



APAC

Economic
growth
through
connectivity

How content platform investments accelerate economic growth

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**Content Platform
investments
facilitate of
Internet value
chain expansion**

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More affordable broadband, in turn, expands access, drives higher usage and contributes to broader economic gains. The presence of multiple submarine cables reduces bottlenecks and improves international connectivity and this supports the increased use of data-intensive applications and services. A 100% increase in data usage corresponds to a 0.98% increase in GDP.

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CP network investments have transformed broadband economics by reducing costs, improving efficiency and expanding access.

Introduction

The global Internet value chain incorporates various industries across jurisdictions and has five distinct segments: content rights, online services, enabling services, connectivity and user interface. Each segment is subject to its own laws, rules, regulations and regulatory bodies. Each segment also comes with its own risks, investment requirements and profit opportunities. Telcos are generally part of the connectivity segment of the Internet value chain. However, some telcos also offer services in other segments of the value chain, like the enabling services, online services and content segments. The market value of the global Internet value chain quadrupled between 2008 and 2020. The connectivity segment more than tripled in market value. Growth between 2008 and 2020 was 331%.

Investments by Content Providers (CPs), such as Meta, Google, Microsoft and Amazon go beyond the content segment by investing in submarine cable systems and deploying local infrastructure, including Points of Presence (PoPs) and caches. CPs contribute to bringing content closer to end users, significantly reducing latency, lowering costs for Internet Service Providers (ISPs) and enabling faster and more reliable network experiences.

Meta’s network investments illustrate the scale and geographic reach of these changes. In Malaysia, caches now serve the vast

majority of Meta’s peak traffic, supported by two PoPs in greater Kuala Lumpur. In Indonesia, hundreds of cache clusters carry nearly the majority of Meta’s traffic, while similar infrastructure deployments across the Philippines and Australia have resulted in most Meta traffic being served locally. These efforts substantially reduce dependence on costly international transit and reallocate network traffic onto domestic paths that are faster and more affordable. In addition, increasing international bandwidth can reduce mobile broadband prices by up to 21% (World Bank, 2024). These improvements are visible across APAC:

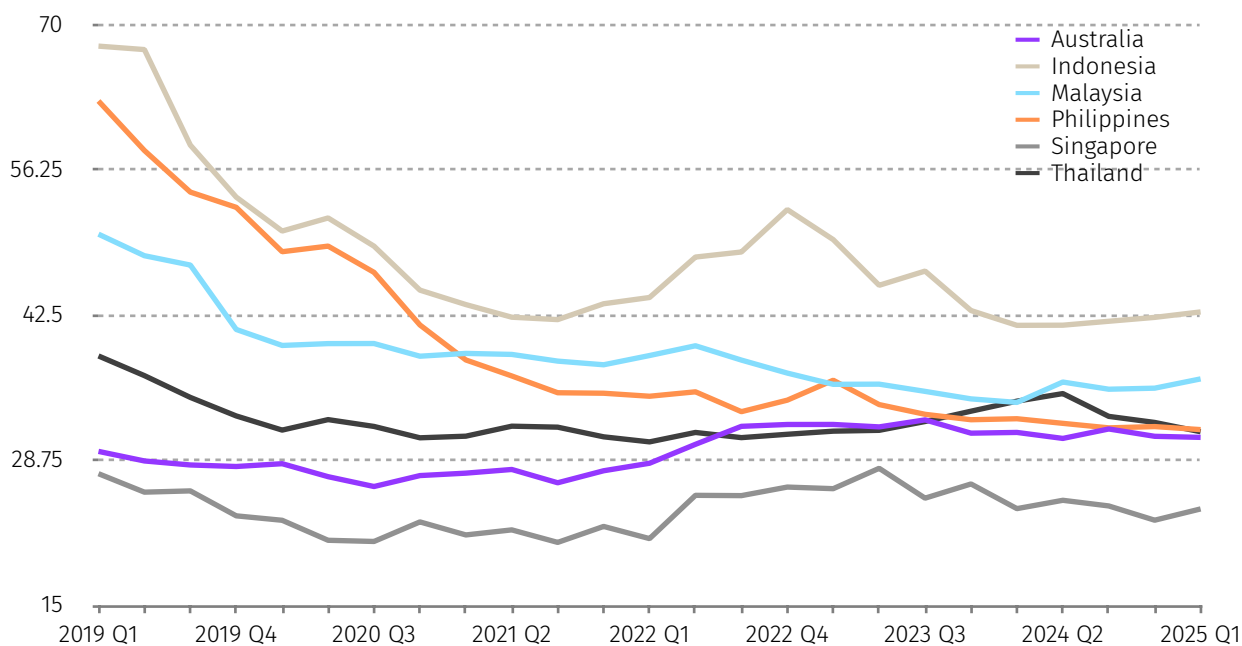
- Mobile latency has declined markedly
- Mobile download speeds have surged.
- The price of Internet use dropped sharply.
- Average monthly usage of gigabytes per capita has increased significantly.
- Network cost per GB decreased exponentially.

The following chapters examine how CP investments enhance connectivity, lower costs, and boost economic growth, covering submarine cables, PoPs and caches, declining network costs, economic impacts and country case studies across APAC. The final section summarises the findings of the report.

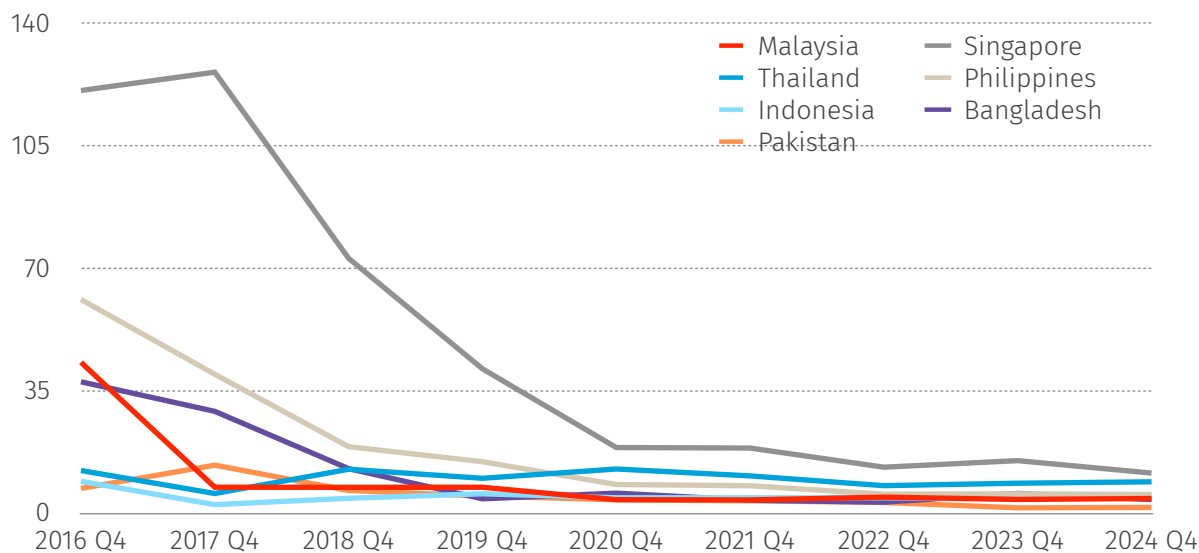
Value creation along the global Internet value chain

Segment	Example activities	2008		2015		2020		Growth
		USD billion	Share %	USD billion	Share %	USD billion	Share %	
Content Rights	Premium content rights	37	3%	66	2%	186	3%	403%
Online Services	e-Travel, video and audio publishing, gaming, gambling, search, social media, information & reference, cloud based services, other online services	477	40%	1,595		3,792	57%	695%
Enabling Technologies & Service	Web design & hosting, payment systems, advertising exchanges, CDNs	188	16%	442	48%	812	12%	332%
Connectivity	Mobile access, tower companies, fixed access	229	19%	586	18%	988	15%	331%
User Interface	Hardware devices, software and systems	251	21%	659	20%	897	13%	257%
Total		1,182		3,348		6,675		465%

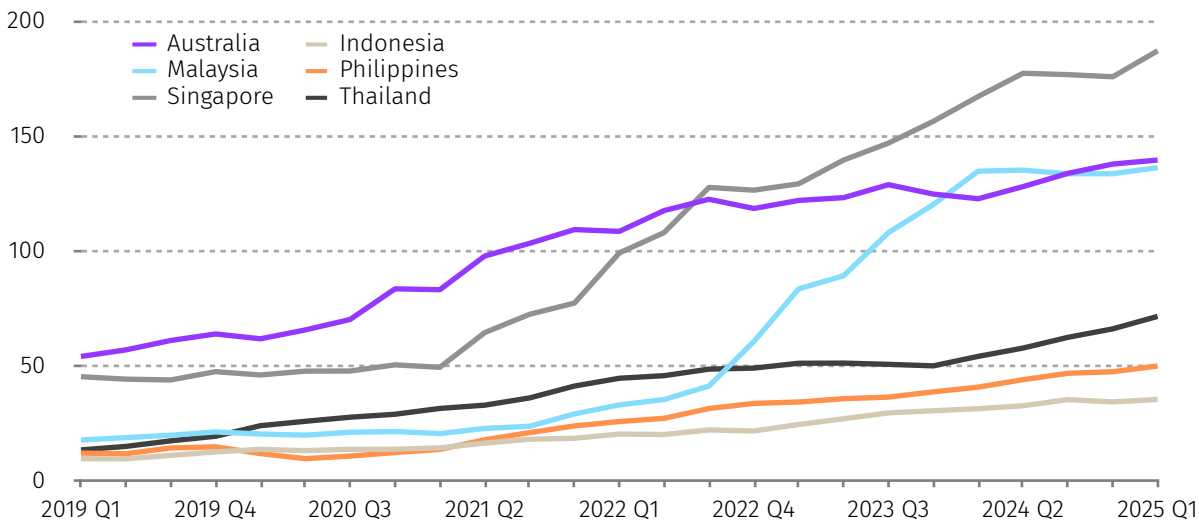
Sources: AT Kearny (2010), GSMA (2016), and GSMA (2022)



Ookla average mobile latency in milliseconds



Cheapest price in USD for 20GB per month prepaid (Source:RIS)



Ookla: Average mobile download speeds in Mbps

Submarine Cable Investments

CP are incentivised to invest in reliable delivery of digital content to end users. This includes building and maintaining data centers that store content, deploying subsea cable systems that carry internet traffic across continents, and establishing PoPs that serve as key handover points to telcos and ISPs.

Submarine cables provide the essential “first mile” connection between national telecommunications networks and the global Internet, making them fundamental to enabling high-speed, high-capacity digital communication (World Bank, 2023). Their impact goes far beyond just technical connectivity. Submarine cables substantially influence Internet affordability and economic outcomes:

- **Lowering Internet Prices:** Every doubling of international bandwidth capacity associated with submarine cables can reduce fixed broadband prices by up to 14% and mobile broadband prices by up to 21% (World Bank, 2024). This price reduction stems from cost savings due to more bandwidth and lower transport costs and intensified competition in domestic telecom markets.
- **Economic Growth Effects:** Infrastructure that enhances international connectivity is strongly linked to broader economic growth. In Malaysia, for example, it has been estimated that for every 10% increase in international bandwidth consumption per user, there was a 0.24% increase in GDP per capita (RTI, 2020).
- **Catalyst for Digital Services and Business Expansion:** Submarine cables facilitate the growth of cloud services, streaming media and e-commerce, enhancing productivity

and enabling new business models (RTI, 2020).

