New interconnection markets in Southeast Asia

TeleGeography
Authoritative Telecom Data

White paper
1. Introduction

*Singapore is undisputedly the network hub of Southeast Asia. That isn’t likely to change anytime soon. But changes are brewing in the region. International operators are injecting fresh network investment into new locations, setting the stage to distribute new aggregation points across the region.* In this paper, we will conduct an in-depth evaluation of the Southeast Asian market, scrutinizing Singapore’s role as the market hub and analyzing frontier markets in the region to see where new, increasingly localized interconnection nodes could flourish. We will specifically look at the potential for new connectivity ecosystems in five of the region’s metropolitan areas: Jakarta, Kuala Lumpur, Bangkok, Manila, and Hanoi. But first, let’s clarify what we mean by “hubs” and make a few observations about how network aggregation is shifting.

2. What makes an interconnection hub a hub?

A handful of global markets earn the distinction of being network interconnection hubs. They are distinguished by aggregating more international bandwidth and more colocation data center capacity than any other markets. Simply put, hubs are the most critical converging points of global network interconnection.

So why are these locations hubs? In part, because their network growth self-perpetuates. To quote an old TeleGeography reader from 2000 called Hubs + Spokes, “As more bandwidth runs to the hub, economies of scope and scale make that hub a key destination for still more bandwidth, because everyone else is already there.”

This accumulating effect explains why hubs tend not to decline in influence. They are massively scaled interconnection ecosystems that attract increasing amounts of network traffic. They also happen to be the converging points for global economic activity – shipping, finance, commerce, and all manner of human activity.

What characterizes an interconnection ecosystem? There are numerous aspects that define major interconnection nodes, but for the sake of this paper, we will highlight a few key characteristics:

- **International Internet bandwidth:** Hubs are a converging point for capacity coming from other locations. Regional and global networks prioritize interconnection to hub locations as their focal nodes to access the global Internet.
Submarine cables: Submarine cables provide a foundational backbone to interconnect nations and regions. When we look at networks investing in physical subsea infrastructure, we get a strong indication of where they want to bolster coverage. For instance, when we observe subsea cable projects where a content network deploys a landing station in a previously undeveloped market, we can surmise that the content network is addressing a critical coverage gap for that location.

Data centers: Data centers – particularly multi-tenant colocation data centers – are the physical nodes where networks interconnect. International colocation operators tend to be cautious when investing in completely new frontier markets. When they do, it is typically through joint venture or acquisition. If a market has international colocation operators present, it’s a clear sign that those operators see potential for the development of a local interconnection ecosystem.

Internet Exchanges (IXs): Local peering exchanges are at the ground level in cultivating new interconnection nodes. A healthy local market will typically have more than one local IX, with numerous member networks and strong traffic levels. This is vital to creating distributed interconnection nodes. If a frontier location is cultivating a healthy domestic IX market, international operators may also see opportunity and invest in the market.

Cloud: A handful of global cloud providers is transforming the global network. These networks invest heavily in transport capacity, hyperscale data centers, and colocation to bring numerous applications to billions of end-users worldwide. When cloud providers like Google, Amazon, and Microsoft deploy onramp nodes in new markets, they are responding to tangible demand in that location. Their presence injects life into local interconnection markets, generating public and private peering within local data centers. When the demand is sufficiently scaled, cloud providers invest further in a market with full cloud regions, deploying data centers across redundant zones. Cloud providers offer some of the clearest indication of potential for localized interconnection in a frontier market, as they enter a location with the mandate to peer with a strong diversity of networks.

Hubs do not exist in isolation. They are inextricably linked to downstream markets. Across each global region, are numerous secondary markets – vital nodes of communications and commerce on a sub-regional and more localized level.
When the Internet started, there was one major global converging point for networks across the globe – in the US. As networks evolved and developed resilience, operators quickly realized that they could not converge on a single point of failure. Rather they needed multiple redundant paths to maintain consistent service and more localized hubs to reduce network latency and tailor localized demand for network access. So over the years, traffic has shifted to more localized hubs in Asia and Europe. These locations have grown into markets as large and mature as any in the US. Locations like Singapore, Hong Kong, Frankfurt, and London have the full mix of content, cloud, peering, and network services that mark the very largest of global hubs.

