

Building an Internet for the future in Southeast Asia

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The region's Internet is vibrant, but a variety of challenges must be addressed to make it accessible and affordable for all.

The Internet and its digital ecosystem have brought about a miraculous technological transformation in the 21st century, both globally and in Southeast Asia. Expanding access to all is crucial for the ongoing development and progress of modern society given the Internet's pervasive and influential presence in our daily lives.

Rapid technological growth has made the Internet one of the world's most valuable tools, especially in Southeast Asia, which leads the world in mobile Internet use. For example, people in Indonesia, Malaysia, the Philippines, and Thailand spend more than four hours a day using mobile Internet—exceeding the global average of three hours.¹ In 2022, more than 460 million people in Southeast Asia used the Internet, with a penetration rate of 80 percent, according to ASEAN.org. Looking ahead, the Southeast Asia and Oceania region could see 29 percent more data traffic per smartphone per month (see figure 1 on page 2). And over the past few years, Southeast Asia has become much more resilient, with the region's economy more robust and diversified than ever. Bridging the gap between China and the United States has also created new opportunities for trade and investment.

The importance of the Internet as a driving force behind Southeast Asia's economic growth and development cannot be overstated. The digital economy is growing rapidly at a rate of 17 percent, outpacing the United States (7 percent), Europe (10 percent), and China (13 percent).² Indonesia, for example, has the highest digital economic value in Southeast Asia, with two decacorns (GoTo and J&T Express) and nine unicorns, including Traveloka and Ovo. And the e-payment industry is poised for rapid growth, with transaction values expected to reach somewhere between \$600 billion and \$1 trillion by 2030.³ These trends present major opportunities for businesses and governments to develop and enhance their digital infrastructure and payment systems to keep up with the region's growing demand for e-commerce and e-payments.

Furthermore, technology-leading Southeast Asian countries such as Singapore are seeing more use cases for advanced technologies, such as virtual reality, artificial intelligence, and autonomous vehicles, which are becoming crucial elements of the Internet and over-the-top services (OTT). In fact, the Internet of the future will serve a non-human market, with applications in areas such as the Internet of Things, smart cities, smart homes, connected vehicles, and wearables. Capturing sustainable business growth will require focusing on these markets.

“The home Internet experience in Singapore in 2030 will not be through the keyboard and mouse but from the AR device connected to the metaverse.”

CTO, Southeast Asia Telco

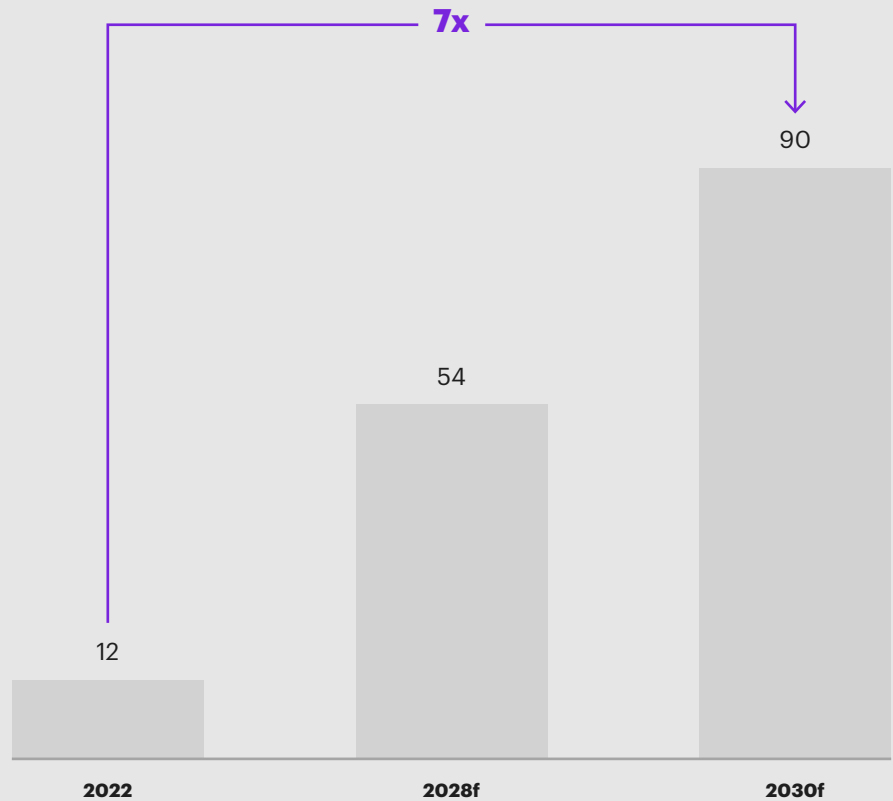
¹ DataReportal, GWI, Meltwater 2022

² IDC Financial Insights

³ IDC InfoBrief: How Southeast Asia Buys and Pays; Kearney analysis

Figure 1
Data consumption in Southeast Asia is expected to skyrocket

Monthly mobile traffic per smartphone (GB per month)



Sources: 5G to become the leading technology in Southeast Asia by 2028, Ericsson Mobility Report; Kearney analysis

