium.

Malaysia's attraction lies in its close proximity to the island state, with Johor only less than 50km by road. Singapore's neighbour also has lower cost of land and labour, excellent infrastructure and connectivity, as well as pro-business policies by the Malaysian Government.

Key risks

Key risks for the Singapore DC industry include escalating energy costs and land limitations, which indirectly cap new developments. The DC-CFA also places more stringent conditions on new DCs with a cap on capacity to factor in sustainability concerns, given that DCs are key consumers of power on the island-state. Rising competition from emerging ASEAN DC hubs such as Malaysia, Indonesia, and Thailand presents a medium to longer-term threat with these countries' greater land resources and improving policies to attract hyperscalers.

Featured Stock Ideas

Singtel (ST SP, BUY, TP: SGD3.30) – well poised to capture ASEAN's DC growth

Singtel's focus on creating a RDC platform would allow the group to capitalise on the strong growth trend within the DC space across three markets – Singapore, Indonesia, and Thailand – which are expected to account for c.76% of the ASEAN DC market by value in 2025. Based on information highlighted in the group's quarterly results deck, the DC segment contributed more than SGD250m in revenue and an EBITDA of SGD150m, which translates into a c.60% EBITDA margin. For 1H FY23 (Mar), the group's DC business generated SGD132m and SGD85m in revenue and EBITDA, ie less than 5% of overall group revenue and EBITDA.

SREIT DC Plays

In the SREITs space, there are two pure-play DC REITs – Keppel DC REIT and Digital Core REIT. Keppel DC REIT is the best proxy for ASEAN DC exposure to Singapore, with 55% of total AUM of SGD3.7bn and Malaysia (1% of AUM), while Digital Core REIT's DC portfolio is fully located in North America. Other industrial SREITs with notable exposure to the DC market include Mapletree Industrial Trust (54% of total AUM with bulk of DCs in North America), and CapitaLand Ascendas REIT (8% of total SGD16.4bn assets).

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INDONESIA

DC Market Overview

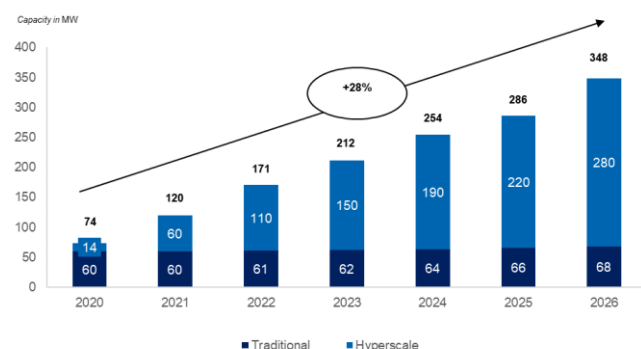
Indonesia's large and vibrant internet economy has fuelled the growth of its DC market. According to Analysys Mason, the country's DC capacity is projected to increase to 328MW in 2026 from 74MW in 2020 or at a CAGR of 28%. This market is now being seen as one of the largest and fastest developing in South-East Asia.

Investments in the local DC market grew rapidly between 2019 and 2021, with the positive trend expected to continue in the foreseeable future – albeit at a slower pace due to base effects. The expansion of hyperscale DCs is expected to drive growth with Alibaba Cloud and Google Cloud having launched their cloud regions in 2019 and 2020. Tencent has rolled out in two areas in 2021 while AWS is slated to deploy the same in 2022. Microsoft is expected to unveil its plans soon.

Aside from the hyperscalers, there are several DC service providers in the market that are focused on co-location services for enterprises.

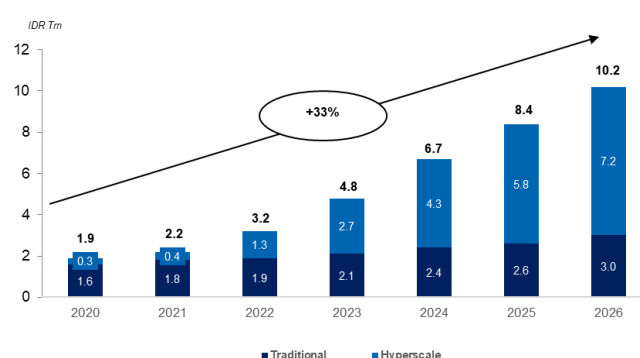
Overall, the industry DC revenue is expected to continue charting strong positive growth, supported by Indonesia's burgeoning internet economy – given that operators are expanding their capacities. According to Analysys Mason, the domestic DC market is expected to see a CAGR of 33% between 2020 and 2026 to IDR10.1trn while revenue from the hyperscalers is projected to grow at a CAGR of 63% over the same period – surpassing traditional or legacy revenues, which encompasses wholesale/retail co-locations, enterprise, and telco DCs in 2022.

