CHAPTER II

Digital infrastructure and ICT use in the Pacific

Digital infrastructure lies at the core of the digital economy. While there is no widely accepted definition of the concept of digital infrastructure (UNCTAD, 2019b), in this report it generally consists of the following levels: (i) ICT networks (the core digital infrastructure for connectivity); (ii) data infrastructure (such as data centres, submarine cables and cloud infrastructure); (iii) digital platforms; and (iv) digital devices and applications.

This chapter takes stock of data and trends related to digital infrastructure in the Pacific and looks at different aspects of connectivity, data and trends in ICT and Internet use. The chapter concludes by highlighting important data gaps that exist for the most relevant indicators.

Key challenges to ICT connectivity in Pacific SIDS

ICT connectivity gap in Pacific SIDS

Submarine cable connections

Half of Pacific SIDS have only **1 cable** or **no cable at all**

Satellite connections

remain relevant

Mobile broadband coverage

Mobile broadband coverage is around the same level as LDCs

Population coverage by 4G in 2020/21

- Developed economies: 99%
- LDCs: 53%
- Pacific SIDS: 52%

Fixed broadband penetration

Fixed broadband penetration is very low: on average, only **1** subscription per **100** people

Mobile broadband is still unaffordable for many

Mobile broadband is still **unaffordable** for many

The **cost** of a mobile subscription **4x** more expensive

- World
- Pacific SIDS

% of monthly GNI per capita spent on mobile connection

- Solomon Islands and Micronesia (Fed. States of): 10%
- Papua New Guinea: 20%

Smartphones are still unaffordable for many

Smartphones are still unaffordable for many

% of monthly GNI per capita spent on cheapest smartphone

- Kiribati: 50%
- Micronesia (Fed. States of): 40%
- Solomon Islands: 25%

Despite these challenges, the region has seen **considerable progress** in:

- ICT infrastructure
- mobile broadband access
- internet use

A general **lack of ICT statistics** for Pacific SIDS requires **urgent attention** as this provides the basis for progress monitoring and evidence-based policymaking