But the Internet revolution comes with challenges

This transformation does bring challenges in terms of access and affordability as well as the penetration of fast Internet. Despite the progress made so far, about 20 percent of Southeast Asians still don't have access.⁴ Furthermore, accessibility to fixed broadband is uneven across the region. (Indonesia's fixed broadband penetration was as low as 18 percent in 2022, and Singapore's was more than 110 percent.⁵) The region is also generally behind other developed regions (Indonesia at 18 percent and the Philippines at 34 percent compared with the United States' 100 percent and South Korea's 115 percent).⁶ But on the positive side, Southeast Asia has a higher percentage of fibre for fixed broadband (Indonesia at 77 percent and the Philippines at 70 percent compared with only 21 percent for the United States and 88 percent in South Korea).⁷

Likewise, Southeast Asia's 5G penetration rate is still below developed countries at about 4 or 5 percent, with only Singapore and Thailand having high rates at 23 and 21 percent respectively, compared with developed countries' 13 percent in 2022.⁸ One of the main reasons is that spectrum availability is a constraint in many Southeast Asia countries, with most having less mobile spectrum than developed nations such as Japan and the United States. In the overall low- and mid-band spectrum, Indonesia, Singapore, and Malaysia have 452 MHz, 825 MHz, and 840 MHz respectively, lagging Japan and the United States, which have more than 1,300 MHz.⁹ The lower amount of mid-band spectrum available in many Southeast Asia countries is attributed to the extensive use of the 3.5 GHz band for satellite connectivity in the region because of the favourable propagation characteristics of the band.

⁴ For this report, Southeast Asia covers Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Their economies make up 90 percent of the geographic region's total GDP.

⁵ Omdia. Fixed broadband penetration includes households and businesses.

⁶ Omdia

⁷ Omdia

⁸ Omdia, Ericsson Mobility Report 2022, GSMA Intelligence

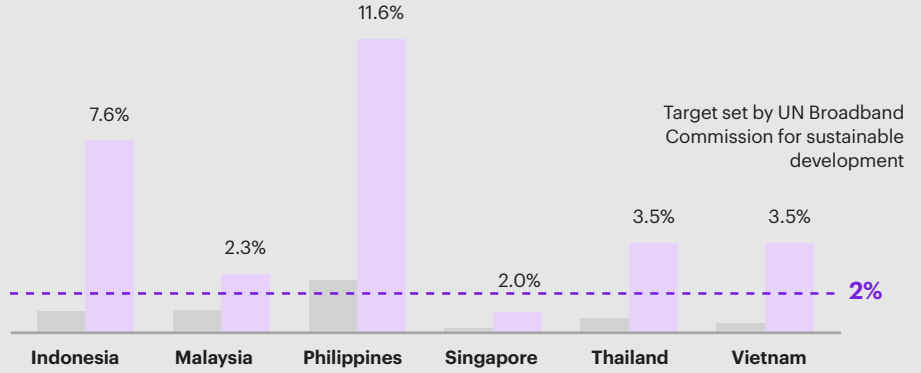
⁹ GSMA Intelligence; Kearney analysis

Figure 2

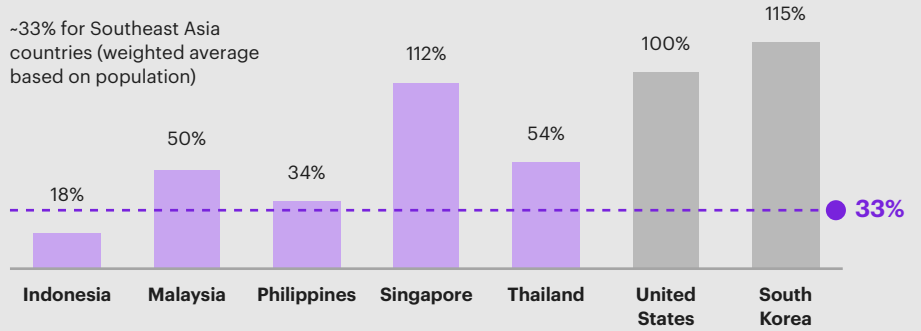
The Internet is unaffordable and inaccessible in parts of Southeast Asia, and fixed broadband penetration is uneven

Affordability gap (broadband cost as a percentage of per capita income in 2021)

- Mobile broadband
- Fixed broadband



Fixed broadband penetration (2022)



Sources: IMDA, International Telecommunication Union, the Alliance for Affordable Internet, Market Intelligence, Omdia; Kearney analysis

Another challenge is the affordability gap for Internet services. Fixed broadband prices in Indonesia, the Philippines, Thailand, Vietnam, and Malaysia do not meet the affordability target of 2 percent of per capita income set by ITU/UNESCO in 2021 (see figure 2). In fact, according to ITU, the price of 1GB of data in Asia Pacific was higher in 2022 than it was in 2021. This disparity creates inequality and hinders the benefits of digital economies.

In addition, the challenge of sustainability has been exacerbated by the advent of 5G, which makes extensive use of power-intensive technologies such as massive MIMO. The ecological toll of Internet use is growing. In fact, the information and communication technology (ICT) sector accounts for 2 to 3 percent of global power consumption, and the amount of electronic waste reached 54 million metric tons in 2019—an increase of 44 million metric tons in only five years, of which around 7 percent comes from Southeast Asia.¹⁰

Finally, geopolitical dynamics are creating a risk of bifurcation that could split the Internet in China and the West into separate, incompatible networks or infrastructure based on different standards, protocols, or governance models. If this happens, Southeast Asia—at the crossroads between China and the West—would be particularly impacted. As these issues persist, the likelihood of a divided Internet grows, which could create challenges for businesses and individuals who rely on a globally accessible Internet and could slow down innovation, making it difficult to achieve interoperability and interconnectivity between different parts of the Internet.