It is against this backdrop, that we have entered another transition. As global hubs have matured, we now see increased demand for localization at a sub-regional level. Several factors influence this trend:

→ High cost: While network and data center costs are competitively priced in some hub markets, others are incredibly expensive. Networks absorb the cost of interconnecting in these locations because their demand is relatively inelastic. They need to be in these places regardless of the expense.

→ Operational uncertainty: Sometimes geopolitical uncertainty, policy changes, or operational challenges cause network operators to try to reduce their dependence on hubs. Recent tensions between the US and China and riots in Hong Kong have brought instability to the forefront of discussions around network deployment.

→ Network resilience: As noted above, networks do not want to converge on a single point of failure. Many cloud and enterprise networks have a mandate to deploy in geographically separate zones to ensure service delivery. This causes many networks to look beyond the obvious regional hubs in determining where to interconnect.

→ Proximity to end-users: Perhaps one of the greatest reasons networks are increasingly interested in shifting away from complete dependence on regional hubs is the fact that advanced networks and services will increasingly mandate deployments closer to the network edge. Bandwidth-intensive applications like gaming and video streaming already necessitate proximity to end users to optimize packet delivery. In the very near future, services like 5G, advanced cloud applications, sensor networks, AI, and self-driving vehicle platforms will require nodes to be deployed wherever there are population clusters. Even
back-end computing services will need to be closer to edge locations as increasingly bandwidth-intensive applications are deployed to the network edge.

We are now seeing the start of a shift in Southeast Asia. While investment in Singapore remains strong, that market is not without its challenges, and while nascent markets in the region remain volatile, they also present new opportunities. Let’s look at Singapore first.

### 3. Singapore’s dominance in Southeast Asia

Singapore is not just the interconnection hub of Southeast Asia. It is also one of the largest global hubs as measured both by international Internet capacity and colocation capacity. Take a look at the accompanying figures. Aside from the anomalous FLAP markets (Frankfurt, London, Amsterdam, and Paris), no other global market has more connected international Internet capacity than Singapore. And among the largest global markets, none is accumulating capacity at a faster rate. As of 2019, Singapore had an estimated 37 Tbps of international Internet capacity at a growth rate of nearly 60% compounded annually since 2015. That growth rate was more than twice as rapid as that experienced by any of the FLAP markets.

In the geography of telecommunications ecosystems, network and colocation data center development go hand in hand. Wherever we see a large concentration of networks, we are bound to see a lot of data centers acting as interconnection nodes for those networks. So it is unsurprising to see a fair amount of overlap in the lists of largest metropolitan markets for international connectivity and for colocation.

By our measures, Singapore ranks among the top markets for both. With around 4.4 million square feet of retail colocation space among roughly 50 sites, Singapore is one of the world’s biggest markets for data center interconnection. Among the providers of data center services in Singapore are at least 20 international operators.

Despite Singapore’s robust operating environment, there is growing concern among global networks that there is far too much dependence on this single market. With no comparable interconnection point in the region, it has become a single point of failure for some networks in the region.

This inherent vulnerability is one of many reasons that network operators are now searching for alternatives to Singapore.
in Southeast Asia. Some of these reasons are negative – mitigating risk – while others are positive – pursuing opportunities to create more robust network environments.

Two points are clear. 1) No movement toward new markets will replace Singapore’s vital position as the network hub of Southeast Asia, but 2) a wider mesh of mature, interconnected markets is vital to the health of Southeast Asia’s interconnection ecosystem. Here are a few reasons that networks need to look further than Singapore in determining deployment strategies.

**Network concentration in one city is not ideal.** Single points of failure are notoriously problematic in network architecture. Internet routing and network design require redundancy and resiliency. This mandate is the primary reason that major cloud providers deploy regional footprints in geographically separate zones. In the case of outages or other volatile situations affecting networks, failover is required far enough from the problem to avoid the effects, but close enough to provide reliable service to the wider coverage area.