- **Impact on Affordability and Access:** The presence of submarine cable connections significantly increases internet speed and quality, allowing for lower per-unit costs of data and expanding broadband access to more users (RTI, 2020).

Moreover, the World Bank (2024) points out that cost savings are the result of economies of scale through increased international bandwidth, a reduction in re-routing costs as a result of more cable availability and a reduction in network maintenance costs as a result of greater redundancy.

The role of CPs in the deployment of submarine cable systems has become increasingly important over the past decade. Traditionally, international submarine cables were financed and operated by telcos. However, the rapid growth in demand for cloud services, video streaming and data-heavy applications as well as the need for greater resilience and diversity of international links (subsea cables) has led major CPs, such as Meta, Google and Microsoft, to take a more active role in building global connectivity infrastructure in order to connect their data centers, PoPs etc -



rather than having to rely on telco-driven routes. Self-build is therefore often more efficient and quicker.

The growing investment into international connectivity by CPs leads to a broader digital ecosystem and underlines the increasingly symbiotic, intertwined relationship between internet services, physical network

infrastructure and national broadband affordability and availability. Submarine cables and PoPs are inputs into the Internet value chain, which contribute to economic growth and job creation.

Submarine cable investments in APAC by CPs

Cable Name	APAC Countries	RFS	Capacity Tbps	CP Ownership
Southeast Asia-Japan Cable (SJC)	Singapore, Philippines, Thailand, Taiwan	2013	73	Alphabet is part owner
Asia Pacific Gateway (APG)	Malaysia, Japan, South Korea, Singapore, Thailand, Taiwan	2016	54	Meta part owner
FASTER	Japan, Taiwan	2016	90	Google part owner
New Cross Pacific (NCP) Cable System	Japan, South Korea, Taiwan	2018	119	Microsoft part owner
INDIGO-Central	Australia	2019	36	Alphabet is part owner
INDIGO-West	Indonesia, Singapore, Australia	2019	36	Alphabet is part owner
Japan-Guam-Australia South (JGA-S)	Australia	2020	36	Alphabet is part owner
JUPITER	Philippines, Japan	2020	75	Meta and Amazon are part owners
Pacific Light Cable Network (PLCN)	Philippines, Taiwan	2022	48	Meta and Alphabet are part owners
Topaz	Japan	2023	240	Google / Alphabet sole owner
2Africa	Pakistan	2024	180	Meta part owner
Bifrost	Indonesia, Singapore, Philippines	2025	124.8	Meta is part owner
Echo	Indonesia, Singapore	2025	144	Meta and Alphabet are part owners
TPU	Philippines, Taiwan	2025	260	Owned by Alphabet
Honomoana	Australia	2026	259.2	Alphabet is sole owner
Proa	Japan	2026	400	Google / Alphabet sole owner
SeaMeWe-6	Malaysia, Singapore, Pakistan, Bangladesh	2026	126	Microsoft is part owner
Tabua	Australia	2026	272	Alphabet is sole owner
Apricot	Indonesia, Singapore, Philippines, Japan, Taiwan	2027	216	Meta and Alphabet are partial owners
Australia Connect Interlink	Australia	2027		Alphabet is sole owner
Bosun	Australia	2027		Alphabet is sole owner
ORCA	Taiwan	2027	76.8	Meta sole owner
Taihei	Japan	2027	304	Google / Alphabet sole owner
Umoja	Australia	2027		Alphabet is sole owner

PoP & Cache Investments

Social media, video streaming and other high-demand content platforms play a central role in driving user engagement online and thus demand for Internet access from Telcos and ISPs. Global Internet traffic is heavily concentrated among a small number of major content providers, which together account for between 65% and 69% of total traffic. Alphabet (including Google) contributes approximately 18% of fixed and 20% of mobile internet traffic, while Meta generates 22% of mobile and 10% of fixed global traffic.

Global Internet traffic by brand		
2024	Fixed	Mobile
Alphabet	18%	20%
META	10%	22%
Netflix	9%	5%
Microsoft	7%	2%
TikTok	6%	12%
Apple	6%	5%
Amazon	5%	1%
Disney	4%	2%
Other	35%	31%

Source: <https://www.applogicnetworks.com/blog/sandvines-2024-global-internet-phenomena-report-global-internet-usage-continues-to-grow>

In 2023, YouTube alone in the APAC region accounted for 16% of downstream internet traffic, with an average daily consumption of 2.5 GB per user. Facebook contributed a further 8%, while YouTube, Facebook, TikTok and Instagram together made up 31% of total downstream traffic - highlighting the dominance of user-generated content in global internet consumption. Data from Sandvine's (2024) report shows that on mobile networks, on-demand streaming, driven primarily by social media apps, represents over 70% of downstream traffic in the APAC region. This heavy concentration of consumption reflects not just user preferences, but the structural role of social

media and video platforms in sustaining high data usage. Without this content, particularly from platforms that generate large data volumes, user demand for internet access would fall sharply. For ISPs, this would mean reduced data consumption, threatening their revenue models, limiting the commercial case for network investment and undermining the appeal of higher-tier service offerings. The business model of broadband services relies fundamentally on the continued availability and popularity of rich, data-intensive content.

Top Apps by downstream volume 2023 – APAC		
Application	Share in download traffic	Average daily download volume per subscribers
YouTube	16%	2.5 GB
Netflix	14%	2.2 GB
Facebook	8%	1.3 GB
Xbox Live	8%	1.2 GB
Playstation	8%	1.2 GB
Disney+	6%	874 MB
Tik Tok	5%	749 MB
iTunes Store	2%	391 MB
Amazon Prime	2%	388 MB
Instagram	2%	340 MB
Others	29%	

Source: Sandvine March 2024 GIPR report

Content use benefits all segments of the Internet value circle. The transition from traditional content-delivery mechanisms (such as broadcasting or cable services) to content on demand or streaming further adds to the demand for broadband. As BEREC (2022) confirms, higher demand for content translates into demand for better speeds and data allowances, and this increases telcos' revenues. BEREC calls this 'mutual interdependence' and sees claims by telcos for payment from CPs to access telcos' networks as ignoring this interdependence.

The Internet is a connected ecosystem, where Telcos benefit from the demand for, and supply of, content. CPs have as much incentive for a high-quality user experience as telcos. Likewise, CPs also have an incentive to supply users with high quality experiences. Quality

deteriorates as networks become congested and CPs have invested in tools, such as on-net Content Delivery Networks (CDNs), to bring content ever closer to the edge (i.e., towards the end user), as well as partnerships with telcos to boost the short video experience and improve network efficiency and lower congestion during peak times (ARCEP, 2021 and WIK Consult, 2022).

Top Apps by upstream volume 2023 – APAC

Application	Share in upload traffic	Average daily upload volume per subscribers
iCloud	11%	159 MB
Playstation	6%	84 MB
YouTube	5%	78 MB
Facebook	5%	74 MB
Netflix	5%	65 MB
Xbox Live	4%	56 MB
Google	4%	55 MB
FaceTime	4%	51 MB
Google Cloud Storage	3%	49 MB
Google Photos	3%	44 MB
Others	50%	
Source	Sandvine March 2024 GIPR report	

Between 2016 and 2024, Meta has made significant infrastructure investments across Asia to enhance digital connectivity. These investments include the deployment of backbone networks, PoPs and caching infrastructure. These investments contribute directly to strengthening regional network resilience, reducing latency and improving the affordability and performance of Internet services. They also reflect the growing role that CPs and technology companies play in building the foundational infrastructure that supports national and regional digital economies.

Meta delivers most of its traffic locally across Asia-Pacific through a combination of cache servers and PoPs, with country-specific variations shaped by infrastructure and regulation. In Malaysia, Indonesia, the Philippines, Australia, Japan, Taiwan, Bangladesh and Pakistan, the majority of

traffic is served from caches distributed nationwide, complemented by PoPs in major urban centres. In Australia, the Sydney PoP also acts as a regional hub for New Zealand and Pacific Island nations, while in Bangladesh and Pakistan the absence of PoPs means some traffic is routed through neighbouring countries. In South Korea, by contrast, local caching is limited due to regulatory constraints, and traffic is primarily served from PoPs in Seoul. Overall, these deployments ensure that Meta traffic in most countries remains in-country, with cross-border routing mainly occurring where regulatory or infrastructure limitations prevent local PoP deployment.

Malaysia - The vast majority of Meta’s traffic across its applications is served by local cache servers near the users. Meta has invested in caches in Sabah, Johor, Sarawak, Malacca, Penang and in greater Kuala Lumpur, as well as 2 PoPs in the greater Kuala Lumpur region keeping almost all traffic in country.

Indonesia - The majority of Meta’s traffic in Indonesia is served locally near the users. It invested in cache clusters throughout the country, which carry about most of its traffic. The remaining traffic is primarily served by two PoPs servers located in the greater Jakarta area. Meta deployed caches in Java, Sumatra, Kalimantan, Sulawesi, Bali, Papua, the Riau Islands, Lombok, Maluku, East Nusa Tenggara and in Flores.

Philippines - The majority of Meta’s traffic in the Philippines is served from local caches. The remaining traffic is carried by three PoPs servers located in Metro Manila. Meta has invested in caches Metro Manila, Cagayan de Oro, Bukidnon, Davao del Norte, and across regions such as Baguio, Benguet, Iloilo, Camarines Sur, Eastern Visayas and Zambales.

Australia - The majority of Meta’s traffic in Australia is localised with caches near the user. The rest is primarily handled by a PoP server in Sydney, which also functions as a regional hub for traffic to and from New Zealand and Pacific Island nations. Meta

deployed caches in Victoria, New South Wales, Western Australia, Queensland, South Australia, in the ACT and in Tasmania.

Japan - Almost allThe majority of Meta’s traffic in Japan is served in country. The rest from is served by PoPs in Tokyo and Osaka. Meta has deployed caches in Honshu, Kyushu, Hokkaido, Shikoku and Okinawa.

South Korea - In contrast, a tiny percentage of traffic in South Korea is served locally via caches in Seoul, Busan, Cheongju and Jeju. The majority is delivered through PoPs located in Seoul. Due to a unique regulatory environment that disincentivizes caching arrangements with the three dominant ISPs, nearly all traffic is routed through PoPs rather than served from local caches. Still, Meta’s infrastructure ensures that almost all most traffic remains within South Korea., with only a small portion from non-incumbent networks routed via Japan.

Taiwan - The majority of Meta’s traffic in Taiwan is local through caches deployed in Taipei, Taichung and Kaohsiung. The rest is handled by PoPs in Taipei. This combination of infrastructure ensures that nearly all Meta traffic remains within the country.

Bangladesh - The majority of Meta’s traffic in Bangladesh is served locally via caches located in Dhaka, Chittagong, Jessore, Comilla, Rajshahi, Sylhet, Ishurdi, Saidpur and Barisal. There are currently no PoPs in Bangladesh due to regulatory and political barriers historical challenges and the absence of neutral colocation facilities. The remaining traffic is primarily served routed via Kolkata, with low latency strong latency performance and supported by failover through other Indian cities and Singapore.