¹⁰ The Global 5 Monitor, United Nations University

The Internet ecosystem is evolving from ISP-centric to multiple players with shared responsibilities

Traditionally, local Internet service provider (ISPs) have been at the centre of the Internet, managing resources, providing access, and supporting a localized ecosystem.¹¹ They have been responsible for managing scarce resources, including spectrum. Access is uneven, and local ISPs have been given a universal service mandate to maximize access. They have also been supporting national ICT and digital agendas and building in tech capabilities to counter the incumbency and scale advantages of large tech players from western countries. Most of this was fuelled by ISPs’ profitability and margins.

However, this changed as ISPs saw their returns decline. From 2017 to 2022, Southeast Asia’s telecommunication sector experienced declining growth of -2 percent compared with average GDP growth of 3.5 percent per year for the same period (see figure 3).

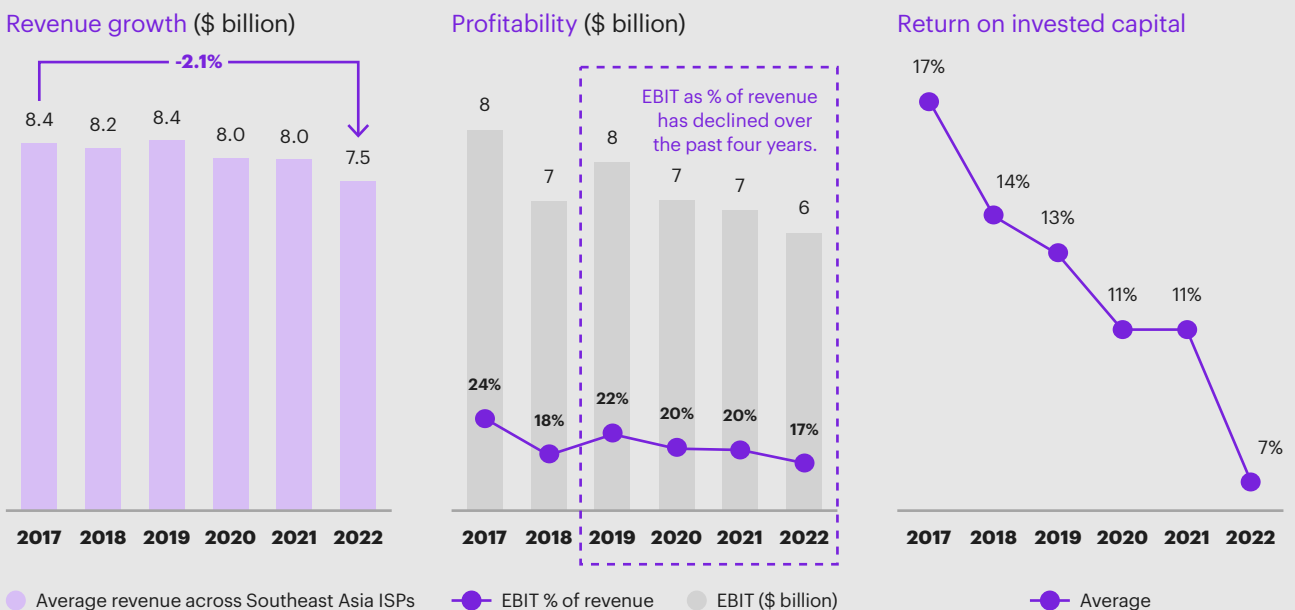
At the same time, costs rose faster than revenue, which chipped away at returns on investments. As a result, ISPs’ ability to make investments has been constrained—threatening the Internet development in Southeast Asia and around the world. This means the Internet will no longer be an ISP-centric endeavour but a responsibility that must be shared by all actors in the Internet ecosystem: regulators, original equipment manufacturers (OEMs), ISPs, and hyperscale cloud and content service providers.

“Whatever ISPs need to bring, there must be a balance between national agenda and commercial exercise.”

Mohamed Tajul Mohamed Sultan, CNO, Telekom Malaysia

¹¹ ISPs include communication service providers (CSPs).

Figure 3
Southeast Asia’s ISPs have been struggling under the weight of financial pressures



Notes: ISPs are Internet service providers. Southeast Asia ISPs are Telkom, Indosat, Maxis, Celcom, Singtel, AIS, and dtac.
Sources: Capital IQ; Kearney analysis

Thought leaders in Southeast Asia have a new vision

We asked thought leaders across all types of organisations involved in Southeast Asia’s Internet ecosystem about their vision for the Internet by the end of the decade (see sidebar: About the study on pages 6, 7, and 8). The response was nearly unanimous: the Internet should be more inclusive, allowing everyone to participate in a digital society and the digital economy (see figure 4). It’s time to bridge the digital divide in a region with large socioeconomic and demographic differences. Internet prices should be affordable for everyone, from professionals in city centres to children in poor neighbourhoods. Everyone should have access regardless of geographic locations—from large metropolitan cities to sparsely populated rural areas.