**Singapore’s colocation costs are high.** Along with Hong Kong, Asia’s other primary international hub, Singapore is one of the most expensive global hubs for colocation deployments. By TeleGeography’s measures, the average price per kilowatt for a 4-kw cabinet with one cross-connect averages around $2,400 per month. This is about 25% pricier than New York’s average price per kilowatt. What’s more, Singapore and Hong Kong have historically maintained the highest colocation rates among global hubs since we began tracking these metrics more than six years ago.

**Singapore has a moratorium on new data center development.** The tremendous concentration of data center development in Singapore has not escaped its government’s notice. In a decision not unlike that declared by Amsterdam in mid-2019, Singapore put a moratorium on new development while the government evaluates the impact of the industry on power and land supply. The impact of halting new development for any period of time cannot be overstated, and it is highly likely that this policy will spur development deeper into the Southeast Asian region, both for data centers and for network deployments.

**Hong Kong cannot be the only alternative.** As networks look to offset dependence on Singapore, the region’s other primary hub of Hong Kong is going through its own uncertainty. The riots of 2019 prompted similar
soul-searching about the volatility of that hub and the need to distribute network assets further in the region. The hunt for new connectivity markets in Southeast Asia is further spurred by the fact that the broader region’s other hub market is showing signs of vulnerability.

New markets are showing signs of promise. Negative factors are far from the only driving force in developing new interconnection markets. Nascent markets in Southeast Asia have tremendous and rapidly growing demand for international bandwidth, saturated telecommunications markets, and an appetite for local interconnection. Furthermore, the continued development of bandwidth-intensive cloud and mobile network technologies will necessitate the establishment of more localized communications markets.

We are on the cusp of a dynamic phase of investment growth in frontier Southeast Asian markets. Let’s take a look first at how network deployments are shifting in the region before pursuing a deeper evaluation of the potential for interconnection ecosystems to be established in new regional markets.

4. Southeast Asian network dynamics

Take a look at the accompanying stacked column chart. While the shift over the past five years may not seem dramatic, it is not insignificant. What it shows us is that there has been a steady decrease in dependency on access to the US and an increase of localization in Asian traffic patterns. Since 2015, the proportion of Asia’s international Internet bandwidth that connects to the US and Canada has fallen from around 40% to just 25%. Concurrently the proportion of international Internet capacity remaining in the region has risen from around 40% to more than 50%.

This shift in traffic sets the stage for new patterns of interconnection within Asian markets. Rather than relying heavily on trans-Pacific connectivity between intercontinental hubs, this change indicates growing regional self-reliance. As hubs like Singapore increasingly provision the full network, cloud, and content ecosystems demanded by operators throughout Southeast Asia, the peering ecosystem can increasingly localize within the regional markets.
Within the region, where do we see traffic growing? If you look at the table above, among the largest markets in Asia, those with the fastest growth bandwidth are in the Southeast – Indonesia, Vietnam, Singapore, and Thailand. These are highlighted in red. While Singapore continues to grow dynamically despite it’s already prominent status as the region’s focal point for international Internet bandwidth, other Southeast Asian locations are on the march as well.

What is more striking is where we find the growth in bandwidth routes. Take a look at the list of the largest international city routes for Internet bandwidth in Asia. Six of these routes (highlighted in red) are growing faster than 60% compounded annually, and of those six, five involve at least one Southeast Asian destination in the countries highlighted in the previous paragraph. The two largest routes interconnect the hub of Singapore with Jakarta and Bangkok, and these routes are growing rapidly. As we can see, Singapore’s continued growth as a hub is at least partly driven by growth in other Southeast Asian markets that are deeply tied to it.