Figure 26: DC capacity in Indonesia



Source: Analysys Mason

Figure 27: DC market size in Indonesia



Source: Analysys Mason

Indonesia's strong DC growth prospects are mainly driven by:

- Growing internet penetration and usage;
- Spillover effect from Singapore's moratorium on new DCs (partially lifted in early 2022);
- Favourable regulation policies and investments;
- Favourable incentives for DC investment.

Internet penetration and usage

We believe the DC industry in Indonesia will see more growth in the years to come. This will be driven by the expanding young and middle class population. Moreover, there were 204.7m internet users in the country in Jan 2022 while the country was ranked seventh out of 11 ASEAN states for internet penetration at 77% – this is above average when you consider ASEAN's internet penetration average of 74%.

Hence, we believe the aforementioned factors provide plenty of room for growth for Indonesia's DC industry – and significant demand for DC development still remains. Additionally, based on Statista data, the number of internet users in a country vs its total population shows that Indonesia has among the highest in the world, with 204.7m active internet users out of a population of over 270m.

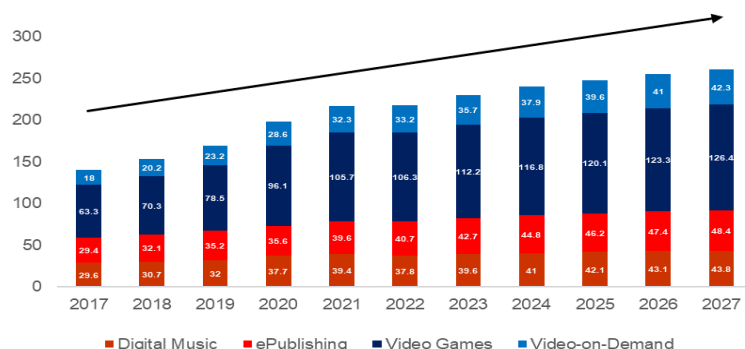
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We are of the view that the growth of social media platforms in Indonesia also increases internet usage. WhatsApp is the most widely used social media platform in Indonesia for communication, data, and file sharing. This is followed by Instagram, Facebook and TikTok. With the rapid increase in social media adoption, coupled with the country's growing young demographic, there is significant scope for Indonesia's DC market to expand.

Note: Most online media subsectors – eg digital music, video games, and video-on-demand – experienced spikes in user numbers in 2021, with a near 10% increase in usage when compared to 2020. We also believe that the usage of such media will rise significantly in future, boosted by the higher internet usage.

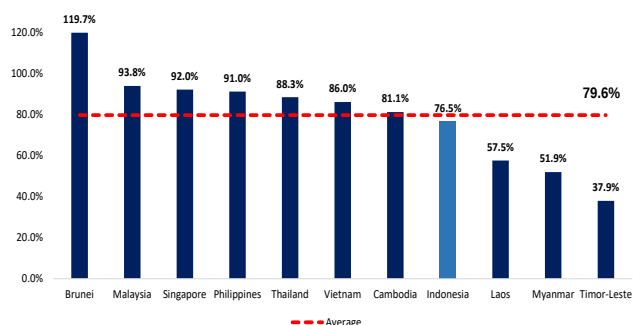
Figure 28: Digital media users by segment in Indonesia



- ◆ Online entertainment in Indonesia has the potential to increase on a yearly basis
- ◆ This growth mainly came from the social restrictions during the pandemic lockdowns, and the fact that 54% of Indonesia's population comprise Generation Z and millennials – demographics that are more tech savvy than older generations