Pakistan - The majority of Meta’s traffic in Pakistan is served locally from caches distributed across Punjab, Sindh, Islamabad Capital Territory, Khyber Pakhtunkhwa and Balochistan. There are no PoPs in Pakistan at present, primarily due to the to regulatory constraints. The remainder of traffic is served

routed from via Oman, with additional failover through Alexandria, Singapore and Marseille.

Google’s PoP and edge investments	
Country	Cities with multiple PoP
Japan	Tokyo, Osaka
Thailand	Bangkok
Singapore	Singapore
Indonesia	Jakarta
Philippines	Manila
Malaysia	Kuala Lumpur
Taiwan	Changhua County, Taipei, Hsinchu
Australia	Sydney, Melbourne, Brisbane, Canberra, Perth
South Korea	Seoul, Busan
India	Chennai, Mumbai, Delhi, Kolkata, Hyderabad,
Sources https://cloud.google.com/cdn/docs/locations#:~:text=Cloud	

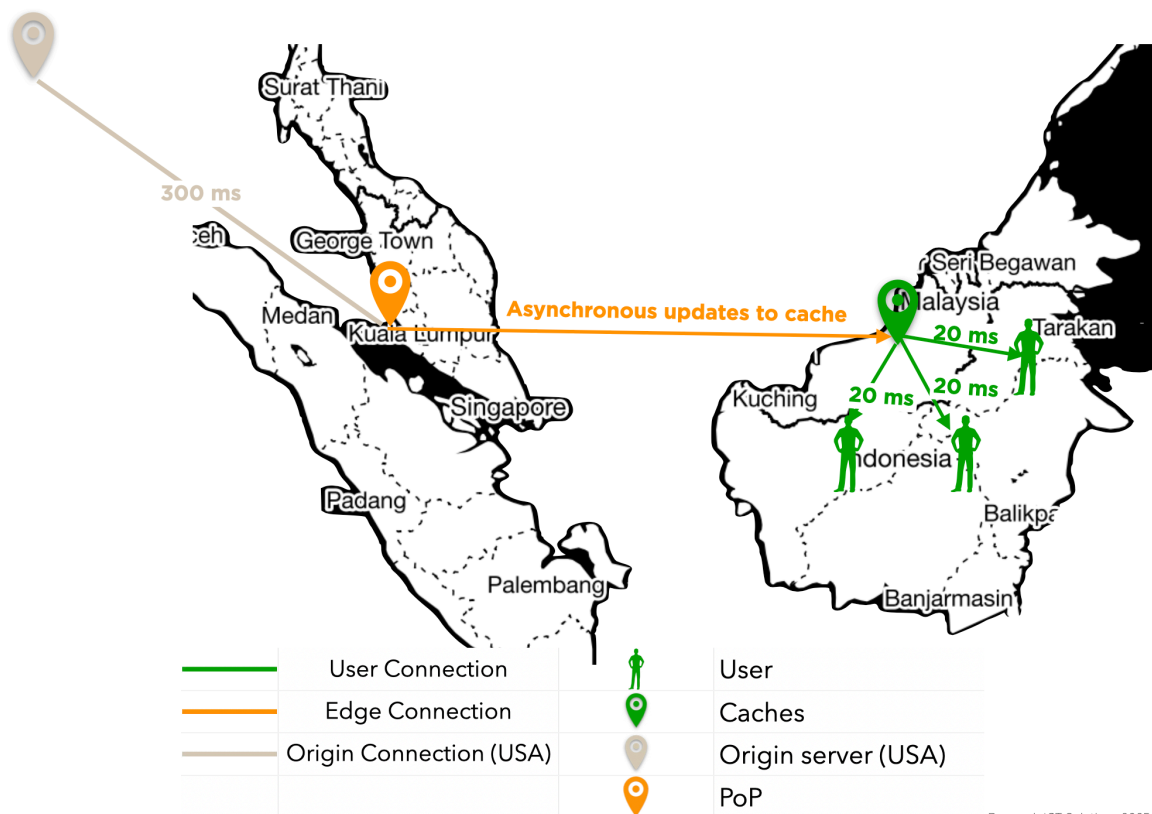
These country examples clearly demonstrate that Meta has made substantial investments in local caches and PoPs to reduce reliance on international transit and improve the efficiency of content delivery to users. By localising the vast majority of traffic within national borders, these infrastructure deployments help lower costs for ISPs, reduce network congestion and enhance user experience. End users benefit from faster loading times, reduced latency and more reliable access to content, particularly during peak traffic periods. Google (Table 23) has also invested in CDNs and PoPs to ensure fast and reliable delivery of its content to its users.

Content accessed via the public Internet is generally provided through cloud servers. CPs invest into various types of edge servers, which operate at the edge of a network providing data storage, processing, networking and security functions closer to the user. This has several advantages compared to accessing cloud services directly (Akamai, 2025):

- Reduced latency and better user experience by reducing the distance that data has to travel to the user.

- Stronger security because shorter distances for data to travel also reduces the risk of cyberattacks.
- Lower costs for ISPs by reducing the need for long distance transit and therefore international bandwidth.
- Higher availability of content and greater reliability of services in case of submarine cable cuts or other disruptions.
- Greater efficiency through local data processing, near to where the data is collected.

The consistent investment by CPs in PoPs and caching infrastructure suggests a clear benefit: they reduce delivery costs and improve service quality. Since CPs account for the majority of internet traffic the potential cost savings from their investments apply to the majority of traffic consumed, reinforcing their relevance to overall network efficiency and user experience.



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Declining Network Costs in APAC

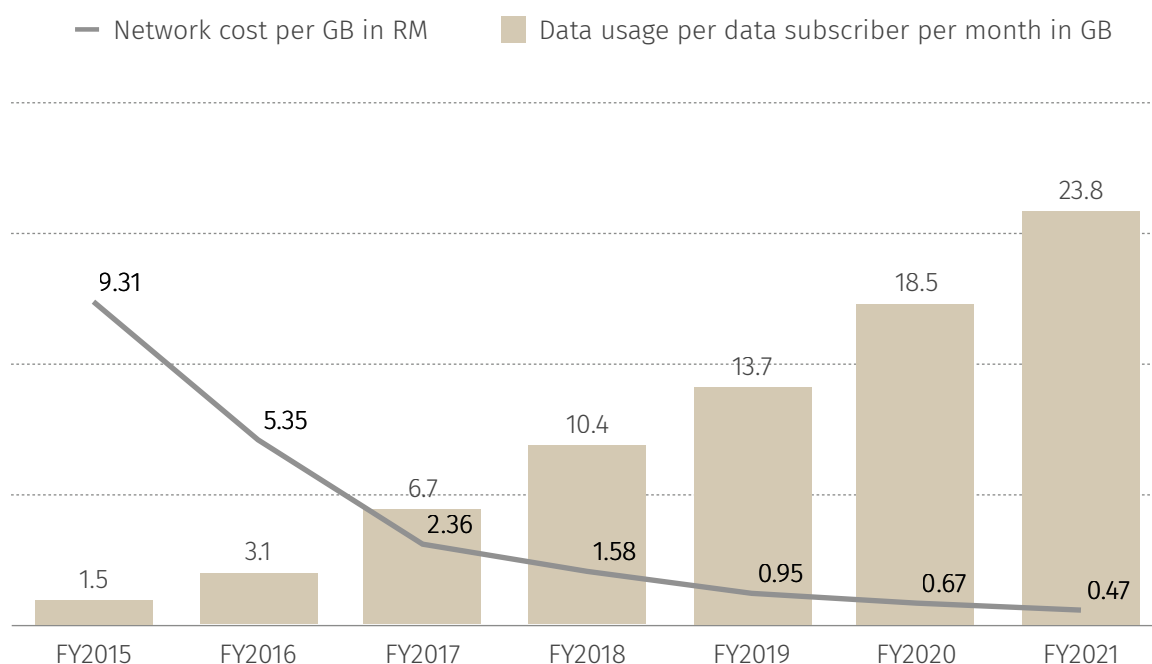
Generally access to the Internet is becoming cheaper over time as a result of several factors, including economies of scale, migration from 3G to 4G and 5G, rollout of fibre to the home (FTTh) and investments in submarine, POP and CDNs.

Declining network costs, and with it declining retail prices, encourages higher network utilisation, which benefits CPs and telcos alike as telcos are able to monetise increased utilisation to subscribers through increased broadband / data sales. Modern broadband networks are mostly about fixed capital expenditure like towers, antennas and fibre routes. As demand for the Internet increases, the cost falls until capacity has to be expanded through additional investments.

The network costs per subscriber of GB data usage has been declining for years in the APAC region, in line with global trends:

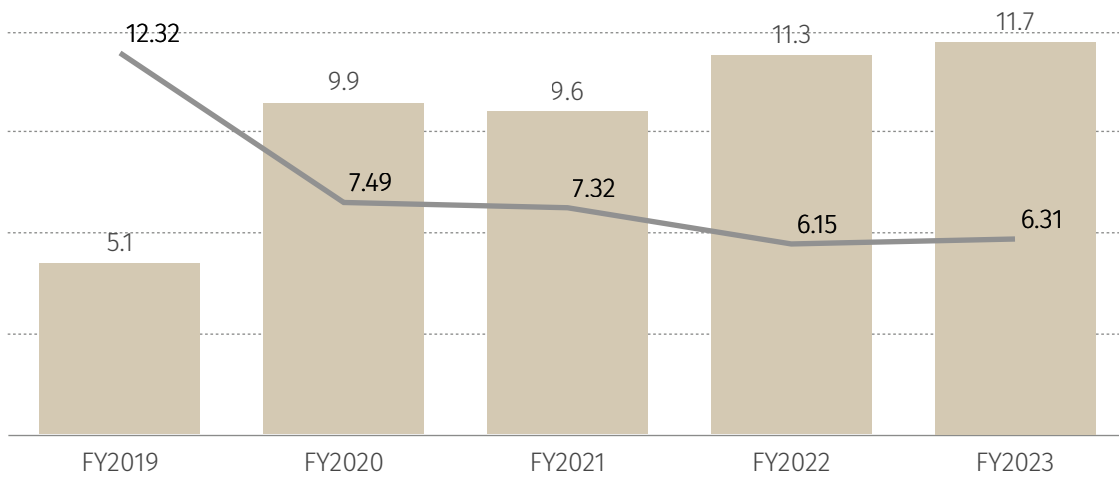
- Celcom Malaysia saw a decrease in network cost per GB from RM 9.3 in 2015 to RM 0.47 in 2021.
- Maxis is the second largest mobile operator in Malaysia after CelcomDigi saw its network cost per GB data traffic declined from RM 0.26 in 2019 to RM 0.12 per GB in 2024.
- For Telkomsel - Indonesia, the assets used per TB of data traffic dropped from Rupiah 12.3 million for the 2019 FY to Rupiah 12.3 million for the 2023 FY.
- For XL - Indonesia the infrastructure cost per GB data traffic halved from Rupiah 1,637 for the 2020 FY to only Rupiah 848 for the 2024 FY.

These examples demonstrate that the cost of providing Internet services to customers is falling with increasing demand for broadband content. The lower prices in turn lead to higher broadband adoption and higher demand. This self-reinforcing process is likely to slow down once market saturation is reached or when new content and new applications cannot increase demand of existing users. New and engaging content benefits all players in the Internet value chain.