We should also note the broader regional connectivity represented by these top Asian routes. Eight of the ten are intra-Asian. This tells us that the network backbone needed for intermeshed nodes of connectivity is already established and growing rapidly.
5. Strategic evaluation of frontier markets in Southeast Asia

While Singapore remains the main focal point for interconnection, the explosive amount of international capacity growth in other regional markets like Indonesia, Thailand, and Vietnam provide an initial indicator that the market could be ripe for the establishment of more localized traffic distribution nodes. But are other locations ready to offset some of the interconnection traffic concentrated in Singapore? Let’s take a closer look at what’s happening in the network, IX, cloud, and data center markets throughout Southeast Asia to see. We will focus specifically on activity taking place in Jakarta, Kuala Lumpur, Bangkok, Manila, and Hanoi.

a. International Internet bandwidth

We have already seen that Southeast Asian markets are increasing their international Internet capacity faster than any other locations in Asia. Let’s take a closer look at our Southeast Asian markets in isolation. A couple observations stand out in the accompanying bar chart.

First, despite its already vast dominance in the accumulation of international IP capacity, Singapore is still growing its capacity at a blistering rate of nearly 60% CAGR. Secondly, Jakarta and Hanoi are amassing international Internet bandwidth at an even faster clip, approaching 70% CAGR. Bangkok’s international Internet capacity is comparable with Jakarta’s at more than 8 Tbps, and its growth rate tracks with Singapore’s.

If you take a look back to the route table in the previous section, you can see where a lot of this international capacity connected. For Jakarta and Bangkok, it’s connected to Singapore. For Hanoi, it is linked with Hong Kong. Kuala Lumpur is part of two of the ten largest Internet routes in Asia, both of which have been accumulating international Internet bandwidth at more than 60% growth CAGR since 2015. One of those routes, predictably, connects with Singapore. The other, larger, route connects to Bangkok.

What all of this shows us is that the markets of Southeast Asia are already highly interconnected. With the growth of healthy peering ecosystems, the region could see the cultivation of a distributed mesh of nodes, woven together by this strong and growing Internet backbone.
b. Submarine cables

As noted in the introduction, submarine cable deployments can give a strong indication of where networks want to connect. For some nations like Indonesia and the Philippines, subsea cables are a vital part of the domestic backbone, interlinking massive island chains. Indonesia alone has nearly 50 submarine cable systems! But these networks also provide vital connectivity to the outside world – both for domestic operators who need to reach hub locations and for networks that are moving into new markets.

Let’s take a closer look at subsea cable investment in the major Southeast Asian markets. Note that the number of planned cables listed in the table only reflects those that are publicly disclosed. We are aware of additional planned cables that could connect to all of these countries. A few observations about this table: For one, publicly announced new submarine cable projects are planned to reach every one of the Southeast Asian countries in our analysis. Additionally, we see that major content networks are investing as part-owners on planned cables that land in each of these markets, with the exception of Indonesia. All of these locations already have lit cables that are partly owned by content network investors. The following are some of the numerous current and planned submarine cables that stand out for their roles in connecting key Southeast Asian markets.

**Current systems**

- **Asia-America Gateway (AAG):** AAG holds the distinction of being the first cable system to directly connect Southeast Asia with the US. Launched in 2009, this system lands in almost every nation highlighted in our analysis: Singapore, the Philippines, Malaysia, Thailand, and Vietnam.

- **Asia Submarine-cable Express (ASE):** Deployed in 2012, ASE links multiple locations including Singapore, Malaysia, and the Philippines.

- **Southeast Asia-Japan Cable (SJC):** Deployed in 2013, SJC also lands in Singapore and the Philippines, among other destinations.

- **The Asia Pacific Gateway (APG):** Launched in 2016, APG includes Singapore, Malaysia, Thailand, and Vietnam among its landings.

- **SEA-US:** This trans-Pacific cable, launched in 2017, links Indonesia and the Philippines to the US mainland via Guam and Hawaii. SEA-US is distinctive as a trans-Pacific cable to Southeast Asia that does not land in Singapore.

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**Number of submarine cable systems**

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>23 (3)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>46 (1)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Malaysia</td>
<td>20 (1)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Thailand</td>
<td>8 (1)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Philippines</td>
<td>13 (1)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Vietnam</td>
<td>5 (1)</td>
<td>1 (1)</td>
</tr>
</tbody>
</table>

(®) - number of systems with content network owners

(Source: TeleGeography)
**Malaysia-Cambodia-Thailand (MCT):** MCT was launched in 2017 and spans 1,300 kilometers interconnecting these three Southeast Asian nations.