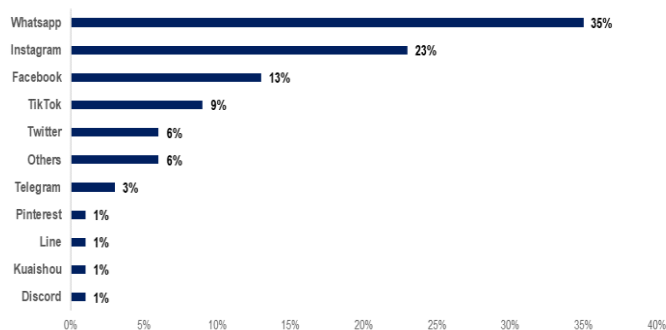
Source: statista.com

Figure 29: Internet penetration in South-East Asia as of Jul 2022 by country



Source: Statista

Figure 30: Social media platform rank

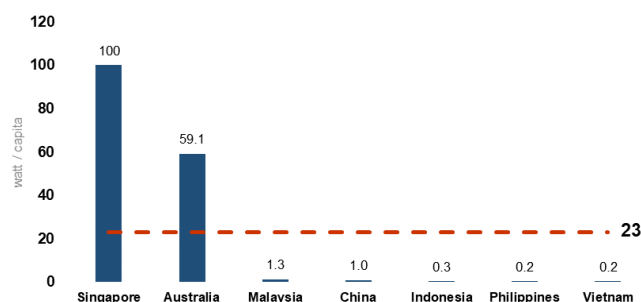


Source: wearesocial

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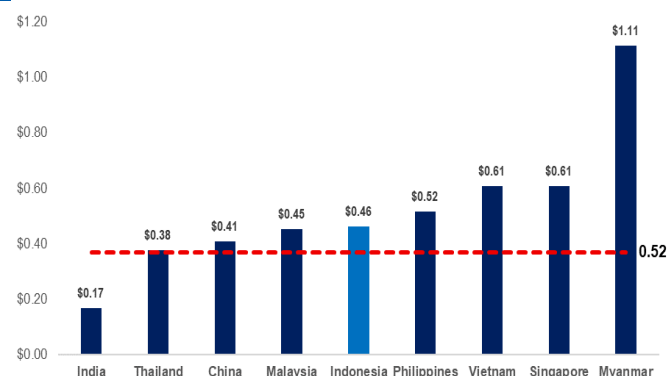
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Figure 31: DC penetration



Source: DCII

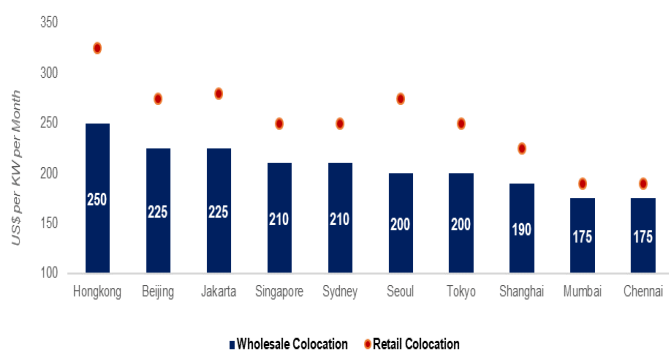
Figure 32: Average price of 1GB mobile data in USD in Jul 2022



Source: cable.co.uk

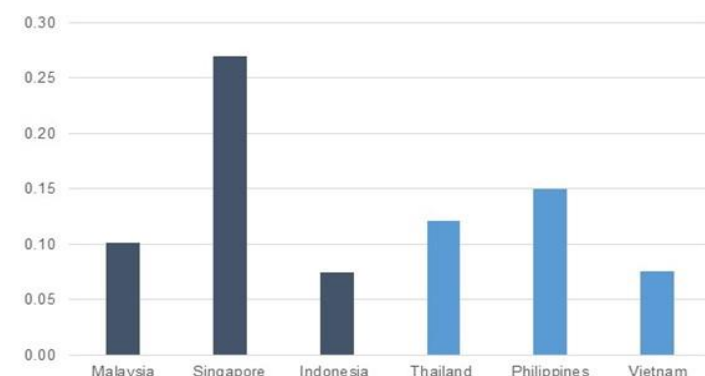
Indonesia's DC penetration per capita is still comparatively low vs its emerging market peers, which suggests considerable room for further expansion. On the mobile data prices, Indonesia has a relatively low rate compared to regional peers at USD0.46 for 1GB. Lower data prices should increase the number of users as well as usage.