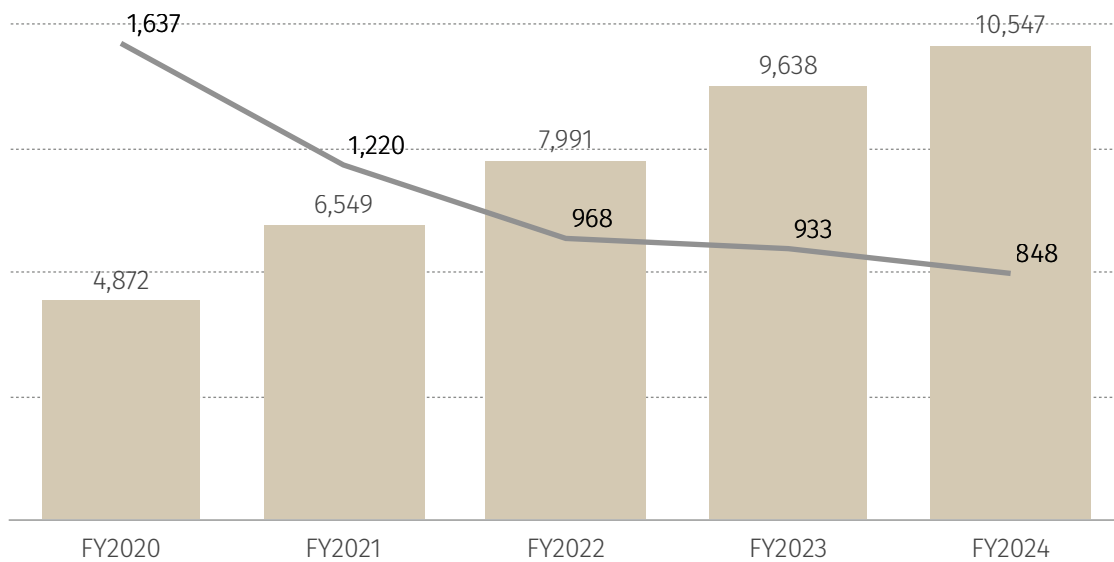
Celcom - Network cost per GB compared to data usage in GB per subscriber per month

— Assets million Rupiah per TB data traffic ■ Data Usage (GB/month) per data subscriber



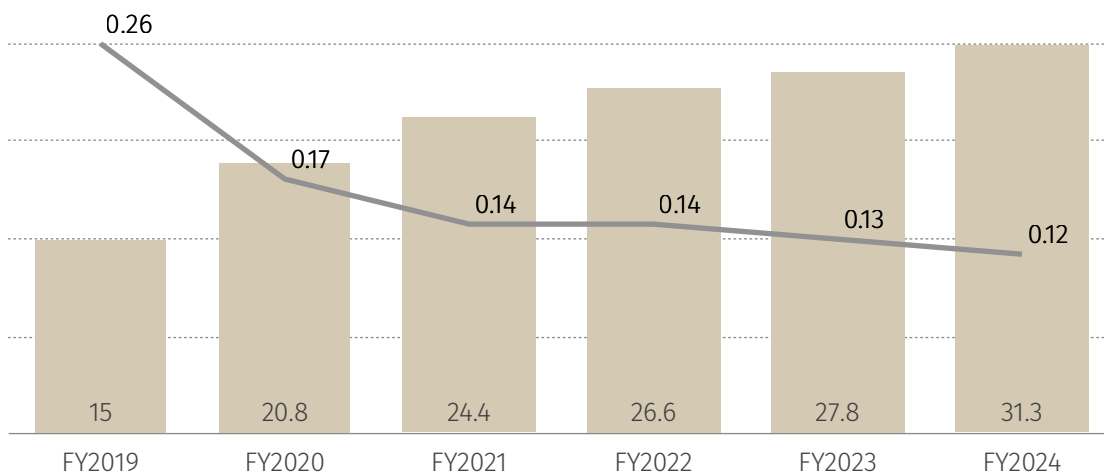
Telkomsel assets in IDR million per TB data compared to data usage in GB per sub per month

— Infrastructure expenses per GB in Rupiah ■ Data traffic in PB



XL Indonesia infrastructure expenses in IDR per GB data compared to data traffic in Petabyte

— Network cost per GB in RM ■ Data usage per data subscriber per month in GB



Maxis - Network cost per GB compared to data usage in GB per subscriber per month

Economic Impact

Accessible, reliable and affordable broadband internet is the foundation of the digital economy and digital inclusion. Improved broadband penetration is largely suggested by the economic literature to be associated with substantial socioeconomic benefits, contributing to enhanced productivity, facilitating information exchange, and improving service delivery across the economy (ITU, 2012).

The impact of broadband adoption on economic growth has been well studied. The measured macroeconomic effects of mobile broadband penetration ranges from 0.8% to 2.46% of additional GDP growth for an increase of 10% in mobile broadband penetration, depending on a set of countries and the time period. The estimates for lower-income Asian countries is at the higher end, with 2.44% of additional GDP growth per 10% higher broadband penetration.

ITU model using broadband penetration

The ITU Study (2020) established that 10% higher broadband penetration for Asia and the Pacific would result in economic growth of 0.51%. For middle and low income countries in Asia and the Pacific the impact is much larger at 2.44%. Applying the results of the ITU (2020) study to countries covered by this analysis demonstrates the economic potential of wider broadband adoption. For example, a 10%

increase in mobile broadband penetration is likely to increase Malaysia's GDP by nearly USD 2 billion, generating both employment and fiscal gains. Based on the Job-to-GDP ratio, this could yield over 78,500 additional jobs, while Malaysia's tax-to-GDP ratio (12.6%) implies roughly USD 257 million in extra tax revenue. Benefits for other countries range from USD 358 million to USD 7.3 billion and from 12 thousand jobs (Singapore) to 3.4 million (Indonesia). The additional GDP growth is not a one-time gain but a continuous benefit for the country's development.

Broadband penetration becomes a less meaningful proxy for countries with near-universal connectivity, such as Japan, with 155% mobile broadband penetration (MCI 2025). The high penetration rates reflect multiple SIM ownership or devices with e-SIMs rather than unique users.

Analysys Mason model based on data usage

In markets with saturated penetration, an alternative proxy for digital impact is mobile data usage. Inputs to data usage include subsea cables that expand capacity and route diversity, while local PoPs and peering reduce latency and improve stability. Together, these elements lower round-trip times, minimise peak-time delays and enhance network resilience - benefits valued by Internet users and businesses alike. Analysys Mason (2022a) modelled the impact of an increase in mobile data traffic on GDP growth for the APAC region and found that a 100% increase in mobile data traffic translates into 0.98% GDP growth. This finding is an alternative proxy for digital impact to mobile broadband penetration of

Impact of a 10% increase in mobile broadband penetration on GDP growth

Authors	Countries	GDP growth for 10% broadband penetration
Czernich et al. 2009	OECD, 1996-2007	0.9% - 1.5%
Koutroumpis 2018	OECD, 2002-2016	0.82% - 1.4%
OECD 2011	EU countries, 1980-2009	1.1%
Qiang et al. 2009	Low-income countries, 1980-2006	1.4%
Scott 2012	Low-income countries, 1980-2011	1.35%
Endquist et al. 2018	Global, 2000-2015	0.6% - 2.8%
ITU 2020	Global	1.5%
	Africa	2.46%
	Asia and Pacific countries overall	0.51%
	Asia and Pacific middle and low-income countries	2.44%

ITU Model: Impact of 10% higher broadband penetration of GDP growth and taxation

Country	GDP USD million (a)	GDP growth as result of 10% higher mobile broadband penetration (b)	Additional GDP USD million (d)	Tax to GDP Ratio % (e)	Additional Tax USD million (d)	Jobs in million (c)	Jobs per million USD GDP (d)	Additional Jobs (d)
Malaysia	399,705	0.51%	2,038	12.6%	257	15.4	39	78,540
Indonesia	1,371,171	2.44%	33,457	12.1%	4,048	139.2	102	3,396,480
Singapore	501,428	0.51%	2,557	14.0%	358	2.4	5	12,240
Thailand	514,969	0.51%	2,626	15.5%	407	39.9	77	203,490
Australia	1,728,057	0.51%	8,813	23.6%	2,080	14.4	8	73,440
Japan	4,204,495	0.51%	21,443	34.1%	7,312	67.8	16	345,831
South Korea	1,712,793	0.51%	8,735	15.7%	1,374	28.7	17	146,346
Taiwan	782,441	0.51%	3,990	14.7%	587	11.5	15	58,670
Philippines	437,146	2.44%	10,666	14.1%	1,504	45.8	105	1,118,496
Bangladesh	437,415	2.44%	10,673	7.6%	816	70.5	161	1,719,248
Pakistan	337,912	2.44%	8,245	10.0%	825	61.7	182	1,504,309

Sources: a) WDI 2025, most recent data, except Taiwan (IMF 2025), (b) ITU 2020 (c) ILO 2025 (d) calculation, (e) WDI 2025, most recent data, except Japan and Pakistan (OECD for 2021), and Taiwan (Taipei Times Jan 2025)

the ITU (2020) study. While measuring the same thing, the mobile data usage model may be more suitable for markets with saturated penetration and also to assess regulatory impacts for time periods of less than a year.

Applying this methodology to the APAC region, highlights how increased data usage translates into measurable economic gains through higher productivity. Between 2018 and 2023, this relationship is estimated to have contributed USD 7.7 billion to GDP in Malaysia and USD 63 billion in Japan.

Conclusion

The ITU and Analysys Mason studies measure the same thing, but from different perspectives. The ITU (2020) study examines the relationship between mobile broadband adoption and economic growth using World Bank and ITU data, which typically lag by about two years. Consequently, the model is better suited for assessing longer-term and more general economic impacts rather than short-term effects.

The Analysys Mason (2022a) study assesses how mobile data usage influences economic growth. Unlike the ITU model, it uses quarterly data, allowing for more timely analysis of the effects of policies and regulations and making it better suited to capture short- and medium-term impacts. By focusing on data usage rather than access, the model is particularly relevant for countries where broadband penetration is already high and growth is driven mainly by increased usage intensity.

Both models have merit and complement each other: the ITU model provides a robust framework for understanding the long-term structural relationship between broadband adoption and economic growth, while the Analysys Mason model captures more immediate, usage-driven effects that reflect current market dynamics and policy interventions. Together, they offer a comprehensive view of how broadband expansion and data consumption jointly contribute to economic development.

Analysys Mason Study: GDP impact in USD billion for an increase in mobile data usage

	2018	2019	2020	2021	2022	2023	Combined
Malaysia	2.3	1.7	1.6	0.8	0.7	0.6	7.7
Indonesia	7.1	5.9	5.6	3.5	3.2	1.4	26.7
Singapore	1.1	4.0	1.1	0.8	1.0	0.6	8.6
Thailand	2.8	2.7	1.7	1.4	1.1	0.4	10.1
Australia	9.7	6.2	1.7	1.3	4.9	2.7	26.5
Japan	12.9	12.5	12.6	7.8	11.6	5.6	63.0
South Korea	4.8	7.0	3.4	3.3	2.6	1.5	22.6
Taiwan	2.0	1.6	1.3	1.1	1.2	0.7	7.9
Philippines	3.6	2.6	1.8	1.0	1.4	0.5	10.9
Bangladesh	3.2	2.5	2.0	2.8	1.8	0.5	12.8
Sources	Calculations based Analysys Mason Study (2022)						

Singapore

Singapore has rapidly evolved into one of the most strategically connected digital hubs in Asia, underpinned by a dramatic increase in submarine cable capacity. The explosive growth has been driven by the city-state's geographic advantage, pro-investment regulatory environment, and position as a regional data center and interconnection hub.