**SEAX-1:** Deployed in 2018, SEAX-1 is the latest of half a dozen small submarine cables providing direct connectivity between Indonesia and Malaysia. The system also has a landing in Singapore.

**Europe-Asia cables:** Major cable systems connecting Europe and Asia enable connectivity to Southeast Asia without necessitating connections through Singapore. Most recently in late 2016 and early 2017, SeaMeWe-5 (SMW-5) and Asia Africa Europe-1 (AAE-1) were deployed. Among its numerous landings, SMW-5 lands in Indonesia, Bangladesh, Sri Lanka, Malaysia, Myanmar, and Singapore. AAE-1 bypasses Singapore but provides connectivity to Malaysia, Myanmar, Thailand, Cambodia, and Vietnam. A number of major submarine cables interconnecting Europe, the Middle East, and Asia land in or near Marseille. Among these are both AAE-1 and SMW-5.

**Planned systems**

**Select submarine cables planned for Southeast Asia**

**PLCN:** The Pacific Light Cable Network (PLCN) is a trans-Pacific cable owned by Pacific Light Data Communications, Facebook, and Google. The cable directly connects Hong Kong to Los Angeles with branches to Taiwan and two landings in the Philippines. Facebook owns 2 fiber pairs on the branch to the Philippines. The entire system was
hoped to be in service by 2020, although regulatory hurdles have proved challenging. The US government has given provisional clearance for Google to operate its fiber pair from the US to Taiwan, and Facebook is requesting the same provision for its fiber pair to the Philippines. The authorization of the 4 fiber pairs to Hong Kong owned by PLDC is uncertain.

→ **BtoBE**: Bay to Bay Express (BtoBE) will be the first submarine cable to directly interlink Malaysia and Singapore with the US. Facebook and Amazon own this cable along with China Mobile.

→ **SJC2**: Facebook is part of a consortium of regional operators that will launch Southeast Asia-Japan Cable 2 (SJC2). This trunk and branch network will reach Singapore, Vietnam, and Thailand, among other destinations.

→ **JUPITER**: JUPITER will directly interconnect the Philippines, Japan, and the US with 60 Tbps of potential capacity. While Filipino incumbent PLDT will wholly own the branch to the Philippines, the system will share ownership with Amazon, Facebook, and several other large regional carriers.

Nearly every major market in Southeast Asia is getting a tremendous new injection of international capacity in the near future. Several of the submarine cables that will be deployed will interconnect multiples of these destinations, enabling a stronger mesh of distributed networking nodes. All of these systems will benefit further from significant investments by major global content networks.

Several of the Southeast Asian markets discussed here have extensive cross-border terrestrial backbones as well. Thailand’s terrestrial fiber optic backbone extends to all of its connecting borders. Malaysia has extensive connectivity with Singapore across the bridges linking the countries.

c. **Colocation data centers**

Colocation is a critical component of the interconnection ecosystem, providing the physical infrastructure in which networks build their peering environments. Colocation data center operators are notoriously cautious about entering entirely new markets. Timing is everything. Typically, there may be sufficient opportunity for one or two operators to make a modest move into a small market, and then the demand is satiated. Very few international colocation operators routinely dip their feet into frontier markets, and those that do generally do so through modest joint ventures or acquisitions.
Within the frontier Southeast Asian markets evaluated here, very few have significant investment by international colocation operators. This fact is juxtaposed with the fact that at least 20 international operators run colocation services out of Singapore. Here are a few observations about our nascent markets.

→ **Jakarta:** NTT and Equinix have established data centers in Jakarta. Equinix’s footprint is small and hasn’t expanded beyond one site in the 7 years the company has been in the market. NTT's facility is about 140,000 square feet. Microsoft Azure’s current onramp footprint is provided by incumbent Telkom Indonesia’s data center brand Telkomsigma.

→ **Kuala Lumpur:** NTT has several facilities in Kuala Lumpur, but the largest local interconnection ecosystem is provided by local provider AIMS. Its data center in Kuala Lumpur houses multiple cloud onramps and Internet Exchange connectivity.