The thought leaders we spoke with also see resiliency and privacy as top priorities. The Internet should be reliable, safe, private, and secure, especially considering the escalating risks of cybersecurity breaches.

“The Internet allows equal access to information—and opportunity—to uplift people. The Internet of the future should allow citizens to uplift themselves and participate in the digital economy.”

Seow Yoke Kong, Chief Technical Advisor, Globe

Figure 4

Vision of the Internet in Southeast Asia



Source: Kearney analysis

About the study

We surveyed top thought leaders in the Internet space in Southeast Asia. Our research also included chief technology officers (CTOs) from major ISPs, regulatory bodies, telecom organizations, vendors, and OTT service providers.

All of the leaders we spoke with as part of our study agreed that accessibility, affordability, and inclusivity are the most crucial features. Additionally, 80% rank accessible, affordable, and inclusive; resilient and reliable; and safe and secure as the top three priorities (see figure A).

Figure A

The most important features of the Internet of tomorrow are accessibility, affordability, and inclusivity, resiliency and reliability, and security

A vision of the Internet in Southeast Asia

Options	Rank
Accessible, affordable, and inclusive	1
Resilient and reliable	2
Safe and secure	3
Fair to all stakeholders	4
Sustainable by design	5

80% of thought leaders rated these as the top three features.

Source: Kearney analysis



Two-thirds identified regulatory constraints, high cost to roll out infrastructure, and legacy infrastructure write-offs as the most significant challenges to the Internet in Southeast Asia (see figure B).

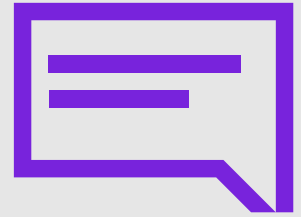
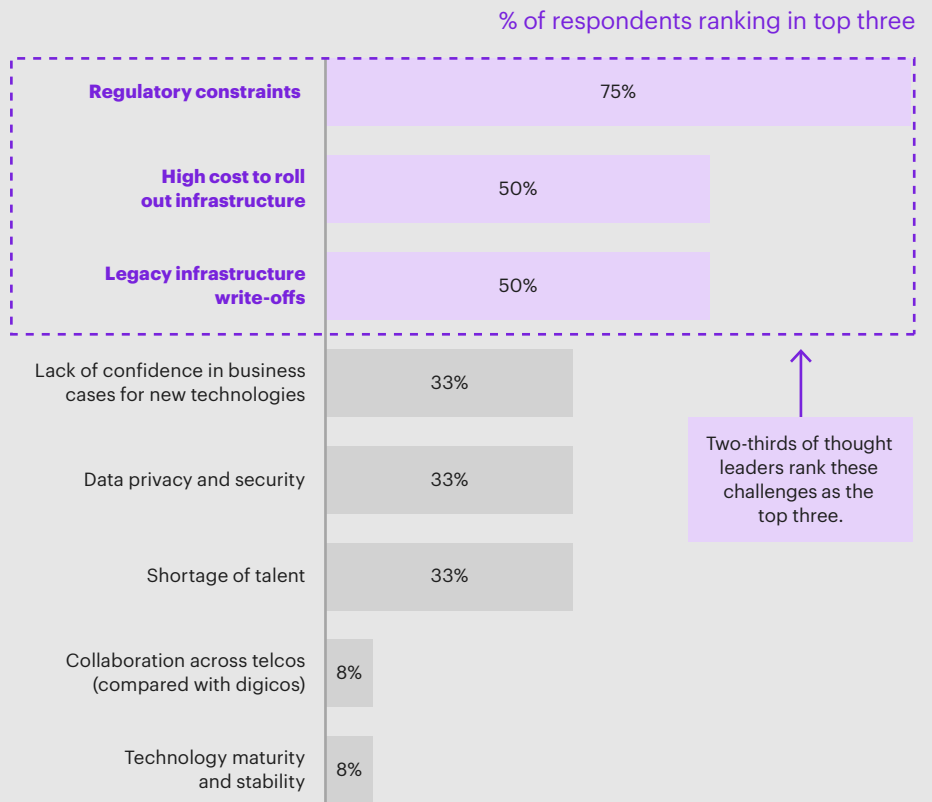


Figure B
Three challenges stand out in the vision of the Internet in Southeast Asia



Source: Kearney analysis



Our study reveals 10 trends across three layers that are shaping the Internet for the future. Of the 10 trends that emerged in our study, seven are particularly important for stakeholders in Southeast Asia to focus on (see figure C).

Technology leaders are shifting their focus toward cloud computing to edge, network softwarization, and sustainability. These trends have gained significant interest and attention among technology leaders.

