



# ECONOMIC IMPACT OF GOOGLE'S APAC NETWORK INFRASTRUCTURE FOCUS ON AUSTRALIA

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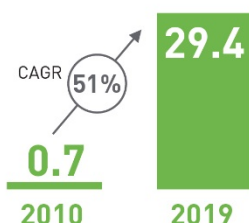
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# Economic impact of Google's network infrastructure in Australia

DATA TRAFFIC IN AUSTRALIA IS GROWING STRONGLY, DRIVEN IN PART BY THE POPULARITY OF GOOGLE'S SERVICES

Australia data traffic growth  
2010–2019 (EB)



12%

Google services' share of APAC internet traffic

GOOGLE INVESTED OVER USD2 BILLION IN NETWORK INFRASTRUCTURE ACROSS APAC, WHICH SUPPORTS THE INTERNET IN AUSTRALIA

>\$2bn

Google's APAC network infrastructure investment

## Australia investments

- 2 submarine cables (Indigo + JGA-S)
- 3 private facilities and 5 IXPs with Google PoPs
- ~60% of bandwidth purchased from telcos
- 8 cities where GCC nodes are deployed

GOOGLE'S INFRASTRUCTURE INVESTMENT HELPS AUSTRALIA REALISE STRONG ECONOMIC BENEFITS FROM INCREASED INTERNET USAGE

Last 10 years (2010–2019)

18 000 Jobs

\$30bn in GDP

Next 5 years (2020–2024)

61 000 Jobs

\$47bn in GDP

<sup>1</sup> All currency in USD, in real 2019 terms

### THESE INVESTMENTS IMPROVE THE CONNECTIVITY ECOSYSTEM WHICH BENEFITS CONSUMERS AND BUSINESSES

**2024**

**25** Exabytes  
internet traffic

**72Tbit/s** in additional  
capacity

**20ms** reduction in  
end-user latency

**2x** faster download speeds  
vs. rest of APAC

**>20%** annual decline in IP  
transit prices

**3** new use cases supported

- Video Conference
- Commerce and Transactions
- Cloud Services

### AUSTRALIA CLOUD SPEND IS EXPECTED TO GROW STRONGLY DRIVING ADDITIONAL ECONOMIC BENEFITS

Australia cloud spend (USD bn)  
2018–2023

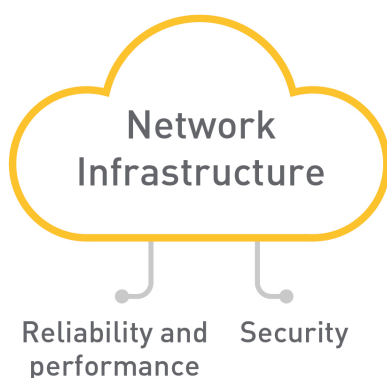


#### Benefits of cloud adoption

- Supports digital transformation agenda
- Additional economic impact from 2019–2023