→ **Other markets:** None of the other frontier Southeast Asian markets have international colocation sites to speak of, with the exception of a small KDDI footprint in Hanoi. That said, Singaporean giant, ST Telemedia Global Data Centres, is building a sizable wholesale data center facility near Bangkok. The site will be Thailand’s largest hyperscale data center, bringing major international investment to the nation’s network sector.

d. **Internet Exchanges**

Internet Exchanges are of utmost importance in cultivating strong interconnection ecosystems. They reduce dependence on transit and liberate networks to build complimentary relationships. They are the platforms from which the Internet grows. High-demand content and cloud networks look at a locality’s peering environment as a primary consideration in determining whether or not to deploy to a new market. With a mandate to peer with a multiplicity of networks, they will not consider moving into a location that has not cultivated a local IX environment.

So let’s consider the current IX ecosystem in Southeast Asia. While peering platforms have developed more in some locations than in others, there is clearly a strong appetite for peering across the region.

It may come as a surprise that Singapore’s largest exchange is not the biggest in Southeast Asia. Rather Indonesia’s OpenIXP has an impressive 1.3 Tbps of peak traffic generated.
by at least 243 member networks. MyIX’s traffic levels in Kuala Lumpur also rival those of SGIX.

SGIX may not be the largest exchange in the region, but Singapore’s traffic is distributed across six separate platforms. Equinix’s exchange in the city-state is at least as large as SGIX’s, and the mix of platforms in the market include a research and educational network exchange and two distributed international platforms.

Both the traffic volumes and the number of connected member networks at Jakarta’s OpenIXP and Kuala Lumpur’s MyIX are impressive and reflect a tremendous local appetite for network traffic exchange. Among the other markets of Southeast Asia, Manila’s PHOpenIX has fairly strong peak traffic levels and member numbers for a small market, and there are indications of nascent peering development in Bangkok and Hanoi.

Outside of Singapore, Southeast Asian IX markets are largely driven by local providers. Further investment by international service providers could unlock greater potential in these markets. DE-CIX’s acquisition of JBIX in Johor Bahru and its plans to enter Kuala Lumpur mark the entrance of a major international IX to the broader region outside Singapore. At the same time, DE-CIX will also invest in a new IX within Singapore itself. This signals two strategic goals:

1. That the company will develop a distributed mesh of peering nodes throughout Southeast Asia – a mesh that will include Singapore but also other vital sub-regional markets in order to enable more localized interconnection.

2. That the platform in Singapore will be used to provide a secure peering ecosystem from which networks can connect through the same peering fabric into more localized Southeast Asian peering markets like Kuala Lumpur.

In each of these markets, there is unmet potential to further grow peering ecosystems. The right platform and partnerships could tap into the localized activity already happening in Jakarta and Kuala Lumpur while also generating more local peering in other nodes throughout Southeast Asia.

e. Cloud onramps and regions

When cloud providers enter a new market, it is in response to tangible, immediate demand. There is little if any speculation involved in the decision-making. And when cloud providers move in, they need to quickly find a multiplicity of network

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**IX ecosystems, April 2020**

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of IXs</th>
<th>Top IX peak traffic</th>
<th>Top IX members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>6</td>
<td>482 Gbps</td>
<td>145</td>
</tr>
<tr>
<td>Jakarta</td>
<td>5</td>
<td>1,300 Gbps</td>
<td>243</td>
</tr>
<tr>
<td>Kuala Lumpur</td>
<td>2</td>
<td>493 Gbps</td>
<td>108</td>
</tr>
<tr>
<td>Bangkok</td>
<td>2</td>
<td>26 Gbps</td>
<td>32</td>
</tr>
<tr>
<td>Manila</td>
<td>2</td>
<td>60 Gbps</td>
<td>60</td>
</tr>
<tr>
<td>Hanoi</td>
<td>1</td>
<td>n/a</td>
<td>18</td>
</tr>
</tbody>
</table>

(Source: TeleGeography)
peering partners in order to expedite the process of onramping customers to their service platforms. Wherever we find major international cloud providers, we find the potential to establish new peering ecosystems or strengthen existing ones. Let’s take a closer look at cloud presence in the main Southeast Asian markets. In the table, impending cloud developments are marked in red.