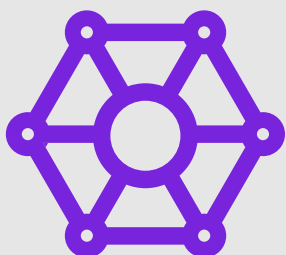
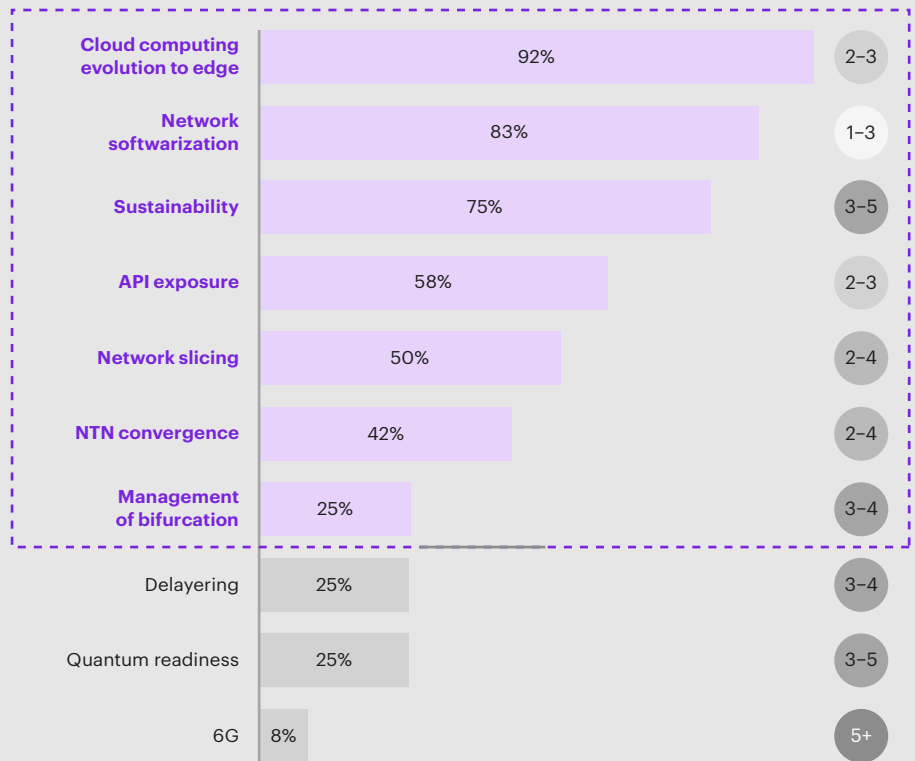
Additionally, there is a growing emphasis on NTN convergence, which is ranked as the sixth most-important trend. Meanwhile, trends such as delayering, quantum readiness, and 6G are becoming less prominent in the minds of technology leaders. This is mainly because these trends require a longer time horizon of more than three years to fully materialize and have a significant impact. As a result, technology leaders are placing less immediate priority on these trends and directing their attention towards more pressing and nearer-term opportunities.

Figure C
Edge computing, network softwarization, and sustainability are the top three Internet trends

Expected horizon in years, when trend is expected to be significant

Notes: API is application programming interface; NTN is non-terrestrial network.
 Source: Kearney analysis

Top-ranked technology trends



Fairness to all is seen as crucial to maintaining the Internet ecosystem. For the Internet to thrive in the long term, the benefits should be equitably distributed across all parties, and companies that make capital-intensive investments should see a return on their investments. And, of course, sustainability is a fundamental principle. The region must integrate environmental principles into the implementation and operation of the Internet, such as reducing electronic waste via a circular economy and promoting measures to achieve net-zero greenhouse gas emissions by reducing energy consumption and using renewable sources.

Making this vision a reality will require first getting the basics right. Most of the thought leaders we spoke with see the cost of infrastructure (5G sites, fibre, and data centres) as the most fundamental challenge. Ultimately, deploying this infrastructure will hinge on having a compelling business case, and cost is an important factor.

Leaders also say it's important to ensure that regulations don't constrain operational and business models or create higher rollout costs. Limited public resources such as spectrum should be made available to ISPs, and telcos will need to collaborate in a new environment with open standards.

“The Internet is making people more socialized. This evolution will continue, with more personalization. Privacy and security will come in.”

**Mohamed Tajul Mohamed Sultan,
CNO, Telekom Malaysia**

Another obstacle that many leaders cite is legacy infrastructure and the difficulty of moving out because of write-offs and, more importantly, inertia from customers who are reluctant to switch over their services. Legacy infrastructure not only increases costs and makes the environment more complex; it also keeps obsolete energy-intensive infrastructure that serves only a small number of people. Other relevant factors that leaders pointed to include a lack of available talent and a lack of confidence on the business cases for new technologies.

“We will see a lot more collaboration between telcos on infrastructure sharing and with the new open digital architecture. Not collaborating may mean going out of business.”

**Thomas Hundt, Group Chief Strategy and
Technology Officer, Axiata Group**

Seven technology trends will shape the Internet in Southeast Asia

New technology trends are shaping the Internet for the future globally (see sidebar: Technology trends shaping the Internet globally on pages 15 and 16). These trends will change the types of services that are delivered to end users, making them more real-time, immersive, and interactive. Our study reveals that seven technology trends are fundamental if the region hopes to make its Internet vision a reality in the next five years.

Cloud evolution and edge

The most relevant trend, according to the thought leaders we spoke with, is cloud computing's evolution to the edge and multi-cloud. Cloud computing is seeing an emergence of use cases in areas such as autonomous vehicles, telehealth, artificial intelligence, and virtual reality, and as a result, cloud is shifting to the edge, pulled by data gravity and the need for lower latency as well as a growing need for data localization and residency. This will require expanding the capacity of local data centres in non-hub countries such as Malaysia, Indonesia, and the Philippines, along with creating more small data centres in regional cities and ultimately rolling out multi-access edge computing (MEC). And as the cloud becomes more pervasive, more companies will want to use multiple cloud computing services from different providers.