CPs have become increasingly central to this expansion. Beginning with Google's early participation in cables like SJC (2013) and continuing with joint ownership in major upcoming systems such as Bifrost (2025, 125 Tbps), Echo (2025, 144 Tbps) and Apricot (2027, 216 Tbps), tech giants like Meta, Alphabet (Google) and Microsoft are now key stakeholders in Singapore's connectivity infrastructure.

Singapore consistently led the region with the lowest latency, dropping from 27.5 ms in Q1 2019 to a low of 20.98 ms in Q3 2021. Despite minor fluctuations after 2022, it remained the top performer at 24.1 ms in Q1 2025. Average mobile download speeds improved from 45 Mbps in 2019 to 187 Mbps in 2025.

Applying the results of the ITU (2020) study to Singapore demonstrates the economic potential of digitalisation and wider broadband adoption. A 10% higher broadband penetration would lead to USD 2.6 billion and



additional tax revenues of USD 358 million leading to about 12,000 additional jobs.

Singapore's monthly per capita data usage rose from 3.8 GB in 2018 to 16 GB in 2023, driving annual mobile data traffic from 0.26 million TB to 1.2 million TB. Applying the Analysys Mason (2022a) findings - a 0.98% GDP rise for every 100% increase in data usage - this surge translated into additional annual GDP growth of USD 0.6–4 billion.

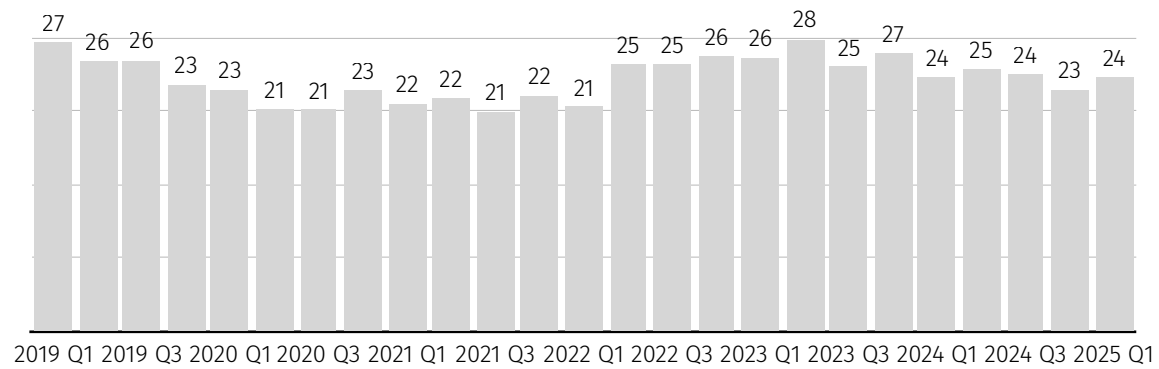
Taken together, the ITU and Analysys Mason models show that Singapore's broadband expansion delivers both sustained and dynamic economic benefits, combining long-term structural gains of about USD 2.6 billion with shorter-term, usage-driven growth ranging between USD 0.6 billion and USD 4 billion per year.

Annual Impact of 10% higher broadband penetration of GDP growth and taxation for Singapore

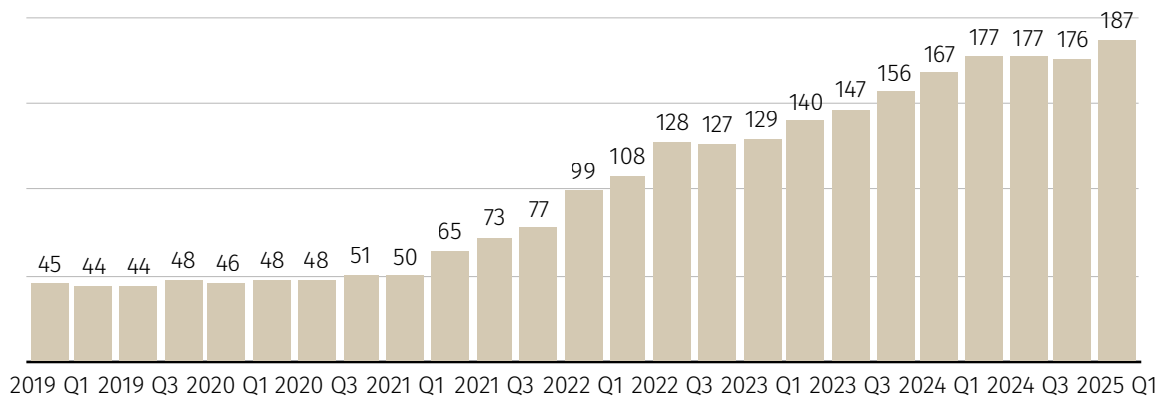
CP partial ownership of submarine cable systems landing in Singapore

Cable Name	RFS	Tbps	Partial Ownership
Southeast Asia-Japan Cable (SJC)	2013	73	Alphabet
Asia Pacific Gateway (APG)	2016	68	Meta
INDIGO-West	2019	36	Alphabet
Bifrost	2025	125	Meta, Alphabet
Echo	2025	144	Meta, Alphabet
Southeast Asia-Japan Cable 2 (SJC2)	2025	137	Meta
SeaMeWe-6	2026	126	Microsoft
Apricot	2027	216	Meta, Alphabet
Source	Telegeography		

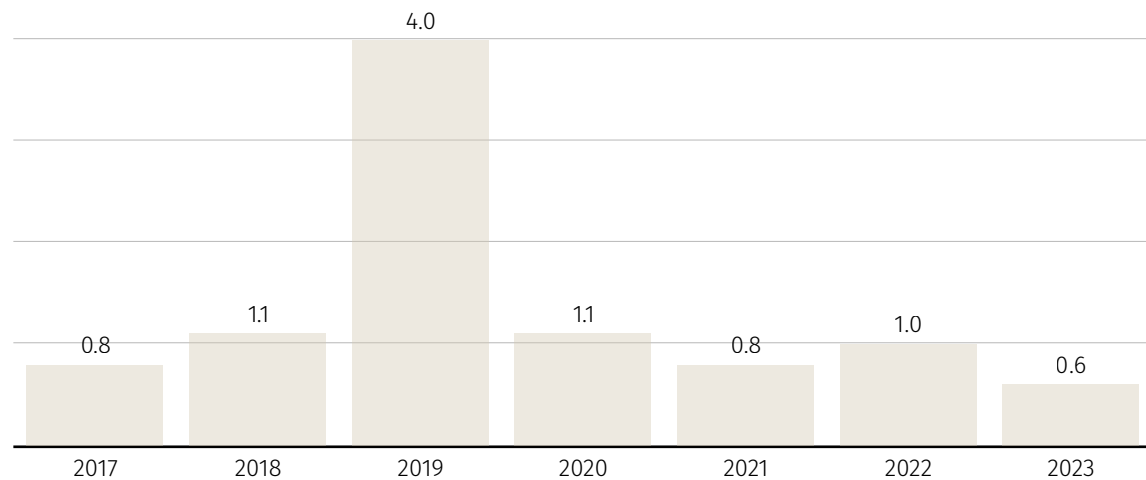
Singapore		Sources
GDP USD million	501,428	WDI 2025 most recent data
GDP growth as result of 10% higher mobile broadband penetration	0.51%	ITU 2020
Additional GDP USD million	2,557	calculation
Tax to GDP Ratio %	14%	WDI 2025 most recent data
Additional Tax USD million	358	calculation
Jobs in million	2.4	LO 2025
Jobs per million USD GDP	5.0	calculation
Additional Jobs	12,240	calculation



Average mobile latency in milliseconds for Singapore (Ookla)



Average mobile download speeds in Mbps for Singapore (Ookla)



GDP impact in USD billion due to increase in mobile data usage for Singapore (Analysis Mason)

Analysis Mason Model: Impact of growth in data consumption on GDP for Singapore

Singapore	2017 Dec	2018 Dec	2019 Dec	2020 Dec	2021 Dec	2022 Dec	2023 Dec	Source
Mobile data usage in GB per capita per month	3	3.8	7.8	10.5	13.1	15.3	16.4	Telegeography
Population million	6	5.6	5.7	5.7	5.5	5.6	5.9	WDI 2025
Data traffic per year million TB	0.20	0.26	0.54	0.71	0.85	1.03	1.16	Calculation
Data traffic change in %		29%	109%	33%	20%	21%	13%	Calculation
GDP impact factor in %		0.29%	1.07%	0.33%	0.19%	0.20%	0.13%	Analysis Mason
GDP USD billion	343	377	377	349	434	498	501	WDI 2025
Additional GDP in USD billion		1.1	4.0	1.1	0.8	1.0	0.6	Calculation

Malaysia

Although Meta's investment covers only one of the 28 submarine cables landing in Malaysia, its participation in the Asia Pacific Gateway (APG) cable is strategically significant. The APG system, with a design capacity of 54 Tbps, strengthens Malaysia's regional connectivity to major hubs in East and Southeast Asia.

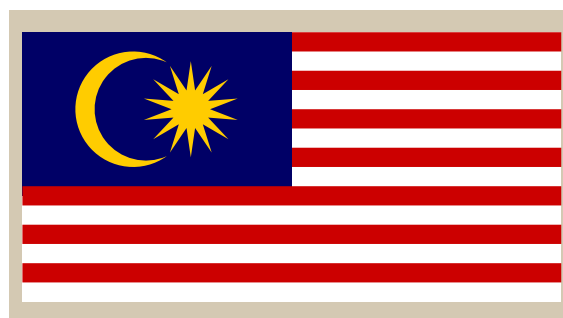
Malaysia showed steady improvement in latency from 50.2 ms in 2019 to ~36.5 ms by 2025. Latency reached its lowest in Q4 2023 at 34.6 ms, though there were slight increases in early 2024. Average mobile download speeds improved from 18Mbps in 2019 to 136Mbps in 2025.

This rise in data consumption was made possible in part by substantial investments in digital infrastructure, including a growing number of submarine cable landings that expand Malaysia's international bandwidth. These investments, some of which involve content providers (CPs), have helped ensure that users can access increasingly data-rich content efficiently and at lower cost. While it is not possible to directly attribute the growth in data consumption to CP investments alone, these investments are a key enabler. The presence of multiple submarine cables reduces bottlenecks and improves international connectivity (removing build out costs from telcos), which, in turn, supports the increased use of data-intensive applications and services, which telcos can monetise through increased or enhanced subscriptions.