**73 000** Jobs **\$108bn** in GDP

### NETWORK INFRASTRUCTURE IS IMPORTANT FOR CLOUD – IT IMPROVES:



#### Case Study: StreamShark

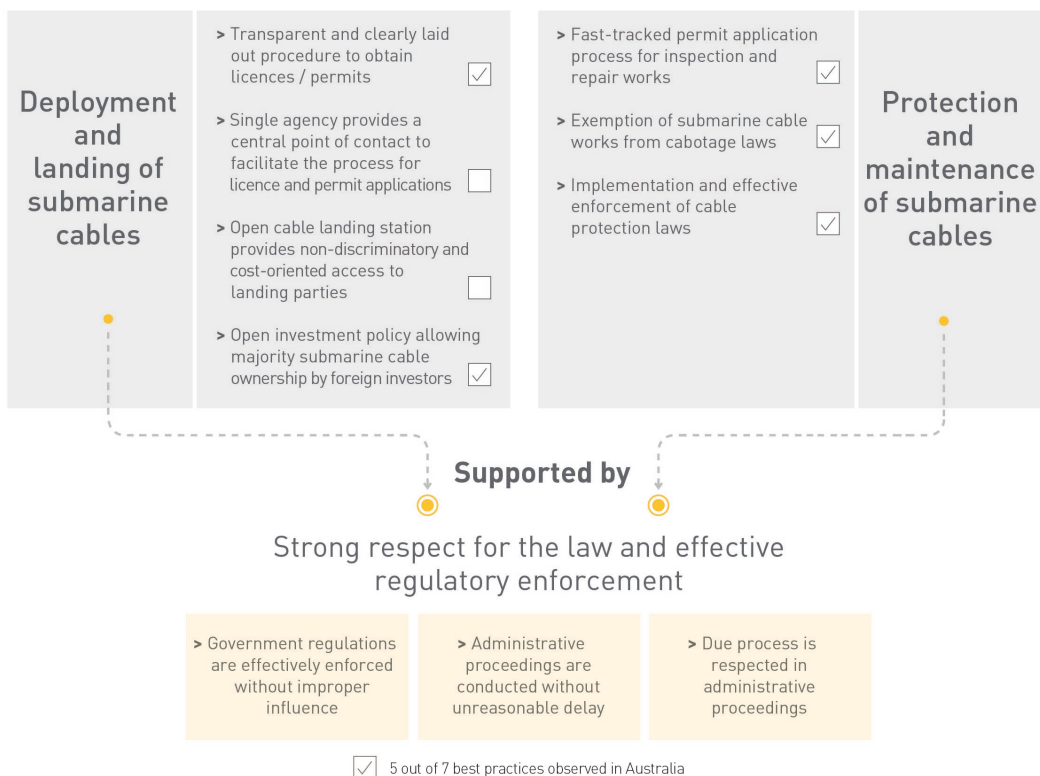
**StreamShark**

Relying on Google Cloud to deliver reliable, high-quality, low-latency video streams of events featuring heads of state and CEOs to millions of people

“Google Cloud gives you the ability to scale out and deliver those big loads and peak audiences and scale that back when that load dissipates.”

James Broberg, Founder & CEO, StreamShark

**REGULATORY AND INVESTMENT REGIMES NEED TO SUPPORT  
FURTHER INVESTMENT IN NETWORK INFRA DEPLOYMENT TO GENERATE  
ADDITIONAL ECONOMIC BENEFITS**



Australia has one of the most developed telecoms landscapes in APAC and, as of 2019, 87% of its population was connected to the internet. Internet traffic generated across both fixed and mobile networks has been growing strongly at around 51% annually from 2010 to 2019, reaching 29EB in total in 2019.

There are four main telecoms service providers in Australia:

- **Telstra**, the incumbent operator
- **Optus**, which is backed by Singtel Group
- **Vodafone** (Vodafone Hutchison Australia or VHA), which is in the process of merging with **TPG Telecom**.

Together with the national wholesale network operator, NBN Co, Australia's domestic access networks provide extensive coverage and high-quality broadband. At the end of 2019, NBN Co's access network had reached more than 10 million premises and connected 6.4 million consumer and business premises.<sup>2</sup> 99% of the population is also within range of 4G mobile coverage.<sup>3</sup>

In terms of international connectivity, Australia is connected to the rest of the world through 12 international submarine cable systems that, as of 2019, offered a total of 205Tbit/s in potential capacity.<sup>4</sup> Telstra has a stake in seven of these cables.

## 1 **Google's network infrastructure investments contributed to greater usage of the internet in Australia, enabling 5% of internet traffic in 2019**

Google's investments in network infrastructure not only improves service performance and reliability of its content and services, they also improve the overall performance and cost-effectiveness of internet infrastructure in Australia. Investments in submarine cables bring new supply, improve the diversity of links and also support the expansion of Google's edge infrastructure. The connectivity improvements include lower latency, faster end-user speeds, lower cost of international connectivity and stimulation of new use cases. These effects translate into more internet traffic generated by both consumers and businesses in Australia.

Google is an investor in the Indigo cable, which went live in 2019 and connects Australia, Singapore and Indonesia. In Australia, the Indigo cable lands in Perth and Sydney and is being used by the consortium to create a new route between these two key cities, along the southern coast of the country. Google also purchases capacity on other international links provided by local carriers, and this purchased bandwidth accounts for around 60% of Google's network capacity to Australia.<sup>5</sup>

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<sup>2</sup> Based on information from NBN Half-Year Report

<sup>3</sup> Analysys Mason Research

<sup>4</sup> Refers to the estimated theoretical maximum capacity that a cable could handle with current technology