“Teleworking is here to stay. Cloud computing will help bring remote working to villages and islands, through such initiatives as the Smart Village and Smart Islands, along with fast connectivity in remote places.”

Atsuko Okuda, Regional Director for Asia and the Pacific, International Telecommunication Union

Network softwarization

The cloud is even extending into the heart of the Internet—the telecommunications network infrastructure—as networks become software running on a hybrid cloud. This trend, which has gained traction around the world over the past five years, will soon become more widespread in Southeast Asia. In fact, it has already started in centralized functions at the core of the network (5G network cores are cloud-native today), and it is expanding through the edge with new technology paradigms such as Open RAN. This transition from hardware to cloud-native software helps ISPs become less capex-intensive to alleviate their investment constraints and introduce agile ways of working that reduce the time to market and offer more innovative services. Another advantage of the “softwarization” of the Internet is that it enables automation and the injection of AI. In the future, AI will become a more prevalent part of the Internet, not only for operations and marketing insights, but also for routing and switching data as the next step to software-defined networks. In the future, the networks that underpin the Internet will evolve from cloud-native to AI-native.

“AI ops will play a vital role beyond gaining operational insights, especially related to customer experience. Without data architecture, platform, and cloud-native networking infrastructure, AI ops will be an exercise in futility.”

Ayush Sharma, CTO, Starhub

Sustainability

Sustainability has moved to the top of the C-suite agenda for OEMs, ISPs, and hyperscalers in Southeast Asia and around the world. For example, OEMs are manufacturing mobile infrastructure equipment with energy-saving features that offset the increase in consumption resulting from 5G. Green energy will become available to operators thanks to the vision of a pan-ASEAN power grid, for which the Lao PDR–Thailand–Malaysia–Singapore Power Integration Project (LTMS–PIP) is the first step. Other countries also have long-term plans for renewable energy, such as Indonesia’s solar initiatives and Vietnam’s efforts in wind and solar energy. Meanwhile, AI can help reduce energy consumption in data centres and telecom networks by optimizing heating, ventilation, and air conditioning (HVAC) and efficiently allocating resources on ISP and IT equipment by predicting load patterns. There is also a growing focus on developing more sustainable supply chains and creating a circular economy by reducing, reusing, and recycling electronic waste. Although sustainability is seen as essential, most of these trends could take three to five years to gain traction.

API exposure

The Internet of the future will also serve non-humans, and it’s about much more than connectivity. Furthermore, ISPs are undergoing through a process of “platformization”, evolving from traditional connectivity providers that offer a data pipe into platform business models that offer telecommunication APIs. This is achieved by implementing platforms that expose network functionality APIs to devices and third-party applications created by communities of developers who enrich the basic network functionality. This year has brought pivotal progress on this front thanks to the launch of the GSMA Open Gateway initiative.

“The Internet of the future will be for non-humans. Therefore, Internet service providers will need to cater to a market that is not human.”

Nugroho, CTO, Telkomsel

Network slicing

5G standalone—the full version of 5G—comes with one transformational innovation: network slicing. Network slicing is the ability to offer differentiated connectivity services with dedicated network resources: the slice. These services can be tailored to the specific needs of third-party applications that can selectively access and control the services or to specific customers who want a dedicated virtual 5G network. In addition, 5G and softwarization are boosting the emergence of private networks, where infrastructure can be more effectively scaled. These dedicated networks open the possibility for ISPs to escape commoditization, offer innovative new B2B2X business models, and foster innovation. We expect this trend to gain traction in Southeast Asia over the next two to four years.

“Private networks, not the public network, will most likely be the home of innovation on 5G.”

Julian Gorman, Head of APAC, GSMA

NTN convergence

Non-terrestrial network (NTN) convergence is especially relevant for Southeast Asia, with its large rural, sparsely populated areas where mobile coverage is not economical. NTN convergence aims to integrate various NTNs (satellite) with mobile networks to provide seamless communication services. The 3rd Generation Partnership Project (3GPP), the standards body for mobile networks, has defined spectrum bands for satellite, and manufacturers such as Qualcomm are making chipsets that support NTN. This NTN convergence can help provide ubiquitous mobile coverage with no need for large investments along with a fallback from the mobile network for emergency services, ensuring continuity in the event of disruptions such as natural disasters or network outages. MWC 2023 gave the NTN convergence a big push.

“NTN use cases are financially viable. MWC 2023 marked the beginning of a new relationship between satellite and mobile operators.”

Julian Gorman, Head of APAC, GSMA

Management of bifurcation

The risk of bifurcation will need to be managed by using open technologies and digital commons to promote a shared, collaborative approach to developing and using internet and digital infrastructure. Adopting open standards, using open-source software and blockchain technology, promoting decentralized communication protocols, and encouraging the use of digital commons can all help promote a collaborative approach to developing and using Internet and digital infrastructure, reinforcing interoperability between the various parts of the Internet, and mitigating the impact of the potential bifurcation split.

All of the above doesn't mean ISPs should limit their focus to these trends. Forward-thinking providers will need to pay close attention to a variety of technology trends—from elevating network security for the quantum computing era to delayering stacks to capture more value.

Achieve the vision by embracing the top seven trends

To make the Internet vision a reality for Southeast Asia, stakeholders will need to take a variety of actions. Below, we shed light on what OEMs, ISPs, hyperscalers, and regulators can do to help move the region forward in each of the top seven technology trends.