**Singapore**: As the leading market in Southeast Asia, it is no surprise that each of the biggest cloud operators in the world has established a strong presence in Singapore. While Oracle is in the process of developing a cloud region here, AWS, Microsoft Azure, Google, and Alibaba already have full cloud regions in the city-state. IBM Cloud has onramp presence in the market as well.

**Jakarta**: Despite ongoing concerns about regulatory encumberances and operational difficulties, both Amazon and Google have decided that it is time to fully move into the Indonesian market with new cloud regions. Alibaba is already established there, and Microsoft Azure has an onramp footprint, but this movement to commit to the market by the two top global cloud providers is a new development.

**Kuala Lumpur**: Several major cloud providers have taken an initial dip into the Malaysian market through onramps, but as of yet, only Alibaba has deployed a full cloud region. The presence of a multiplicity of major cloud providers is clear indication of demand for a strong interconnection ecosystem in this market.

**Bangkok, Manila, and Hanoi**: As of yet, none of the world’s largest cloud providers have established cloud regions or onramps in Thailand, the Philippines, or Vietnam. It is hard to determine whether network priorities are leading any of them toward near-term investments in these markets either. The most active content network with dedicated submarine cable access to these locations is not one of the cloud providers but rather Facebook. Facebook is involved in current and planned subsea projects connecting to each of these locations through its investment in PLCN, JUPITER and SJC-2. Google is a part-owner of Southeast Asia Japan Cable, which also lands in the Philippines, and Amazon is part-owner on JUPITER. Nonetheless, with populations of around 100 million each and wireless subscriber penetration rates exceeding 100%, it is feasible that these countries will see deployments by major cloud providers in the near future. At the very least, direct cloud connectivity will be available via new onramps.

<table>
<thead>
<tr>
<th>Location</th>
<th>Cloud regions</th>
<th>Cloud onramps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>AWS, Azure, GOOG, Alibaba, Tencent, Oracle</td>
<td>AWS, Azure, GOOG, IBM, Alibaba, Oracle</td>
</tr>
<tr>
<td>Jakarta</td>
<td>Alibaba, AWS, GOOG</td>
<td>Alibaba, Azure, AWS, GOOG</td>
</tr>
<tr>
<td>Kuala Lumpur</td>
<td>Alibaba</td>
<td>Alibaba, AWS, Azure, GOOG</td>
</tr>
<tr>
<td>Bangkok</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Manila</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Hanoi</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
f. Pricing competitiveness

Network pricing competitiveness is critical to the sustainability of strong interconnection ecosystems. High pricing can be an indicator of a monopolistic operating environment and can be a costly deterrent to networking scale. Conversely, competitive pricing generally indicates that a given location is “on-net”, with a strong mix of local and international carriers providing affordable network access. Few interconnection ecosystems can truly fulfill their potential until market competitiveness is established.

Let’s look at two critical types of network pricing in Southeast Asia. Wavelength prices give us a good indication of the cost of getting to a location, while IP transit rates tell us what it costs to access the Internet in a location.

What is striking in looking at transport costs within Asia is how expensive the routes are. If we take the inter-hub route of Hong Kong-Singapore as a benchmark in the sampling below, all other routes are far pricier. The route to Kuala Lumpur is twice as expensive, with a weighted median 10 Gbps wavelength rate of over $7,000 per month. The Jakarta-Singapore rate is particularly daunting, at nearly $23,000 per month — a 7x multiple over the Hong Kong-Singapore price.

The rates of price erosion on these routes provide some encouragement though. Pricing on the routes to Jakarta and Kuala Lumpur all eroded more than 20% CAGR between 2016 and 2019.

The cost of IP transit in these markets is no less troubling. Not only is Singapore by far the least expensive market, but its price is also dropping faster than most other Southeast Asian markets. Only Bangkok’s erosion is faster at 21% CAGR between Q1 2017 and Q1 2020, but its current weighted median IP transit price is $5.35. Among the non-hub markets here, Kuala Lumpur has the most competitive price, but it is still 3 times higher than Singapore’s. Particularly worrisome is the fact that Manila’s and Jakarta’s median rates both exceed $6, and their prices are not eroding rapidly.