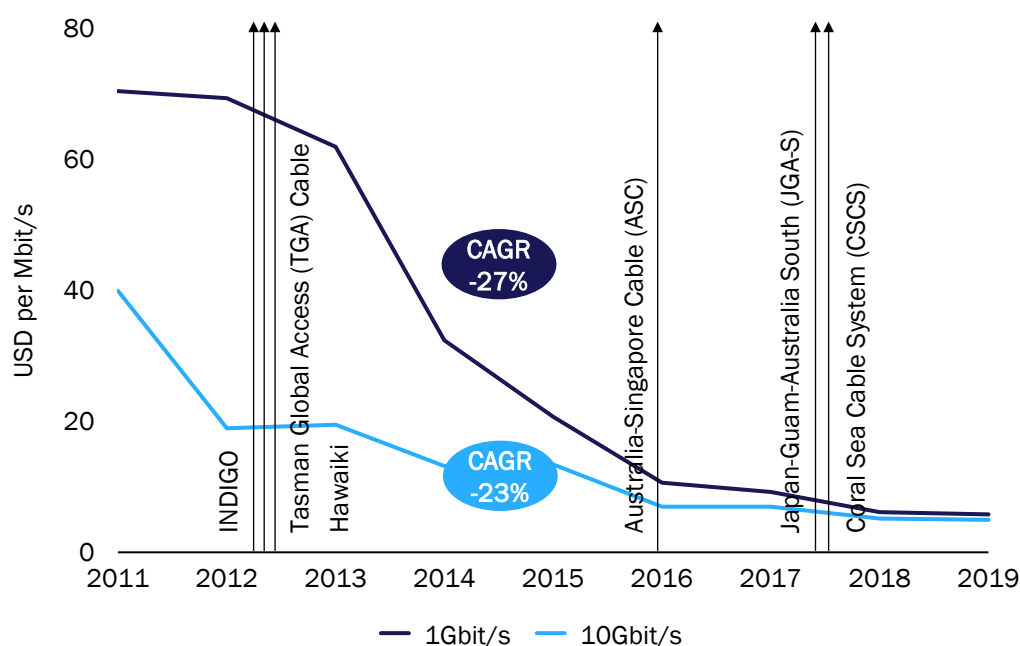
<sup>5</sup> Google data received in Feb 2020

In addition, Google has announced an investment in the JGA-S cable. The JGA-S cable will enable route diversity which enhances service reliability: it connects Australia northwards to Guam while the Indigo cable connects to Indonesia and Singapore to the west. In total, Indigo and JGA-S will bring an estimated 72Tbit/s of additional potential capacity to Australia.

These investments in network infrastructure allow Google to deliver more traffic and at a better quality of service to Google users, and also positively impact the connectivity ecosystem in Australia. Besides bringing additional bandwidth into Australia, Google's investments in submarine cables improve route diversity, and our modelling suggests that these investments correlate with lower end-user latency, an impact of up to 20ms in Australia by 2024.

Cables in which Google has invested have also contributed to the decline in the cost of international bandwidth: since 2011, IP transit prices have declined by over 23% on an average annual basis, as shown in Figure 1 below.

Figure 1: Historical IP transit prices<sup>6</sup> in Sydney, Australia and mapped against announcements of new international submarine cables between 2010 and 2019 [Source: TeleGeography, 2019]



Apart from investments in international capacity, Google has also invested in edge infrastructure and deployed PoPs in three private peering facilities and cross-connected to IXPs at five locations as provided in Figure 2 below. Google also invests in content caches, with GGC nodes already deployed in eight cities across Australia.