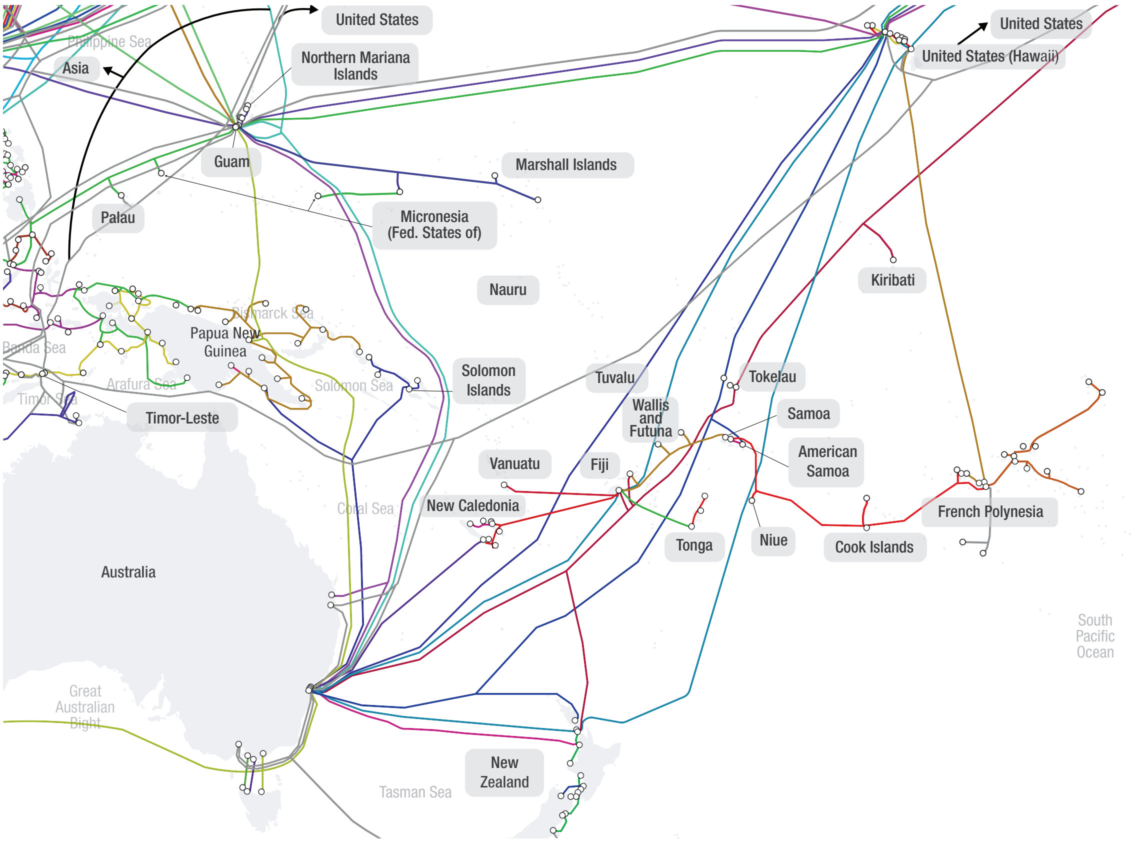
A. DATA TRANSMISSION AND STORAGE

1. International connectivity

a. Submarine cables

Submarine cables contain the optical fibres that rapidly transmit large amounts of data from one point to another and are crucial for Internet connectivity in the Pacific region. These undersea cables are more reliable than satellite networks and deliver the international bandwidth necessary for the data-intensive, high-speed Internet activities associated with the digital economy. They also offer higher bandwidth capacity and are more cost-effective to operate (Pacific Islands Forum Secretariat (PIFS), 2020). Pacific SIDS are connected to this bandwidth through various transmission networks: intercontinental cables (originating and terminating in Australia, Asia and the United States) with landing points in the Pacific; interregional cables linked to landing points in Asia, Australia and the United States (Hawaii); and intraregional cables connecting countries within the Pacific. Domestic submarine cables – typically connecting the main islands where international cables arrive to the outer islands of a country – extend the reach of these data transmission networks (see figure II.1).

Figure II.1. The submarine cable network connecting Pacific SIDS (as of November 2022)



Source: UNCTAD, based on TeleGeography (2022).

While international cables connecting to Pacific SIDS are owned by a mix of private companies, governments and State-owned enterprises (SOEs), domestic cables are exclusively owned by SOEs (see annex table 4). Funding for intercontinental submarine cables comes predominantly from private investors. In contrast, branch cables between Pacific SIDS – as well as those directly connecting the Pacific with Australia or Hawaii – are generally funded by public entities and multilateral institutions (States, SOEs, the World Bank and ADB). Domestic extensions of international submarine cables are almost fully financed by the public sector and international donors.

These sources of funding and ownership of international submarine cables can be attributed to their high deployment and maintenance costs – in addition to the high costs of deploying domestic cable infrastructure in the Pacific region (PIFS, 2020). The involvement of donors and development partners has therefore been vital to expand cable infrastructure in the Pacific.[13] The leading contractor for laying cables in the region has been a private sector cable supplier and operator: Alcatel Submarine Networks (see annex table 4).

The arrival of an international submarine cable to a country can sometimes generate new investment in domestic cable extensions. For example, Tonga was able to use the remaining funds from multilateral banks – initially destined for the Tonga Cable project to Fiji – to partially finance the Domestic Extension Cable to connect another two islands.[14] The Gondwana-2/Picot-2 cable has been in service since August 2022 and assures Internet resilience in New Caledonia. Gondwana-2 is the second international connection, while Picot-2 extends access to other areas of the main island and outer islands on its way to Fiji.

Although the number of Pacific SIDS with multiple submarine cable connections has increased substantially in recent years, many still rely on a single cable and others have no cable at all (see table II.1). An international submarine cable connection, especially an intercontinental one, is a key factor for remote islands to benefit from increased bandwidth and Internet connection speeds. In theory, such connections should also create broader positive effects such as lower wholesale prices for Internet suppliers, lower retail prices for consumers and higher volume for data plans. An international cable deployment often covers only the major and most-populated island. Domestic cable links can then be added from the major island to outer islands. The deployment of both international and domestic submarine cables can happen in parallel.