Figure 33: Asia-Pacific DC rent



Source: CBRE

Figure 34: Electricity prices per kWh (Sep 2022)



Source: Global Petrol Prices

Indonesia still sustains a market price premium – even in Asia-Pacific – currently c.USD168 Kw/month for hyperscale cloud, USD206 Kw/month for wholesale colocation (500KW), and c.USD251 Kw/month for retail colocation (250 KW). Indonesia's electricity rate for businesses is also the lowest among South-East Asian countries, at c.USD0.08/ kWh which compares with Singapore's USD0.27/kWh.

Furthermore, Indonesia's digital economy and financial technology sectors have grown significantly. E-commerce growth and the shift to cashless transactions are accelerating the rise of digital payments. The adoption of digital payments, particularly in urban areas, has been spectacular – ranging from offline retail stores and public transit to utility bill payments. The number of people using digital payment systems in 2021 is predicted to have almost doubled from 2017, with a 30% increase expected by 2025. As a result, transaction value will grow faster than in 2021. Expanding digital services, particularly in Indonesia's financial services industry, inevitably drives demand for DC services.

A domino effect is in play for existing infrastructures and investments in new facilities – particularly for the DC category. As DCs evolve, 5G will be less defined by size and more by proximity to end-users and their agility in processing, movement, and secure data storage. The impact of 5G on core DC infrastructure will remain centred around optimising efficiency, reliability, resiliency, and security to ensure 5G service is not compromised. Energy security, 5G, and IoT will place greater power demands on an already power-intensive industry.

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Positive spillover from the Singapore moratorium

The Singapore Government lifted [a 2019 moratorium](#) on new DCs at the start of 2022 and will evaluate proposals for the construction of new facilities based on the level of energy efficiency. Regulations in Singapore are more rigorous for DCs due to limited energy sources and land availability. The Singapore Trade and Industry Ministry has clarified that it will be more selective as DCs are "intensive water and electricity users". The focus is to grow the industry more sustainably, with approvals granted on a case-by-case basis. To reach climate goals, the Government will seek to anchor best-in-class DCs in resource efficiency by only allowing 60MW of new capacity, in tranches of 20MW. New DCs should also have a PUE of 1.3 or below.

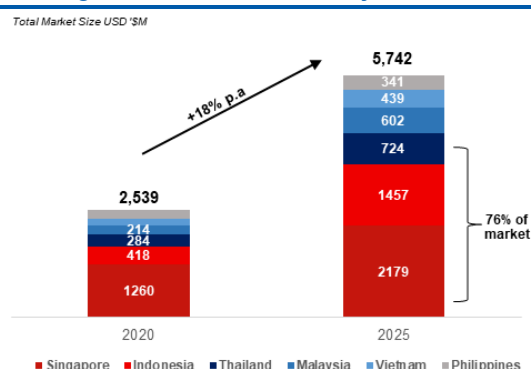
Given the capacity constraints in Singapore, Malaysia and Indonesia have emerged as critical beneficiaries, especially for larger hyperscale DC players like Amazon, Microsoft, Tencent, and TikTok's parent ByteDance. In Indonesia, land purchases can be done prior to having a DC development license whereas in Singapore, a license must be obtained first prior to purchasing land.

Figure 35: Digital payment users



Source: statista.com

Figure 36: Regional DC demand: Ready for lift-off



Source: Frost & Sullivan 2020

Domestic regulations are supportive of local DCs

The Financial Services Authority regulations no. 13/POJK.02/2020 and no. 4/POJK.05/2021 are about applications of risk management in using information by commercial banks and non-banks. These regulations were imposed by the Financial Services Authority specifically for financial institutions. Non-bank financial institutions with assets of more than IDR500bn must have a DC and a disaster recovery centre. Both bank and non-bank financial institutions' electronic systems must place their data and disaster recovery centres within Indonesian territory. However, financial institutions can be allowed to host their DCs overseas, subject to approval by the authorities and the fulfillment of certain requirements.

Under the Indonesia Government regulation no. 71 of 2019 on Organisation of Electronics Systems and Transactions, public electronic system operators (ESOs) must place their electronic systems and data in Indonesia unless there is no availability of domestic storage technology. The regulation covers state institutions and/or other institutions appointed by the state that operate an electronic system. For now, private ESOs are not subject to the same requirements. An additional requirement stipulates that the Government can define private or public institutions with "strategic electronic data", for which the service of a specific DC is utilised to protect electronic documents and back-ups, with details to be expanded via subsequent regulations. While not explicitly defined, "strategic electronic data" is expected to encompass institutions that own vital information, ie financial services, telecommunications, and IT.