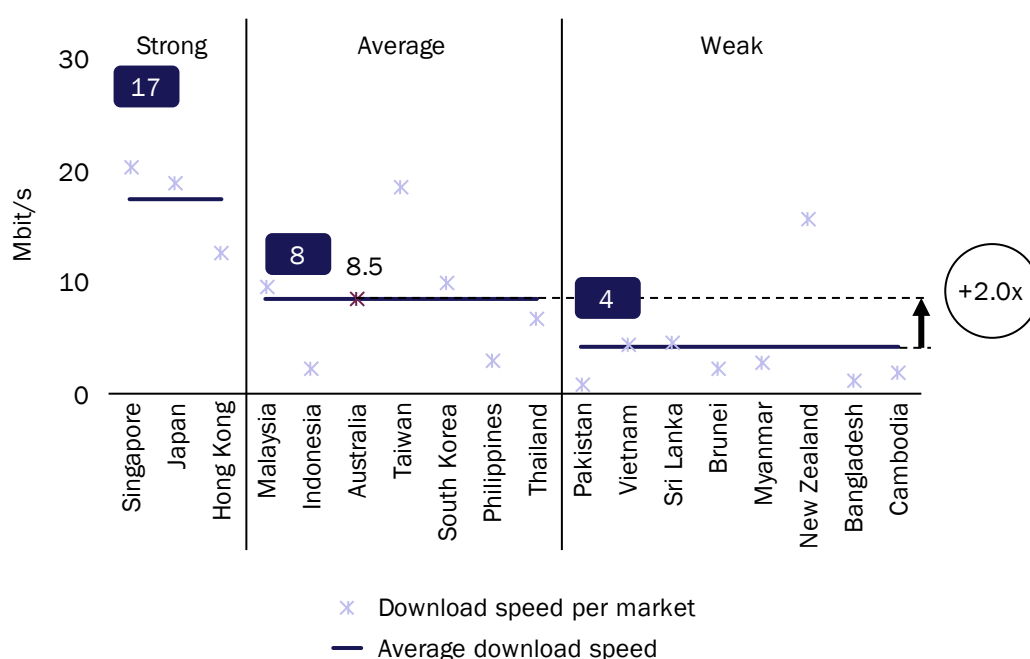
<sup>6</sup> Refers to USD per Mbit/s of IP transit prices in Australia based on the committed data rate of 1Gbit/s and 10Gbit/s from TeleGeography; calculation is based on averaging the weighted median prices by cities to derive prices by years

Name of facility / fabric	Type	Location
EdgelX	Public	Sydney
Equinix Sydney	Public	Sydney
IX Australia	Public	Sydney
MegaIX	Public	Sydney
PIPE Networks	Public	Sydney
Equinix (SY1/SY2)	Private	Sydney
Global Switch	Private	Sydney
NEXTDC S1	Private	Sydney

Figure 2: List of Google peering facilities in Australia [Source: Google, PeeringDB, 2020]

These investments in edge infrastructure and PoPs bring popular Google content closer to end users, which has led to faster download speeds in Australia<sup>7</sup>; in 2019, the average download speeds in the country were up to twice that of less well-connected economies, as shown below in Figure 3.

Figure 3: Download speed comparison [Source: M-lab, 2019]



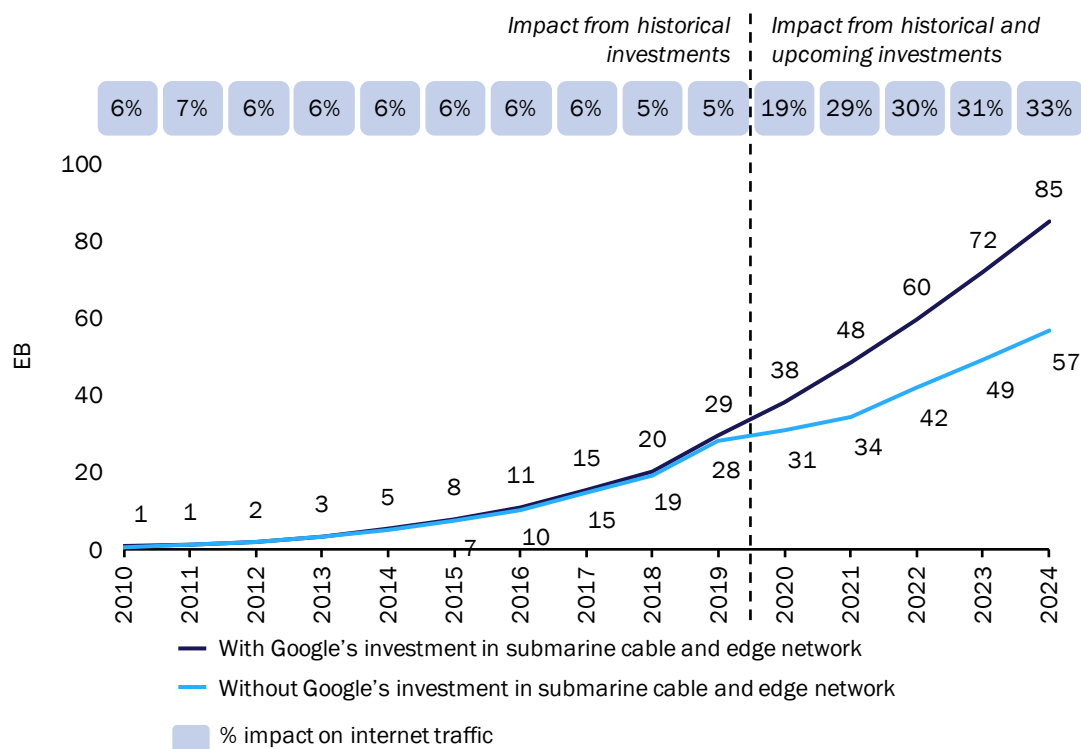
Improvements in latency and internet speed increase ISPs' ability to deliver innovative services such as cloud services, video conferencing and gaming. Low latency is also critical for transactional services, including e-commerce.