Applying the results of the ITU (2020) demonstrates the economic potential of digitalisation and wider broadband adoption for Malaysia. A 10% increase in mobile broadband penetration leads to an 0.51%

CP partial ownership of submarine cable systems landing in Malaysia

Cable Name	RFS	Tbps	Partial Ownership
Asia Pacific Gateway (APG)	2016	54	Meta
SeaMeWe-6	2026	126	Microsoft
Source	Telegeography		



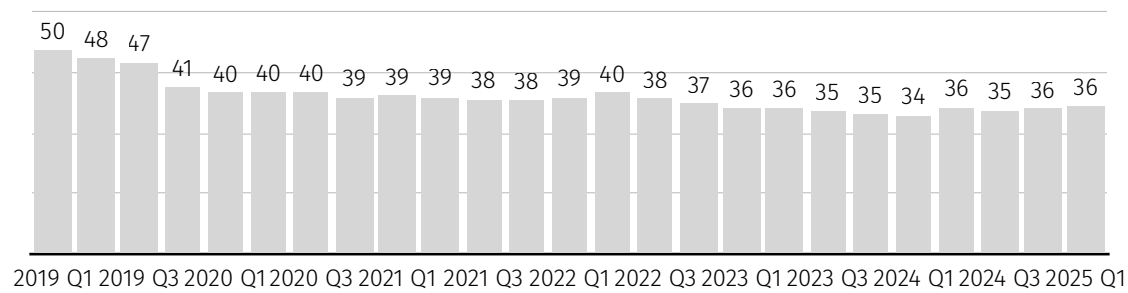
increase in GDP, translation to USD 2 billion for Malaysia and based on Malaysias tax revenue to GDP ratio to USD 257 million in tax revenues. GDP growth is also linked to job creation. Using a jobs per million USD GDP ratio implies that a 10% increase in broadband penetration leads to about 80,000 additional jobs.

Malaysia's mobile per capita data usage rose from 12 GB in 2018 to 40.6 GB in 2023, driving annual mobile data traffic from 4.7 million TB to 17.1 million TB. Applying the Analysys Mason (2022a) model - a 0.98% GDP rise for every 100% increase in data usage - this growth translated into additional annual GDP gains of USD 0.6–2.0 billion.

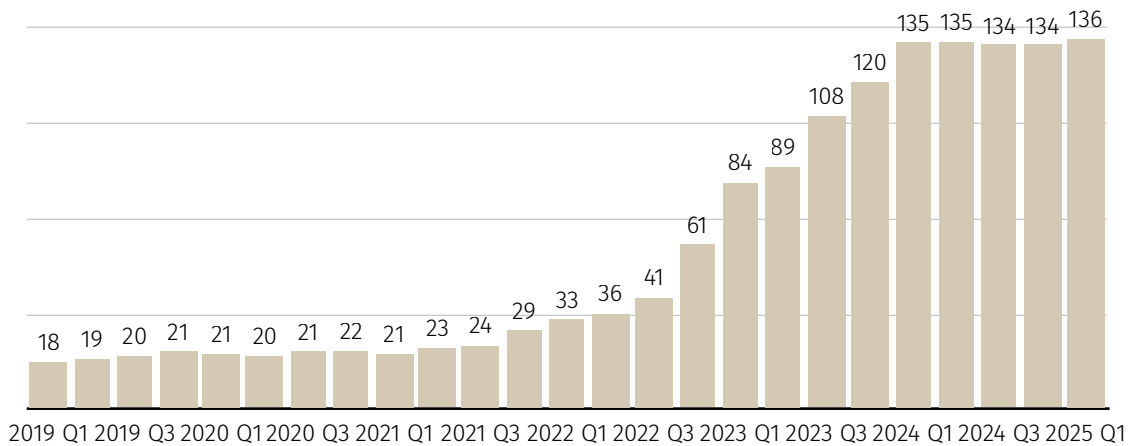
Taken together, the ITU and Analysys Mason models show that Malaysia's broadband expansion delivers both sustained and dynamic economic benefits, combining long-term structural gains of about USD 2 billion with shorter-term, usage-driven growth of USD 0.6–2.0 billion per year.

Annual Impact of 10% higher broadband penetration of GDP growth and taxation for Malaysia

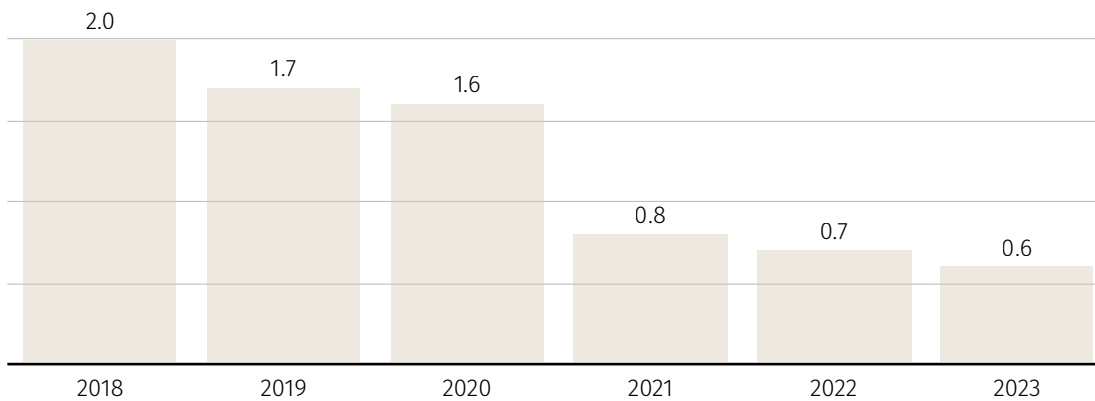
Malaysia		Sources
GDP USD million	399,705	WDI 2025
GDP growth as result of 10% higher mobile broadband penetration	0.51%	ITU 2020
Additional GDP USD million	2,038	calculation
Tax to GDP Ratio %	13%	WDI 2025
Additional Tax USD million	257	calculation
Jobs in million	15.4	LO 2025
Jobs per million USD GDP	39.0	calculation
Additional Jobs	78,540	calculation



Average mobile latency in milliseconds for Malaysia (Ookla)



Average mobile download speeds in Mbps for Malaysia (Ookla)



GDP impact in USD billion due to increase in mobile data usage for Malaysia (Analysis Mason)

Analysis Mason Model: Impact of growth in data consumption on GDP Malaysia

Malaysia	2017 Dec	2018 Dec	2019 Dec	2020 Dec	2021 Dec	2022 Dec	2023 Dec	Source
Mobile data usage in GB per capita per month	7.4	12	17.4	25.5	30.5	35.8	40.6	Telegeography
Population million	32.4	33	33.4	33.9	34.3	34.7	35.1	WDI 2025*
Data traffic per year million TB	2.87	4.72	6.98	10.37	12.54	14.90	17.12	Calculation
Data traffic change in %		1	48%	49%	21%	19%	15%	Calculation
GDP impact factor in %		0	0.47%	0.48%	0.20%	0.18%	0.15%	Analysis Mason
GDP USD billion	319	359	365	337	374	408	400	WDI 2025*
Additional GDP in USD billion		2	1.7	1.6	0.8	0.7	0.6	Calculation

Philippines

The Philippines has experienced a substantial increase in submarine cable capacity over the past two decades, marking its transformation into a critical connectivity node in Southeast Asia. Content providers have become increasingly central to this growth. Several large-scale investment by CPs such as Meta, Amazon and Alphabet in the Philippines has accelerated international connectivity easing the cost for national telcos.

The Philippines saw strong improvement, moving from 12.2 Mbps in early 2019 to 50.1 Mbps by Q1 2025 in average mobile download speeds. The most rapid progress occurred after 2021, indicating major infrastructure upgrades. The Philippines reduced latency from 62.8 ms in 2019 to 31.7 ms in 2025, an impressive improvement. Gains were especially notable after 2020, likely due to increased investment in infrastructure.

Applying the results of the ITU (2020) demonstrates the economic potential of digitalisation and wider broadband adoption for the Philippines. A 10% increase in mobile broadband penetration leads to a 2.44% increase in GDP, translation to USD 10.6 billion for the Philippines and based on the tax revenue to GDP ratio an additional USD 1 billion in tax revenues. GDP growth is also linked to job creation. Using a jobs per million USD GDP ratio implies that a 10% increase in broadband penetration leads to about 1.2 million additional jobs.

CP partial ownership of submarine cable systems landing in Philippines

Cable Name	RFS	Tbps	Partial Ownership
Southeast Asia-Japan Cable (SJC)	2013	73	Alphabet
JUPITER	2020	75	Meta, Amazon
Pacific Light Cable Network (PLCN)	2022	48	Meta, Alphabet
Bifrost	2025	124.8	Meta
TPU	2025	260	Alphabet (100%)
Apricot	2027	216	Meta, Alphabet
Source	Telegeography		

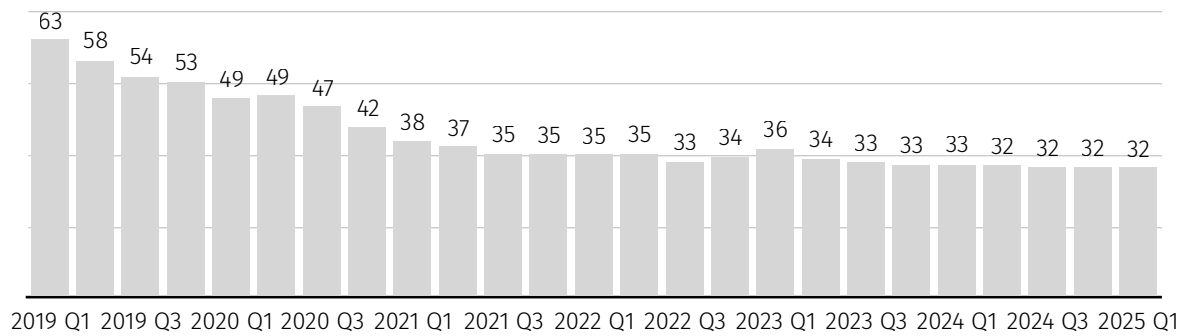


The Philippines mobile per capita data usage rose from 1.9 GB in 2018 to approximately 9 GB in 2023. However, in 2023 the usage has dropped, suggesting that there is room for growth. Mobile data traffic rose from 2.5 million TB to 12.8 million TB. Applying the Analysys Mason (2022a) model - a 0.98% GDP rise for every 100% increase in data usage - this growth translated into additional annual GDP gains of USD 0.5–3.6 billion.

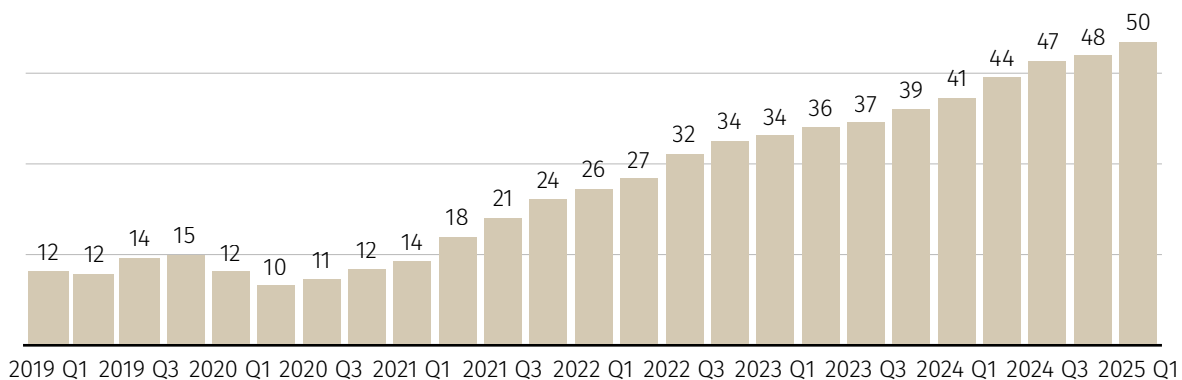
Taken together, the ITU and Analysys Mason models show that the Philippines broadband expansion delivers both sustained and dynamic economic benefits, combining long-term structural gains of about USD 10.7 billion with shorter-term, usage-driven growth of USD 0.5–3.6 billion per year.