Indonesia will become the fifth country in South-East Asia to implement Personal Data Protection regulations. Under the Ministry of Communication and Informatics' regulation no. 20 of 2016 on Personal Data Protection In Electronic Systems dated 1 Dec 2016 ("MOCI Regulation 20/2016"), and Government regulation no. 71 of 2019 on the Implementation of Electronic Systems and Transactions dated 10 Oct 2019 ("GR 71/2019"), the scope of the regulations was limited to personal data protection in electronic systems. Its comprehensive set of provisions protects different types of personal data, stakeholders' rights and obligations, processing and transferring, data protection officer appointments, dispute resolution, and even administrative and criminal sanctions.

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Favourable tax breaks

Taxpayers making new investments in pioneer industries in Indonesia may be eligible for a corporate income tax reduction under the Minister of Finance Regulation No. 130/PMK.010/2020 (MoF Regulation 130). Investments ranging from IDR100-500bn are entitled to a tax reduction of 50%, while investments exceeding IDR500bn are entitled to a 100% tax reduction. The tax holiday is offered for pioneer businesses in the digital economy including data processing, hosting, and related digital economy activities, with the duration of the holiday contingent on the amount of investments.

Figure 37: Income tax reduction

Investment (IDR)	Income Tax Reduction	Facility Period
100 bn - < 500 bn	50%	5 years
500 bn - < 1 trn	100%	5 years
1 trn - < 5 trn	100%	7 years
5 trn - < 15 trn	100%	10 years
15 trn - < 30 trn	100%	15 years
< 30 trn	100%	20 years

Source: Ministry of Finance Indonesia

Figure 38: Current ongoing ecosystem developments

Company	Activity	Description
Big Data Exchange (BDx)	Launching of BDx Indonesia	Announced the launch of BDx Indonesia, assuming operations for four existing data centres in the Jakarta market. BDx plans to upgrade these existing centres and develop greenfield sites, to reach 70 MW by 2023 and 250 MW in the next five years. The data centres will connect BDx's cluster in China and Singapore.
EdgeConneX	Acquiring of local DC	Enters the Jakarta market by acquiring a local 7 MW data centre owned by GTN and developing adjacent land that will total 90MW in capacity once fully developed.
NTT	Launching the new DC	It launched its Jakarta 3 data centre. The facility will offer 15.2 MW of initial capacity and eventually will attain 40 MW once fully built. Jakarta 3 will be connected to the upcoming APRICOT cable system that will arrive in 2024, which links all of NTT's major data centres in the area.
DCI	Opening the first phase of the planned DC	The first phase of a planned data centre in Karawang, East of Jakarta, was opened. The project's first phase, H2-01, has 15 MW in capacity. When fully built out, the campus will reach a total capacity of 600 MW.
Indonet	Opening a 6MW facility	Recently acquired by Digital Edge, it opened a 6MW facility in downtown Jakarta. The firm has acquired two sites in Kuningan to help build a further 40 MW capacity for the market.
AWS	Launching a new cloud region	They launched a new cloud region, ap-southeast-3, in Jakarta at the end of 2021. The facility joins two Direct Connect and one CloudFront edge location that AWS currently operates in the market.
Indosat	Partnership with Tech Mahindra	Indosat announced a partnership with Tech Mahindra to establish itself as the top telecommunications provider in Indonesia. The partnership is aimed at integrating 5G, cloud services and IoT across Indonesian networks.

Source: Cushman Wakefield

Cloud-based services supported by technology advancements are also driving demand for DCs. South-East Asia's growing start-up ecosystem will likely make it an important market for cloud-based, on-demand computing service providers. This dynamic ecosystem attracts global firms like Alibaba Cloud, Google Cloud Platform, Amazon Web Service, Microsoft Azure, and most recently, Tencent, to Indonesia. The country is home to many start-up companies, including Gojek, Tokopedia, and Traveloka. Indonesia's robust digital economy has propelled it to own the region's top cloud market share. Numerous start-up ecosystems actively rely on the cloud for infrastructure and rapidly expanding IT requirements. Moreover, increased demand for smart devices, rising demand for analytics and cloud services, and the expansion of wireless networking have led many enterprises to invest in big data and IoT technology.