The end result of these improvements is greater demand for the internet in Australia: based on Analysys Mason's modelling, we estimate that internet traffic would have been 5% lower in 2019

<sup>7</sup> Google traffic is a significant contributor to network traffic in APAC – approximately 12% of total uplink and downlink network traffic

in the scenario where Google had not made investments in network infrastructure, and the impact is expected to increase to 33% by 2024, as seen below in Figure 4.<sup>8</sup>

Figure 4: Impact of Google's investments in edge network infrastructure on internet traffic served by Google's services in Australia [Source: Analysys Mason, 2020]



## 2 The positive impact of Google's network infrastructure investment benefits the internet ecosystem in Australia, supporting 18 000 jobs and led to USD3 billion in additional GDP in 2019

The increase in internet use has a positive impact on economic activity across various sectors, leading to benefits for consumers and businesses. We estimate that the increase in internet usage contributed USD30 billion in GDP (in real terms<sup>9</sup>) in Australia from 2010 to 2019; by 2019, we estimate that GDP would have been 0.2% lower, equivalent to about USD3 billion in the scenario where Google had not made investments in network infrastructure.

Google's upcoming network investments from 2020 onwards, including its future use of the JGA-S submarine cable system, are expected to spur higher internet traffic usage. Both past and future investments in submarine cables and edge infrastructure will contribute positively to the economy, generating an estimated USD47 billion in additional GDP from 2020 to 2024, of which

<sup>8</sup> This takes into account the effect of the entire submarine cable system(s) that Google participates in. As explained in Annex A of the full report, the fact that Google was an investor in these systems appears to have a statistically significant effect on their impact on the geographies they serve.

<sup>9</sup> GDP figures are in constant USD using 2019 as the base year and using a fixed exchange rate to USD in 2019; GDP statistics in USD are sourced from the World Bank and Euromonitor



USD12 billion (or 0.6% of GDP) would be in 2024 alone (see Figure 5 below). This GDP impact represents the base case of our modelling estimates and could range between USD13 billion and USD112 billion from 2020 to 2024 (see Figure 6 below).

Figure 5: Increase in real GDP attributable to Google's network infrastructure investments in Australia  
[Source: Analysys Mason, 2020]