Annual Impact of 10% higher broadband penetration of GDP growth and taxation for Philippines

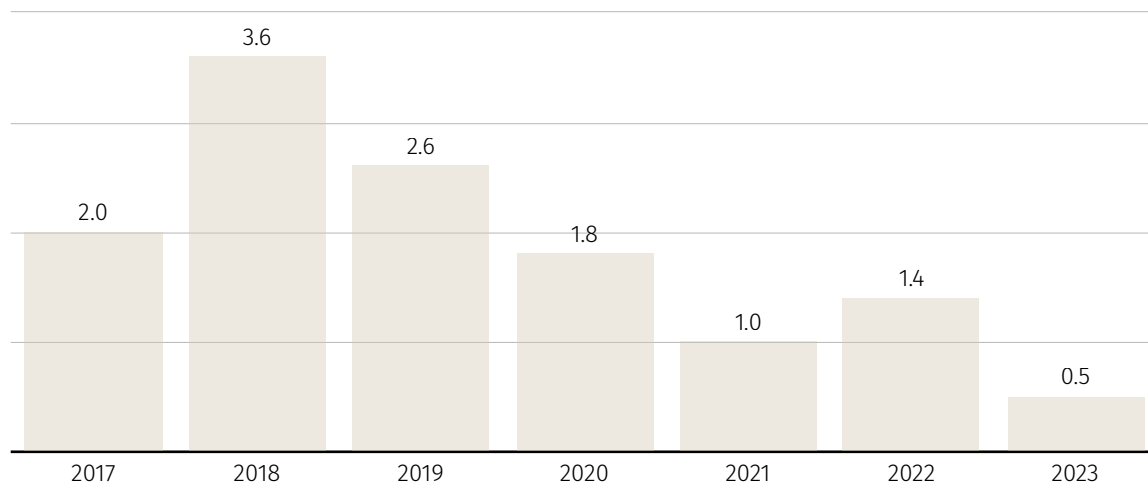
Philippines		Sources
GDP USD million	437,146	WDI 2025
GDP growth as result of 10% higher mobile broadband penetration	2.44%	ITU 2020
Additional GDP USD million	10,666	calculation
Tax to GDP Ratio %	14.1%	WDI 2025
Additional Tax USD million	1,504	calculation
Jobs in million	45.8	LO 2025
Jobs per million USD GDP	104.9	calculation
Additional Jobs	1,118,496	calculation



Average mobile latency in milliseconds for Philippines (Ookla)



Average mobile download speeds in Mbps for Philippines (Ookla)



GDP impact in USD billion due to increase in mobile data usage for Philippines (Analysys Mason)

Analysys Mason Model: Impact of growth in data consumption on GDP Philipines

Philippines	2017 Dec	2018 Dec	2019 Dec	2020 Dec	2021 Dec	2022 Dec	2023 Dec	Source
Mobile data usage in GB per capita per month	1	1.9	3.3	4.9	6.1	8.3	9.3	Telegeography
Population million	108	109.5	110.8	112.1	113.1	114.0	114.9	WDI 2025*
Data traffic per year million TB	1.24	2.54	4.36	6.59	8.33	11.33	12.77	Calculation
Data traffic change in %		105%	71%	51%	26%	36%	13%	Calculation
GDP impact factor in %		1.03%	0.70%	0.50%	0.26%	0.35%	0.12%	Analysis Mason
GDP USD billion	328	347	377	362	394	404	437	WDI 2025*
Additional GDP in USD billion		3.6	2.6	1.8	1.0	1.4	0.5	Calculation

Australia

Australia's submarine cable capacity has grown significantly over the past three decades and since 2019 is driven by CP involvement. Alphabet (Google) is listed as part owner of three and sole owner of four upcoming systems.

Australia average download speeds grew from 54.2 Mbps in early 2019 to 139.6 Mbps in Q1 2025. The largest annual gain occurred between 2020 and 2021, when average speeds jumped nearly 36% (from 61.9 Mbps in Q1 2020 to 83.3 Mbps in Q4 2020). Australia's latency stayed relatively stable, ranging between 26–32 ms. After peaking in 2022 (up to 32.1 ms), performance began improving again, reaching 30.9 ms in Q1 2025.

Applying the results of the ITU (2020) study to Singapore demonstrates the economic potential of digitalisation and wider broadband adoption. A 10% increase in mobile broadband penetration leads to an 0.51% increase in GDP, translation to USD 8.8 billion for Malaysia and based on Malaysia's tax revenue to GDP ratio to USD 2 billion in tax revenues. GDP growth is also linked to job creation. Using a jobs per million USD GDP ratio implies that a 10% increase in broadband penetration leads to about 73,000 additional jobs.

Australia's mobile per capita data usage rose from 6.9 GB in 2018 to 17.4 GB in 2023, driving

CP partial ownership of submarine cable systems landing in Australia

Cable Name	RFS	Tbps	Partial Ownership
INDIGO-Central	2019	36	Alphabet
INDIGO-West	2019	36	
Japan-Guam-Australia South (JGA-S)	2020	36	
Honomoana	2026	259.2	Alphabet (100%)
Tabua	2026	272	
Australia Connect Interlink	2027		
Bosun	2027		
Umoja	2027		
Source	Telegeography		

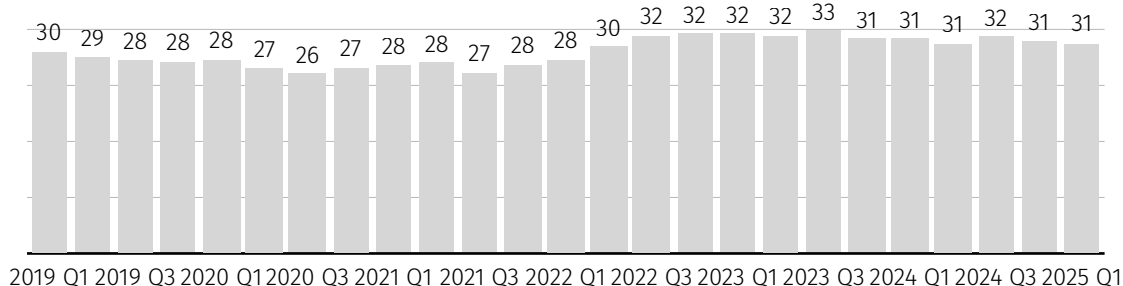


annual mobile data traffic from 2 million TB to 5.6 million TB. Applying the Analysys Mason (2022a) model - a 0.98% GDP rise for every 100% increase in data usage - this growth translated into additional annual GDP gains of USD 1.3-9.7 billion.

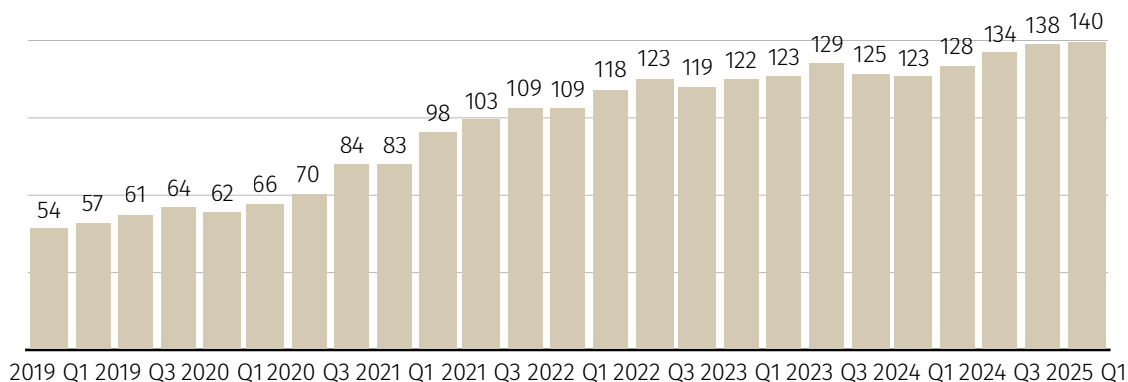
Taken together, the ITU and Analysys Mason models show that Australia's broadband expansion delivers both sustained and dynamic economic benefits, combining long-term structural gains of about USD 8.8 billion with shorter-term, usage-driven growth of USD 1.3 to 9.7 billion per year.

Annual Impact of 10% higher broadband penetration of GDP growth and taxation for Australia

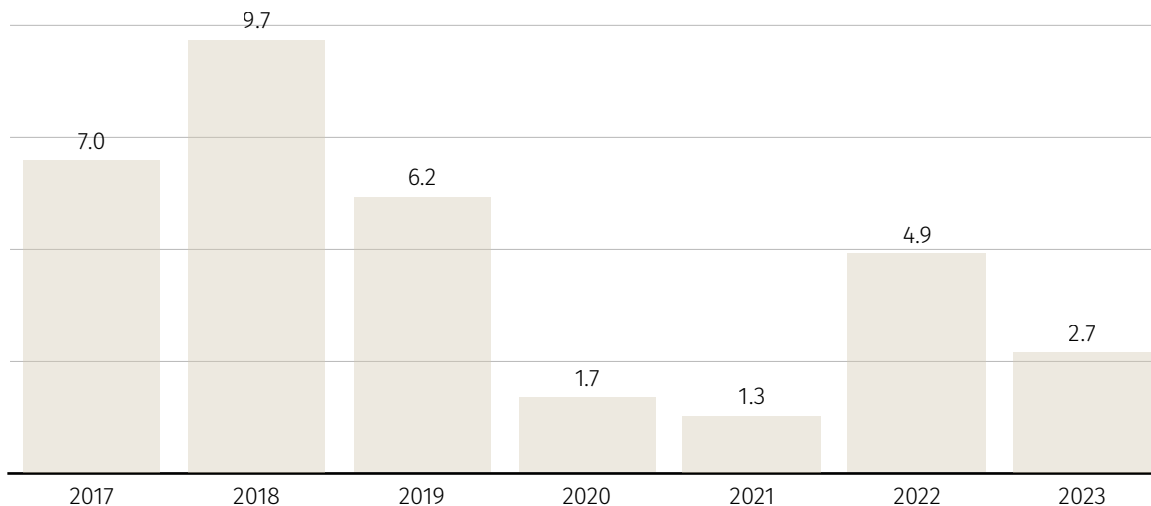
Country	Australia	Sources
GDP USD million	1,728,057	WDI 2025, most recent data
GDP growth as result of 10% higher mobile broadband penetration	0.51%	ITU 2020
Additional GDP USD million	8,813	calculation
Tax to GDP Ratio %	24%	WDI 2025, most recent data
Additional Tax USD million	2,080	calculation
Jobs in million	14.4	LO 2025, most recent data
Jobs per million USD GDP	8.0	calculation
Additional Jobs	73,440	calculation



Average mobile latency in milliseconds for Australia (Ookla)



Average mobile download speeds in Mbps for Australia (Ookla)



GDP impact in USD billion due to increase in mobile data usage for Australia (Analysys Mason)

Analysys Mason Model: Impact of growth in data consumption on GDP Australia

Australia	2017 Dec	2018 Dec	2019 Dec	2020 Dec	2021 Dec	2022 Dec	2023 Dec	Source
Mobile data usage in GB per capita per month	4	6.9	9.9	11.0	12.0	15.4	17.4	Telegeography
Population million	25	25.0	25.3	25.6	25.7	26.0	26.7	WDI 2025
Data traffic per year million TB	1.22	2.07	3.01	3.40	3.70	4.80	5.56	Calculation
Data traffic change in %		70%	46%	13%	9%	30%	16%	Calculation
GDP impact factor in %		0.68%	0.45%	0.13%	0.09%	0.29%	0.15%	Analysis Mason
GDP USD billion	1,326	1,428	1,393	1,328	1,557	1,691	1,728	WDI 2025
Additional GDP in USD billion		9.7	6.2	1.7	1.3	4.9	2.7	Calculation

Indonesia

Indonesia has seen a rapid expansion in its submarine cable capacity over the past two decades. In 2003, the total installed capacity was just 6.4 Tbps, with early systems such as TIS (Thailand–Indonesia–Singapore) providing initial connectivity. By 2024, total capacity had surpassed 1,400 Tbps and by 2028, it is projected to exceed 2,600 Tbps - a 400-fold increase over 25 years. This growth reflects not only rising domestic data demand but also the country's increasing integration into the global digital economy. Indonesia's vast geography and archipelagic structure make submarine cables critical for national connectivity and investments have surged accordingly.