Batam – An emerging hotspot for DCs

Jakarta catapulted itself to a worldwide DC market owing to its undersea solid cable connectivity, central geographic location in South-East Asia, and a massive population increase experiencing digital transformation. These factors allowed Indonesia's capital city to leap ahead of the small builds in many similar cities and straight to hyperscale – with 127MW currently under construction and more operators looking for entry points. The current projects will grow the Jakarta market by over 900MW, with little unattractive legacy infrastructure holding back large-scale deployment.

While Jakarta continues to expand, the DC moratorium in Singapore has led to some creative solutions, including at the nearby recently-designated special economic zone of Batam. The island has drawn rapid interest, thanks to its business and income tax breaks. Initially, the Gaw Capital-backed Data Centre First secured a 2.75ha site for DC development. At 2021-end, GDS Holdings announced a site purchase in Batam to develop two DC buildings totaling 28MW capacity upon completion. The island is also the site for TLKM's new 75MW DC, to be built in partnership with Singtel.

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Figure 39: Construction update

OPERATOR	LOCATION	GFA SIZE (SQM)	TOT.POWER (MW)	STAGE / EST. DELIVERY
Pure Data Centres	Jakarta	20,000	20	Under Construction / Q2 2022
Princeton Digital	JC2	22,800	35	Under Construction / Q3 2022
STT	Bekasi	60,000 (est)	72	Under Construction / Q1 2023

Source: Cushman Wakefield

Figure 40: Recent site sales

PROPERTY	SIZE (SQM)	SALE DATE	BUYER	SELLER
Mataram, Lippo Cikarang	40,000	22-Feb	EdgeConnex	Multipolar Technology

Source: Cushman Wakefield

Figure 41: Overview of key players

Category	Operator	No. of data centres	Gross datacentre space (m2)	Critical IT capacity (MW)	Description
Data-centre focused	DCI	4 current + 1 under construction	Undisclosed	37	Data-centre campus is sited on 8.5 hectares of land that can be scaled to 300MW. Understood to be serving hyperscalers such as Alibaba Cloud and Google Cloud, which highlights the suitability of its assets to meet the stringent requirements of such customers.
Datacentre focused	NTT	2 current + 1 planned	~7,700 (current) + 18,000 (planned)	>9	Building a 45MW data centre with investments of ~USD500 million that may be well placed to meet cloud providers' requirements given large potential capacity and redundant power routes. In addition, NTT owns and operates one of the world's largest Tier-1 global IP backbones which can facilitate connectivity between Jakarta and overseas cloud regions.
Datacentre focused	Biznet	3 current + 1 planned	>7,000 (current)	>10	Currently has three data centres, with plans to expand to Surabaya and Yogyakarta.
Datacentre focused	GTN	1 current	~6,500 (current)	5	Tier 3-equivalent facility in Cikarang has potential for expansion to 40MW.
Datacentre focused	Space DC	1 current + 1 planned	>40,000 (planned)	1.5	Upcoming player that operates a Tier 3 facility in Greater Jakarta with 1.5MW capacity and is building a 24MW facility in the existing data-centre campus that is expected to fully come online in 2022.
Datacentre focused	IndoKeppel	1 (planned)	>9,800 (planned)	N/A	Upcoming player that has suggested that it will be targeting cloud players. Facility is being built on a 3-hectare plot with potential to expand to become a 7-hectare data-centre campus which claims to provide 40MW of capacity. Has 3 larger data centres serving enterprises and more than 12 smaller data centres serving SMEs.
Telcolinked	Telkomsigma	>15 current + 1 under construction	Undisclosed	>25	Primarily serves financial institutions which comprise >50% of its customer base. The new Telkom Hyperscale Data Centre construction broke ground in June 2020 – the facility will be built on 65,000m2 of land, housing 10,000 racks and boasting an IT capacity of 75MW. First stage of this facility is understood to have gone into operation in 2021, delivering 25MW.
Telcolinked	PDG	5 current + 1 planned	~16,000 (current) + ~24,000 (planned)	~10	PDG acquired 70% of XL Axiata's data-centre assets in July 2019, which includes two Tier 3/4 facilities within Greater Jakarta. Announced in 2021 that it is developing a 22MW facility adjacent to its JC1 facility.
Telcolinked	Lintasarta	3 current	5,100 (current)	>3	Tier 3 facility in Jakarta appears to have limited capacity and uses PLN as its electricity supplier which may deter customers given concerns on reliability.
Small players	Moratelindo	6 current	5,724	2.2	Data centres in Jakarta, Surabaya, Medan, Palembang, Bali and Batam, with a total of 514 racks. Within the Mora internet exchange point (Mora IXP) network, and connected to Public Data Center and other exchange-points in Indonesia.
Small players	DTP	5 (current)	~900	Undisclosed	Small player with a portfolio of small facilities that houses