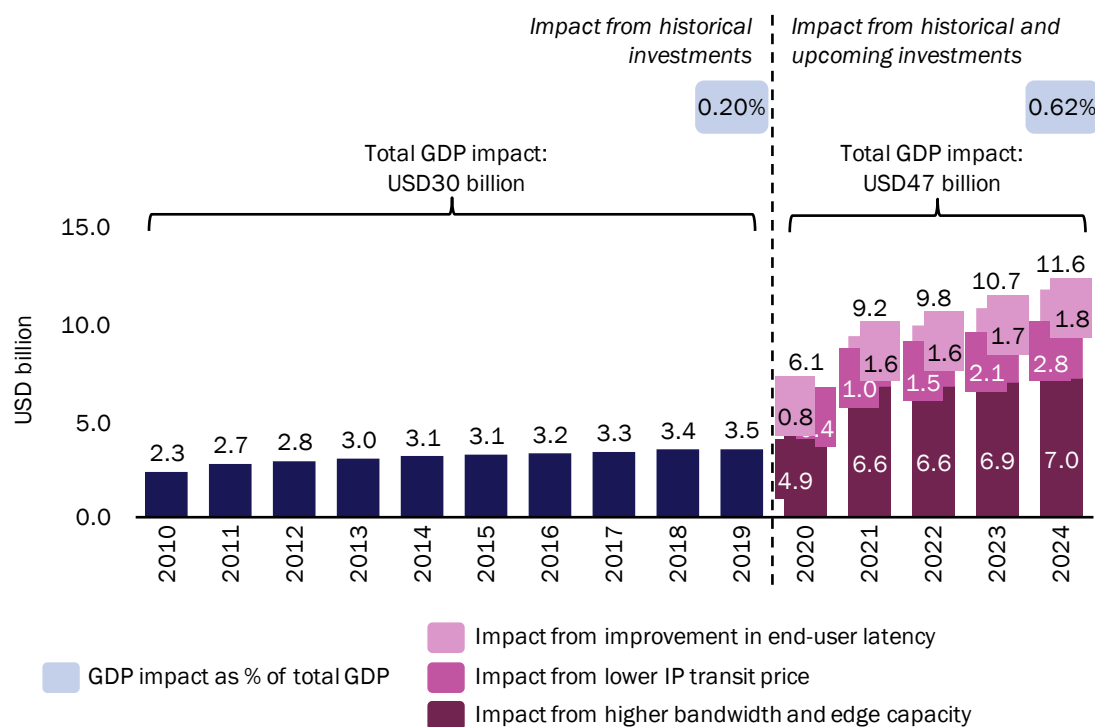


Figure 6: Increase in real GDP from 2020 to 2024 attributable to Google's network infrastructure investments in Australia by modelling scenarios and connectivity components [Source: Analysys Mason, 2020]

Drivers of data traffic impacting GDP	Conservative <sup>10</sup>	Base case <sup>11</sup>	Aggressive <sup>12</sup>
Bandwidth and edge impact + IP transit price + Latency impact	21	47	112
Bandwidth and edge impact + IP transit price impact	19	40	94
Bandwidth and edge impact only	13	32	82

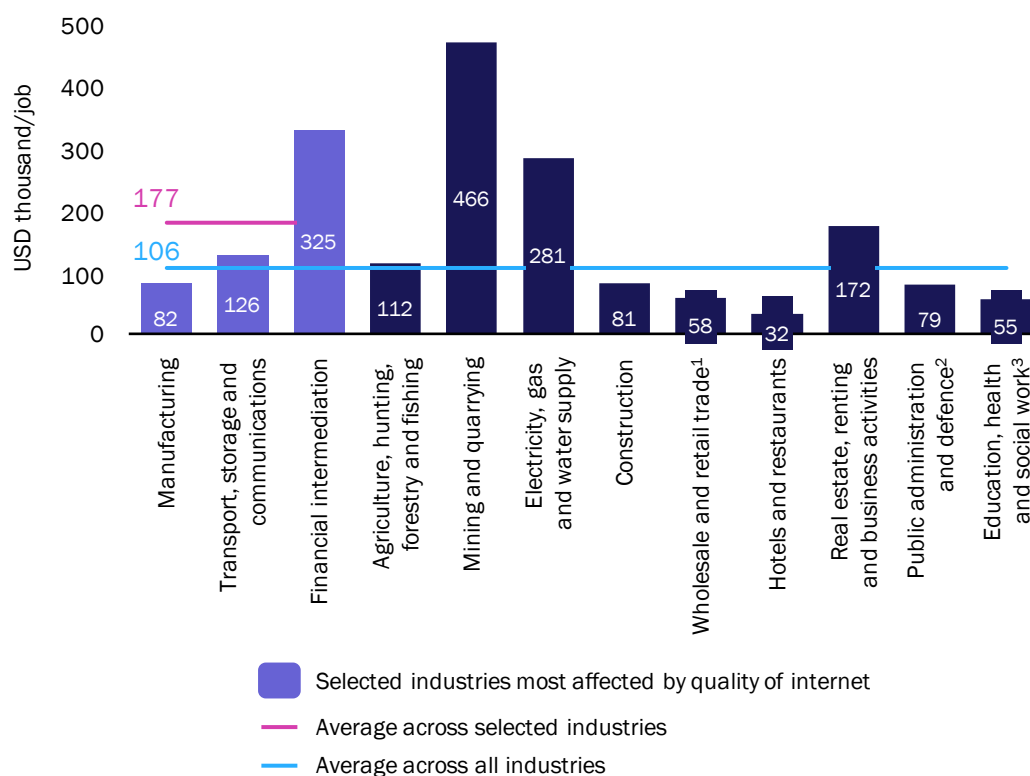
The economic benefits arising from Google's network infrastructure investments translate into jobs: direct jobs in the construction and telecoms sector and indirect jobs driven by the improvement of broadband connectivity across the broader economy, particularly in industries such as IT, financial services and manufacturing. Based on an assessment of gross value added (GVA) across industries in Australia, we estimate that, in 2019, the average GVA per job was USD177 000 in industries most affected by the quality of the internet (see Figure 7 below).