6. Outlook

Is Southeast Asia ready to develop a more distributed mesh of interconnection nodes? Singapore remains the region’s only connectivity hub. The confluence of its moratorium on new data center development and the volatility in Hong Kong will undoubtedly push network operators to consider distributing deployments more widely throughout Southeast Asia.
In fact, major international network, content, and cloud providers have already begun to deploy infrastructure throughout Southeast Asia in response to high demand for quality low-latency gaming and streaming service delivery. And as network advancements like 5G push more computing power to the edge, there will be a push for more widely distributed interconnection infrastructure. This shift will not reduce the need for strong hubs like Singapore, but rather supplement that need with greater edge peering, networking, and computing resources.

While challenges remain, there are also strong indications that the time has come for interconnection to distribute more widely throughout Southeast Asia. On the network side, we see dynamic demand for connectivity among these markets. The tremendous amount of international Internet capacity interconnecting Singapore, Jakarta, Bangkok, Hanoi, and Kuala Lumpur lays a strong backbone to facilitate the creation of distributed interconnection points among these cities.

The growing cloud onramp and cloud region deployment activity in Jakarta and Kuala Lumpur conveys even more immediate potential, as major cloud providers like Google, Amazon, and Microsoft address tangible demand for cloud access in these markets.

A few of the signs in Southeast Asian markets are mixed or troubling. The current peering environments in these locations vary. Jakarta and Kuala Lumpur have tremendous peering volumes and member numbers associated with their top exchanges, signaling strong potential for more options. Manila shows promise, with a fairly sizable number of member networks and moderate peering traffic volume. Other locations like Bangkok and Hanoi have lackluster or unknown traffic levels. But the insufficiency of current platforms could be addressed as new exchanges enter the market and tap into unmet potential.

Investment in data center infrastructure is needed in many Southeast Asian markets. Kuala Lumpur has at least one strong local data center ecosystem, and Jakarta has a few local and international providers that house a diversity of networks. A multiplicity of data centers with truly neutral network, IX, and cloud environments is critical to spurring interconnection in the Southeast Asian frontier.

Network pricing must also be addressed – and with it network competitiveness. The current lack of price erosion and stubbornly high IPT and transport rates in Southeast Asia remain a concern and speak to outsized influence by local incumbents.
Nonetheless, the impetus for development is strong. The demand for connectivity in Southeast Asia is growing rapidly, cloud providers are moving in, and some international operators have reached a breaking point with overdependence on Singapore. Southeast Asia is not alone in this current phase of dynamic development. In Latin America, the Middle East, and North Asia, operators are discovering creative partnerships that enable them to push for change and bypass incumbents in difficult operating environments.

The movement toward a more distributed mesh of interconnection nodes is natural step for Southeast Asia. Other parts of the world have already gone through a similar transformation. If we look, for example, to Europe, we see a continent that has been heavily reliant on the so-called FLAP markets (Frankfurt, London, Amsterdam, and Paris). Now several secondary hubs including Marseille, Stockholm, Sofía, and Madrid have cropped up, both localizing more network interconnection on a sub-regional level and building strong route connections with the FLAP markets. As carriers, cloud providers, and peering platforms like DE-CIX have moved deeper into local European cities, smaller markets have increasingly become “on-net” with the rest of the continent, enabling access to the same platforms at costs comparable to larger markets. The same can be done in Southeast Asia, as international operators like DE-CIX work to create a neutral and distributed mesh of interconnected markets throughout the region.

About DE-CIX

DE-CIX is the world’s largest peering and interconnection provider operating several carrier and data center neutral interconnection platforms in Europe, the Middle East, North America, and Asia.

Find out more at www.de-cix.net.

→ 10 useful tips on how to maximize the benefits of peering

Bernd Spiess, peering expert for several years, has developed 10 tips for peering, from optimizing routing data base entries to prefix aggregation.

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