Source: Analysys Mason

Key risks

The effects of geography on DC quality. Indonesia's geography is one of the main factors affecting its connectivity – connection is relatively uneven across the country. While incoming connections to metropolitan centres are improving, connectivity to the rest of the country remains inadequate, particularly in rural areas.

Rising power costs and consumption may affect profitability. In line with advances in other markets, DC asset developers may be required to achieve green energy requirements through renewable energy sources or carbon credits. If prices rise in the future, especially if revenue is under pressure, the business case for DC investment will become less appealing. To deal with power failures, DC operators must invest in redundant back-up systems, which raises operational costs.

Lack of slowing economic growth to DC demand. The economy may face immediate expenditure pressures. Many businesses will have less income – putting a strain on spending plans ie for storage and memory. This will affect the storage and memory industries. We may see the first signs of a slowing demand and a drop in costs for various memory technologies, although this could also be due to new memory production capacity coming on line and swelling supply.

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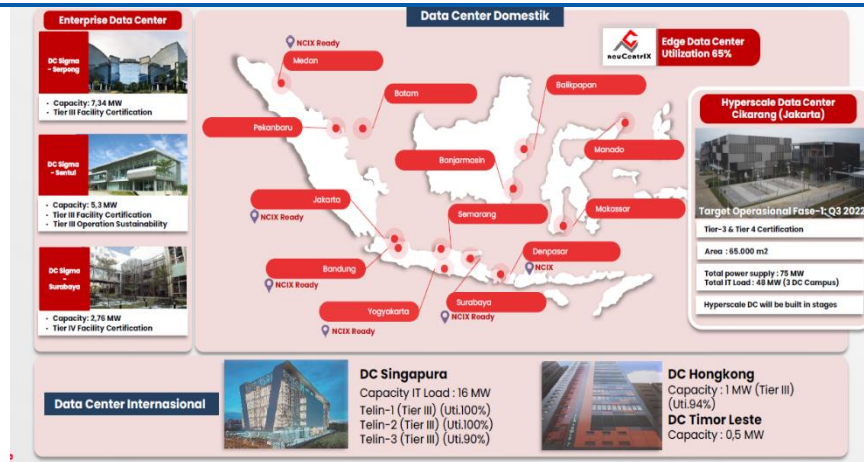
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Featured Stock Ideas

Telkom Indonesia (TLKM IJ, BUY, TP: IDR5,030) – In the big league

We see TLKM as being among the telco operators in Indonesia with the largest capital and ready-made infrastructure to develop the DC trend in the country through its subsidiary NeutraDC. The latter is a direct subsidiary of TLKM, and runs the DC business within the group. It plans to continuously expand DC capacity at home and abroad – expecting to achieve 400MW capacity by 2030. It also aims to grow its Indonesian market share from the current 15% to 40% by 2030. This should come on the back of increasing demand for DC services and driven by the CSPs and financial industries, on top of the upside potential from Singapore market's spillover.

Figure 42: NeutraDC as a hub of the digital ecosystem



◆ NeutraDC has several smaller DCs known as neuCentrIX, which is a neutral-carrier data centre ecosystem and one-stop solution for colocation, cloud service, and internet exchange

◆ These neuCentrIX are located in 13 major Indonesian cities with more than 200 racks and serving more than 150 customers