<sup>10</sup> The conservative modelling scenario refers to the use of coefficients (within the 95% confidence interval) in the supply and demand side equations to provide the lowest GDP impact. Specifically, the *highest* coefficient values are used in the supply side equation for latency and both latency and IP transit price variables in the demand side equation for mobile data usage; the *lowest* coefficient values are used in the supply side equation for internet bandwidth and internet bandwidth variable in the demand side equation for mobile data usage

<sup>11</sup> The base case modelling scenario refers to the use of mid-point coefficients (within the 95% confidence interval) in the supply side equations (coefficients for submarine cable count and Google submarine cable percentage variables) and demand side equation (coefficients for internet bandwidth); Latency and IP transit price variables in the demand side equation are kept at the highest coefficient values which provides the lowest GDP impact

<sup>12</sup> The aggressive modelling scenario refers to the use of coefficients (within the 95% confidence interval) in the supply and demand side equations to provide the highest GDP impact while keeping latency and IP transit variables unadjusted (see above base case modelling scenario). Specifically, the lowest coefficient values are used in the supply side equation for latency; the highest coefficients are used for the supply side equation for internet bandwidth and the internet bandwidth variable in the demand side equation for mobile data usage

Figure 7: 2019 GVA per job by industry in Australia [Source: Analysys Mason, national statistics authority via Euromonitor, 2020]



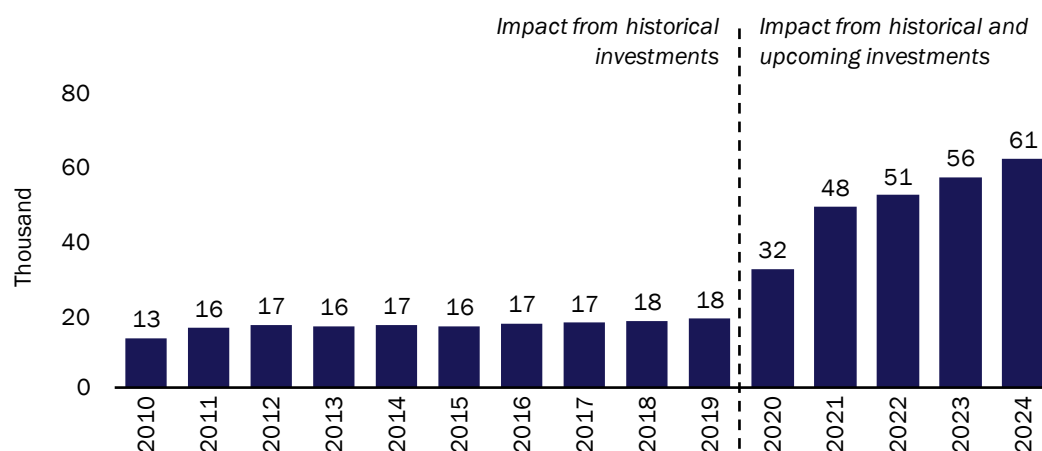
<sup>1</sup> Includes repair of motor vehicles, motorcycles, personal and household goods

<sup>2</sup> Includes compulsory social security

<sup>3</sup> Includes other community, social and personal service activities

Based on this assessment, we estimate that Google's network investments and their impact on GDP led to around 18 000 jobs by 2019, growing to 61 000 jobs by 2024 (see Figure 8 below).

Figure 8: Impact of Google's network investments on job creation in Australia [Source: Analysys Mason, 2020]



### 3 Investments in network infrastructure contribute to the reliability and security of the cloud, driving further positive economic impacts in a segment that is expanding at 17% annually

According to BCG's "Ascent to the Cloud" report, Australia is one of the most advanced cloud markets in APAC. The country's public cloud spend is growing at 17% annually, from USD4.7 billion in 2018 to an expected USD10.5 billion in 2023. The increase in cloud spend is expected to have a cumulative GDP impact of USD108 billion between 2019 and 2023 and support 73 000 jobs by 2023.<sup>13</sup>

Google is an important global player among public cloud service providers. At the end of 2019, GCP had been deployed in seven cloud regions in APAC, one of which is in Sydney. The GCP region in Sydney was launched in 2017 and contains three cloud zones. Further expansion has been announced, with a new cloud region planned for Melbourne in 2021.<sup>14</sup>

Google's network infrastructure investments provide route diversity, connecting cloud regions in Australia to other regions through different paths and enable low service latency, high levels of availability and increased resilience to cable cuts. The improved reliability, resilience and security of the Cloud service is important to Google Cloud customers in Australia as shown in the case study below.