The more recent wave of high-capacity systems, such as SEAX-1 (2018, 387.2 Tbps), BNCS-1 (2024, 230.4 Tbps), INSICA (2026, 480 Tbps), and ACC-1 (2028, 256 Tbps), demonstrates a shift toward ultra-high-throughput systems, designed to meet not just local but regional interconnection needs. CPs such as Meta and Alphabet (Google) are playing a growing role in this infrastructure build-out. While they may not appear as named equity investors in every system, they are often involved through pre-sale purchases - long-term commitments to buy capacity in advance, which help fund the construction of these cables and remove these costs from ISPs. In several cases, such as Bifrost, Echo and Apricot, Meta and Alphabet are listed as part-owners.

Indonesia's mobile download speeds rose from 9.8 Mbps in Q1 2019 to 35.5 Mbps in Q1 2025. Though starting from a low base, Indonesia nearly quadrupled its speeds,

CP partial ownership of submarine cable systems landing in Indonesia

Cable Name	RFS	Tbps	Partial Ownership
INDIGO-West	2019	36	Alphabet
Bifrost	2025	125	Meta
Echo	2025	144	Meta, Alphabet
Apricot	2027	216	
Source	Telegeography		



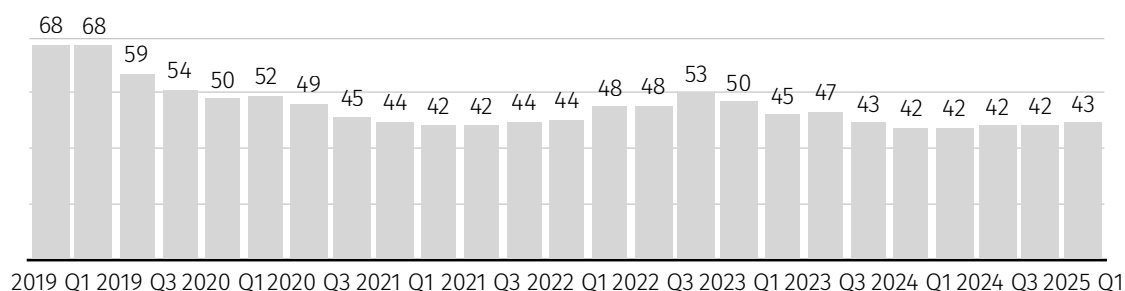
showing consistent annual improvements, albeit at a slower pace than peers. Indonesia had the highest latency among the six countries in early periods, nearly 68 ms in Q1 2019. However, it steadily improved over time, dropping to 42.8 ms in Q1 2025, though still trailing behind its regional peers.

Indonesia's mobile per capita data usage rose from 3.5 GB in 2018 to 14.1 GB in 2023, driving annual mobile data traffic from 11.3 million TB to 47.5 million TB. Applying the Analysys Mason (2022a) model - a 0.98% GDP rise for every 100% increase in data usage - this growth translated into additional annual GDP gains of USD 1.4-7.1 billion.

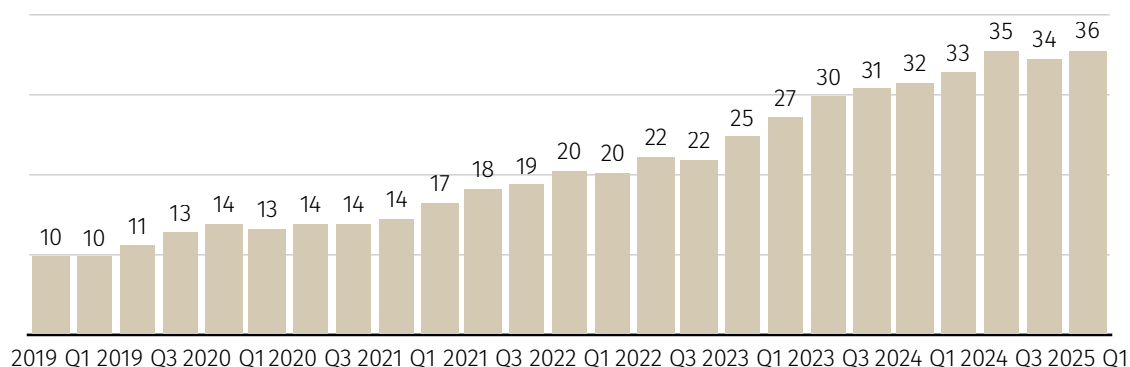
Taken together, the ITU and Analysys Mason models show that Indonesia's broadband expansion delivers both sustained and dynamic economic benefits, combining long-term structural gains of about USD 33.5 billion with shorter-term, usage-driven growth of USD 1.4 to 7.1 billion per year.

Impact of 10% higher broadband penetration

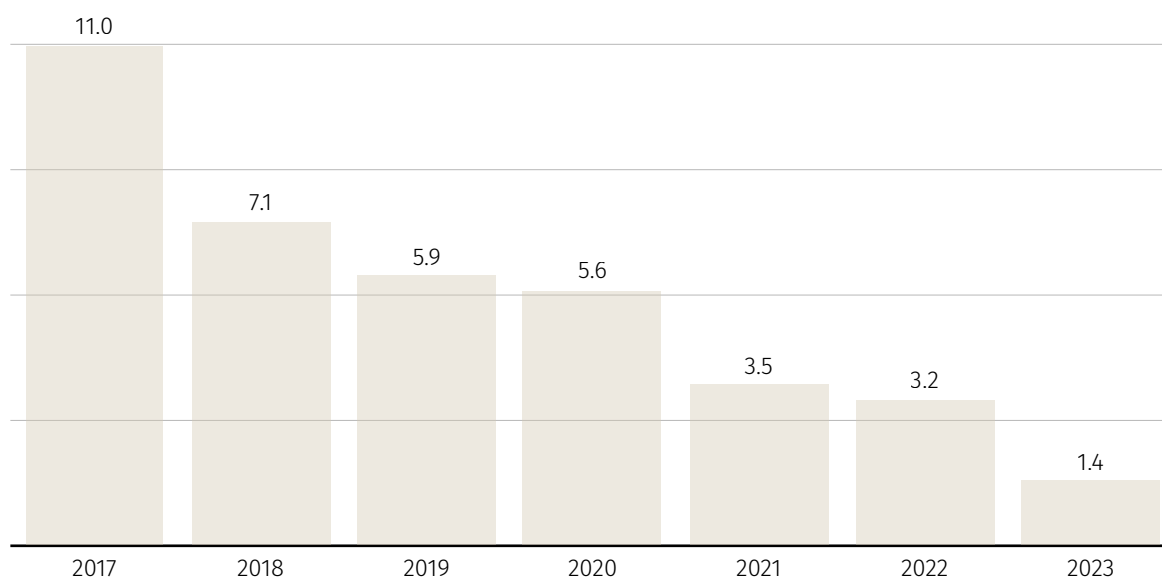
Country	Indonesia	Sources
GDP USD million	1,371,171	WDI 2025
GDP growth as result of 10% higher mobile broadband penetration	2.44%	ITU 2020
Additional GDP USD million	33,457	calculation
Tax to GDP Ratio %	12%	WDI 2025
Additional Tax USD million	4,048	calculation
Jobs in million	139.2	LO 2025
Jobs per million USD GDP	102.0	calculation
Additional Jobs	3,396,480	calculation



Average mobile latency in milliseconds for Indonesia (Ookla)



Average mobile download speeds in Mbps for Indonesia (Ookla)



GDP impact in USD billion due to increase in mobile data usage for Indonesia (Analysis Mason)

Analysis Mason Model: Impact of growth in data consumption on GDP Indonesia

Indonesia	2017 Dec	2018 Dec	2019 Dec	2020 Dec	2021 Dec	2022 Dec	2023 Dec	Source
Mobile data usage in GB per capita per month	2	3.5	5.3	8.0	10.4	12.8	14.1	Telegeography
Population million	267	270.0	272.5	274.8	276.8	278.8	281.2	WDI 2025
Data traffic per year million TB	6.65	11.26	17.26	26.52	34.54	42.99	47.51	Calculation
Data traffic change in %		69%	53%	54%	30%	24%	11%	Calculation
GDP impact factor in %		0.68%	0.52%	0.53%	0.30%	0.24%	0.10%	Analysis Mason
GDP USD billion	1,016	1,042	1,119	1,059	1,187	1,319	1,371	WDI 2025
additional GDP in USD billion		7.1	5.9	5.6	3.5	3.2	1.4	Calculation

Conclusion

The market value of the global Internet value chain quadrupled between 2008 and 2020, and the connectivity segment more than tripled. This growth indicates that the connectivity segment is not in decline. Content drives broadband demand, increasing revenues for broadband providers, which in turn reinvest in expanding network capacity. The connectivity segment remains highly profitable, with above-average EBITDA margins and ROE, with no indication of market failure.

CP investments in network digital infrastructure reshape the economics of broadband markets. Their participation in submarine cable projects, such as the Asia Pacific Gateway (APG), and investments in local content caches have contributed to reducing the cost of delivering data. These infrastructure investments have helped expand international bandwidth significantly and bring positive financial and social benefits of a more connected population.

CP network investments have also contributed to declining network costs. The cost to

operators of delivering data, measured as network cost per GB, has steadily declined. This trend directly challenges claims that rising usage volumes are “unsustainable” for network operators. As international connectivity improves and local caches reduce the distance content must travel, the cost per unit of data falls, enabling telco networks to accommodate higher traffic at lower incremental costs. Rather than imposing an increasing financial burden, growing data usage has coincided with lower network costs and greater efficiency.

The advantages extend beyond the telecommunications operators themselves. Reduced delivery costs have facilitated more competitive mobile broadband pricing, as demonstrated by the consistent decline in retail prices. Consequently, more affordable broadband expands access, stimulates higher usage, and contributes to broader economic gains. Numerous studies establish a correlation between increased broadband penetration and higher GDP growth, thereby magnifying the economic impact of infrastructure-led reductions in network costs.



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