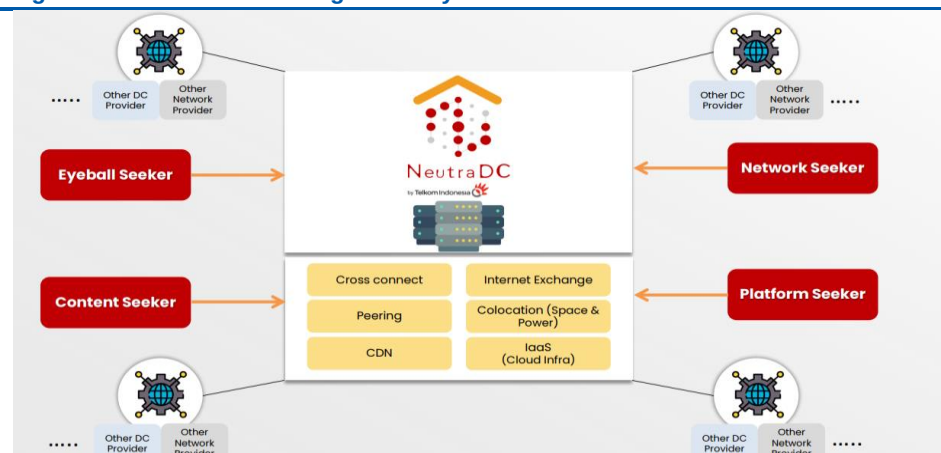
Source: Company data

NeutraDC will then expect to leverage its existing infrastructures through smaller DCs spread all over Indonesia, Hong Kong, Singapore, and East Timor, and combine it with the hyperscale DC while riding on TLKM's captive 360,000 enterprise users. NeutraDC will also act as a hub for the digital ecosystem while aiming to fulfil the needs of four user segments:

- Eyeball seekers – includes OTT players;
- Content seekers – individuals seeking contents on social media or other platforms, ie YouTube;
- Network seekers – those looking for ways to distribute content;
- Platform seekers – those needing cloud capacity.

As at Dec 2022, TLKM has a total of 28 DC facilities – 23 in Indonesia and five abroad. It started the groundbreaking of the first phase of its second hyperscale DC (HDC) in Batam, in partnership with Singtel and Medco Power. The HDC will be built on 8ha land across three campuses with 75MW designed total capacity and 51MW designed IT load capacity. The first phase of the DC development involves 20MW IT load.

Figure 43: NeutraDC as a digital ecosystem hub



Source: Company data

Indosat Ooredoo Hutchison (ISAT IJ, BUY, TP: IDR7,580) – in JV with BDX

Indosat Ooredoo Hutchison (ISAT), along with its subsidiary Aplikasi Lintasarta and Starone Mitra Telekomunikasi had in May 2022 inked a new shareholder and JV agreement with BDX Asia Data Center Holdings (BDX), which led to the creation of BDX Indonesia (BDx). The JV represents one of the largest foreign investments in the Indonesian DC sector with the unlocking of value of its DC assets presenting opportunities for ISAT to expand its non-cellular segment. The JV brings together ISAT's digital telecommunication capabilities, Lintasarta's award-winning portfolio and extensive ICT experience, as well as BDX's best-in-class connectivity and global DC expertise. BDX operates four DCs previously owned by ISAT – all located at key sites in Jakarta.

XL Axiata (EXCL IJ, BUY, TP: IDR3,140) – DC partnership with Princeton Digital

XL Axiata's (XL) DC ventures are undertaken via its 14.8%-owned associate Princeton Digital Group Data Centers (PDGDC). PDGDC was the result of XL's earlier disposal of its five DCs in Indonesia to the Singapore-based Princeton Digital Group, which emerged as a strategic investor in 2019.

DCI Indonesia (DCII IJ, NR) – South-East Asia's first Tier-4 pure-play DC

DCI Indonesia (DCII) is the first Tier-4 DC in South-East Asia with one of the strictest service level agreements. As a cloud and carrier-neutral DC, it is trusted by more than 40 telco providers, four global cloud players, four e-commerce platforms, eight multinational banks, 11 multinational insurances, 100 financial services firms, and more than 60 companies and state-owned enterprises. DCII was listed on the IDX in Jan 2021 with IDR150bn raised through its IPO. In June 2021, Indonesian tycoon Anthoni Salim increased his stake in DCII to 11.1% from 3.03% after acquiring 192.7m shares and injecting IDR1.1trn in capital for the company to expand its DC capacity. It has two large DC complexes in West Java with five buildings and a combined capacity of 52MW. It is in the process of developing a third DC on Bintan. For FY22, DVII expects to spend c.IDR500bn for capacity expansion.

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