Cloud computing evolution to edge

Regulators and governments across Southeast Asia will need to focus on data protection, especially in the areas of privacy and security, and collaborate on adequacy-based interoperable frameworks that allow personally identifiable information (PII) to flow between countries that have comparable regulations, along with creating flexibility in data sovereignty to allow a workload mobility computing service that is standard and ubiquitous and provides the functional richness and developer experience of the traditional cloud. Hyperscalers and their data centre infrastructure providers, particularly in emerging countries across the region, should prepare for an increase in computing capacity, driven by the Internet's shift to the edge, as well as the additional computing needs created by AI and natural language processing technologies.

Network softwarization

Operators will need to keep the momentum going on network softwarization, gradually evolving from hardware to software infrastructure. For this to be successful, a talent pipeline will need to be scaled. ISPs will have to reskill their workforce or work with governments and universities to create talent development programmes. Regulators should facilitate the technology adoption by making the necessary provisions in data protection regulations and critical infrastructure policies that allow for these evolutions. Policies should look more closely at network security and factor in the new cloud-native infrastructure resilience paradigms.

Sustainability

Southeast Asia's ISPs and hyperscalers should boost their use of renewable sources and benefit from power greenification initiatives such as the LTMS-PIP and large renewable initiatives available in their own countries, such as in Indonesia and Vietnam. Incentives for solar power on cell sites from governments will also help. ISPs and hyperscalers should also collaborate with tech OEMs to reduce their equipment power consumption and scope 3 emissions. One fundamental action is to phase out legacy energy-inefficient technologies that have a big impact in power consumption and benefit from modern technologies with power-saving features in the network and the data centre. Finally, regulators and governments should establish policies for managing e-waste to support the circularity of device and infrastructure equipment.

API exposure

To move to a platform business model based on API exposure, ISPs can work together to create, promote, and adopt open telecommunication APIs in the region. This can be achieved through initiatives such as the GSMA Open Gateway, in addition to creating Southeast Asia-specific APIs and seeding a regional community of developers. Regulators should also have simple, light-touch policies on telecommunication APIs to avoid stifling innovation and constraining the emergence of a local developer community. Hyperscalers should facilitate ISPs to integrate their products with their networks. Standardization and open interfaces will help.

Network slicing

Vendors, content providers, and hyperscalers should work together with ISPs as part of the slicing ecosystem through partnerships, innovation hubs, and other initiatives to push for specific use cases relevant to the region.

NTN convergence

NTN convergence will require spectrum regulation coordination between satellite and mobile. Regulators should also modify the universal service regulations to include NTN. Mobile and satellite operators should get more involved in NTN convergence for the region. Network and device OEMs should also promote the affordability of chipsets through flexible systems on chips (SoCs) that tap into economies of scale to be more accessible for people across Southeast Asia.

Management of bifurcation

Finally, managing bifurcation and potential stack splits in Southeast Asia requires ISPs to collaborate with one another and devise scenarios and risk plans with roadmaps that embrace open technologies to bridge any technology gaps. Government bodies and regulators should establish policies that promote flexibility and adaptability among ISPs, mitigating the risk of split Internet standards and governance. Forward-thinking OEMs should consider promoting open technologies beyond Internet standards to ease the impact of standard fragmentation and to maintain interoperability.

“No organisation or government can achieve this alone. Public–private partnerships are crucial to ensure that the Internet in the region progresses in a resilient, sustainable, and secure manner while creating building blocks for emerging technologies.”

**Jeth Lee, Head of Legal and Regulatory Affairs,
APAC, Microsoft**

A call to action

The transformation of the Internet in Southeast Asia is at a crucial juncture. The region will need to bridge the digital divide with a trustworthy and inclusive Internet for everyone and seize the opportunity to leapfrog to the next step-change in the evolution of the Internet to continue growing competitively. Although technology trends such as edge cloud, software-centric networks, API exposure, NTN convergence, 5G slicing, and more sustainable connectivity are still nascent in the region, they hold a wealth of potential to empower all actors in the Internet ecosystem—regulators, OEMs, ISPs, and OTT hyperscalers—to realize the vision of a more accessible, affordable, sustainable, reliable, and secure Internet from which every party takes a fair benefit.

Embracing the emerging technologies is part of a long-term road map, but it is important to act now with close collaboration between all stakeholders to achieve the common vision. This means that all actors will need to own the actions that we have described and plan for the best ways to execute them.

In summary, making the vision of an Internet for Southeast Asia a reality will require concerted effort from every actor across the ecosystem. By working together and taking action now, Southeast Asia can move with surefootedness toward a powerful future of the Internet—one that is a driving force for the region’s socioeconomic development.