<sup>13</sup> The studies underlying the cloud market forecasts were conducted before the onset of the COVID-19 pandemic and thus did not include the effects on the economy arising from COVID-19. We have left these forecasts unchanged, although the forecasts used for the main economic impact assessment in this report reflect updated forecasts as of June 2020. The size of the cloud services market may actually increase faster than anticipated as a result of COVID-19

<sup>14</sup> ARN, see: <https://www.arnnet.com.au/article/671554/google-cloud-launches-new-melbourne-region/>



### Case study: Sajari deploys GCP to increase scalability and reduce latency

Sajari is a real-time, cloud-based search and matching engine based in Sydney. Sajari launched its search and matching technologies directly onto a public cloud service, however, its search and match latency was varying significantly and was failing customer expectations.

The company was looking for consistent compute performance and minimal network latency and began experimenting with GCP. Sajari found that compute and network latency performance on GCP was faster and more reliable than on its incumbent provider's platform. Currently, Sajari uses Google Compute Engine to keep processes running during updates, Google Kubernetes Engine allows the business to spend little time managing infrastructure, Google App Engine for application development, Google Cloud Datastore provides data storage and BigQuery is used for data capture and analysis. Leveraging GCP, Sajari now can:

- Analyse millions of data points in less than a second
- Deliver a median search query time of less than ten milliseconds
- Process about one billion requests per month

GCP enabled Sajari to keep latency to a minimum and achieve consistent performance, while growing the business to hundreds of customers globally.

### Case study: StreamShark

StreamShark is a technology company with expertise in reliable video stream delivery for global reach. It launched in 2011, electing to start operation in the cloud. With GCP, StreamShark is able to deliver reliable, high-quality, low-latency streams of events featuring heads of state and CEOs to millions of people.

“ Google Cloud gives you the ability to scale out and deliver those big loads and peak audiences and scale that back when that load dissipates. ”

**James Broberg**, Founder & CEO, StreamShark

Besides improving the performance of cloud services, Google's network investments also serve as the underlying infrastructure layer delivering cloud traffic. GCP customer traffic carried on Google's own network is shielded from internet exposure, making it less likely that GCP customers' traffic will be attacked, intercepted, or manipulated by malicious actors.

#### 4 **Australia's regulatory and investment regime is conducive to network infrastructure investments**

The regulatory regime in Australia is generally seen as an example of best practice in terms of stimulating investments in network infrastructure. The application process for landing submarine cables is transparent, and the ACMA provides the necessary information to cable owners. There are also no equity limits on foreign investments in network infrastructure. These factors enable ease of deployment and ease of landing of submarine cables in Australia.

In terms of ongoing maintenance and protection, there are strong laws in place to protect submarine cables. Cable protection zones have been introduced that prohibit human activities such as fishing and anchoring, and criminal penalties can be imposed for cable damage. Cabotage laws have also been deregulated for submarine cable repair works, which allows critical repair works to happen within the fastest possible timeframe whenever cable cuts occur.

Australia is also seen as a jurisdiction with strong regulatory enforcement principles. It scores well on the Rule of Law index, with a regulatory enforcement factor score of 0.82, which is one of the best scores amongst APAC countries.<sup>15</sup> This boosts investors' confidence, particularly in the context of capital-intensive investments such as the deployment of submarine cables.

There are best practice processes in other jurisdictions that could be applicable to Australia, such as enabling open cable landing stations where submarine cable owners can interconnect at existing cable landing stations at non-discriminatory terms and cost-based rates. The Australian government could also consider empowering a centralised party that would lead the application process between submarine cable owners and other government entities; and reduce complexities in dealing with both federal and state authorities.

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<sup>15</sup> World Justice Project – “Rule of Law Index 2020”, see <https://worldjusticeproject.org/our-work/research-and-data/wjp-rule-law-index-2020>