Technology trends shaping the Internet globally

Ten technology trends are shaping the Internet for the future (see figure D):

Services layer

Network API exposure: Exposure of APIs that offer network functionality to evolve the telecom business from connectivity to platform by enabling an ecosystem of apps and a community of developers that consume and enrich the functionality of the network

Edge cloud and multi-cloud evolution: The shift of cloud computing services to the edge of the network to optimize latency and performance that enables new real time use cases, and seamless use of multiple cloud service providers

Network systems and control layer

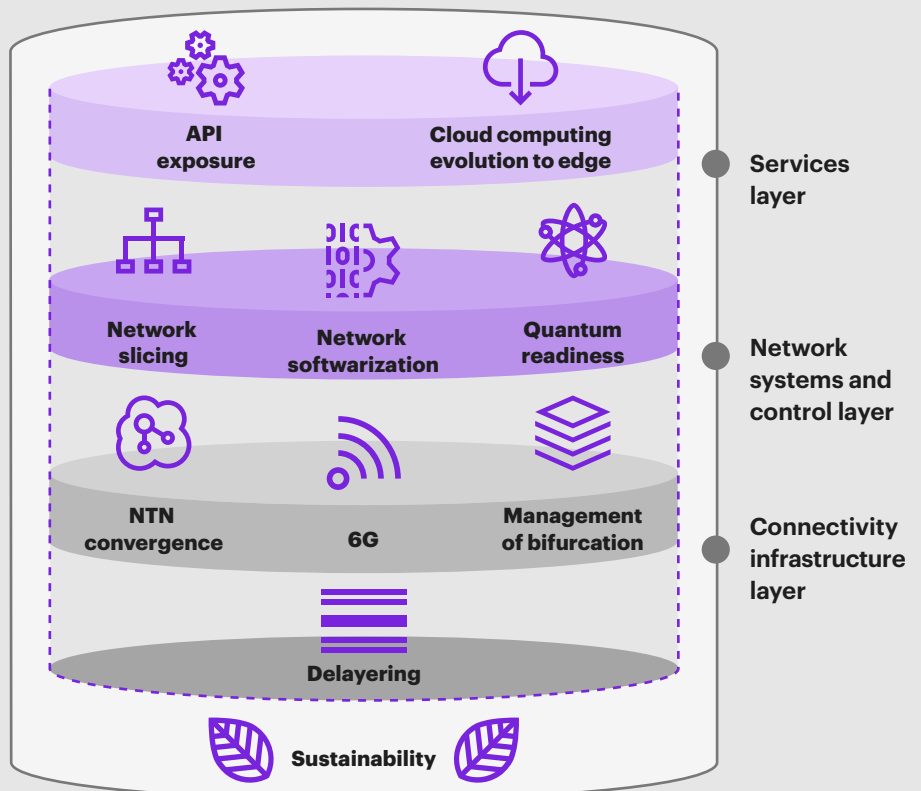
Network slicing: Offering of dedicated and differentiated connectivity services tailored to specific needs; general service for a set of applications or customer-dedicated; capability for third-party applications to access and control these services

Network softwarization: ISPs' network architecture evolutions from physical (based on appliances) to virtual (software running on cloud), which fosters flexibility, innovation, and automation of infrastructure management

Quantum readiness: Implementation of encryption algorithms that are resistant to attacks from quantum computers as well as quantum key distribution (QKD), a technology that uses the principles of quantum mechanics (entanglement and projection) to exchange encryption keys in a way that is impossible to intercept without being detected

Figure D
ISPs will need to keep an eye on several trends

Top technology trends for Southeast Asia



Note: ISPs are Internet service providers; NTN is non-terrestrial networks; API is application programming interface.
 Source: Kearney analysis

Connectivity infrastructure layer

NTN convergence: Seamless convergence and coordination of various non-terrestrial networks (NTN), such as satellite, especially low-Earth orbit, with mobile networks to provide ubiquitous communication services

6G: A new mobile standard for 2030 that aims to incorporate most of the new technology trends, including delayering, NTN, and quantum-safe and sustainable (6G will evolve from cloud-native to full AI-native and may be closed-loop automated. Also, 6G will incorporate new modulation techniques such as OTFS and may operate in new frequencies potentially including terahertz bands.)

Management of bifurcation: The risk of the Internet being split into separate, incompatible networks based on different standards, protocols, or governance models: one for the East and another for the West (Open technologies and digital commons could mitigate this risk by promoting a shared, collaborative approach to the development and use of internet and digital infrastructure.)

Across layers

Delayering: Disaggregation of the ISP value chain into multiple layers for infrastructure, network, and service that allows for combinations of Internet functionalities, often taking place in different organizational entities, such as InfraCos, NetCos, and ServCos

Sustainability: Net-zero objectives through reduction of emissions by using renewable sources and less energy intensive equipment and e-waste reduction through adoption of circular economy practices



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About Asia Tech x Singapore: ATxSG

ATxSG 2023 is Asia's leading technology event, jointly organised by Infocomm Media Development Authority (IMDA) and Informa Tech and supported by the Singapore Tourism Board (STB). The event consists of two main segments, ATxSummit and ATxEnterprise.

The ATxSummit is an invitation-only plenary covering themes such as generative AI, web 3.0 and trust, soonicorns, and sustainability across four pillars: Tech x Trust, Tech x Good, Tech x Builders, and Tech x Creative. ATxSummit also features the ATxAI and SG Women in Tech conferences, alongside G2G and G2B closed-door roundtables to facilitate a closer partnership between the public sector and digital industry.

Organised by Informa Tech and held at Singapore Expo, ATxEnterprise will host conferences as well as exhibition marketplaces comprised of B2B enterprises across technology, media, infocomm, satellite industries, and start-ups. ATxEnterprise consists of BroadcastAsia, CommunicAsia, SatelliteAsia, TechXLR8, and InnovFest x Elevating Founders.

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