Aside from Guam (which has 11 connections), Fiji has the largest number of connections to international cables (see table II.1).[15] As of 2022, three countries were not yet connected to any international submarine cable: Nauru, Timor-Leste and Tuvalu.[16] Among the 17 Pacific SIDS connected to international submarine cables, seven rely on a single cable, which is far from ideal. Being connected to multiple international submarine cables increases network redundancy, reduces the impact of outages caused by cuts of submarine cables (box II.1), improves bandwidth and connection speeds, and may decrease Internet services prices.[17]

While important advances have been made in terms of submarine cable connectivity, it will likely take years – if not decades – before cable infrastructure reaches all remote communities in the Pacific. In the interim, satellite connections will remain relevant to reach these remote areas.

Table II.1. Number of submarine cables and number of inhabited islands with Internet connectivity in Pacific SIDS, by type, September 2022

	Submarine cables										Inhabited Islands	
	Total active	Total planned	By deployment scope								Connected with submarine cables	Dependent on satellite or microwave
	(a)	(p)	Intercontinental		Interregional		Intraregional		Domestic			
			a	p	a	p	a	p	a	p		
Guam	11	4	4	3	4	1	3	0	0	0	1	0
Fiji	6	0	2	0	0	0	4	0	0	0	2	108
Papua New Guinea	4	0	0	0	2	0	0	0	2	0	5	0
French Polynesia	3	1	1	0	0	0	1	0	1	1	15	61
Micronesia (Fed. States of)	3	0	1	0	0	0	1	0	1	0	3	62
New Caledonia	3	0	0	0	1	0	1	0	1	0	5	0
Samoa	3	0	0	0	0	0	3	0	0	0	2	2
American Samoa	2	0	1	0	0	0	1	0	0	0	1	5
Northern Mariana Islands	2	0	0	0	0	0	2	0	0	0	3	0
Tonga	2	0	0	0	0	0	1	0	1	0	3	33
Palau	1	1	1	1	0	0	0	0	0	0	1	7
Kiribati	1	0	1	0	0	0	0	0	0	0	1	20
Tokelau	1	1	1	0	0	0	0	0	0	1	1	2
Solomon Islands	1	0	0	0	1	0	0	0	0	0	4	343
Cook Islands	1	0	0	0	0	0	1	0	0	0	2	11
Marshall Islands	1	0	0	0	0	0	1	0	0	0	2	22
Niue	1	0	0	0	0	0	1	0	0	0	1	0
Vanatu	1	0	0	0	0	0	1	0	0	0	1	66
Wallis and Fortuna	1	0	0	0	0	0	1	0	0	0	2	0
Nauru	0	0	0	0	0	0	0	0	0	0	0	1
Timor-Leste	0	1	0	1	0	0	0	0	0	0	0	2
Tuvalu	0	0	0	0	0	0	0	0	0	0	0	9

Source: UNCTAD, based on Watson (2021), United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) (2019), TeleGeography (2022) and various governmental, non-governmental and regional sources.

Note: Inhabited islands concerns either all known inhabited islands, or the major ones, per country.

Box II.1. Damage to submarine cables: The case of Tonga

Damage to submarine cables occurs all over the world. About 70 per cent of all cable faults are caused by human activities such as fishing and anchoring, and around 14 per cent are caused by natural hazards (current abrasion or earthquakes).[18]

Repairing damaged submarine cables takes a long time. According to Submarine Telecoms Forum (2019), the average repair time was 25 days in 2019. However, repairs could take longer for intercontinental cables and for those located in remote areas in the Pacific because of travel time for the repair crews.

Among international submarine cables deployed in the Pacific, only the Tonga Cable (connecting with Fiji) has ever been severed.[19] The cable was damaged in the tsunamis when the Hunga Tonga volcano erupted on 15 January 2022. Because Tonga relies on this cable to access the Internet, this resulted in a shutdown of high-speed Internet in the country. It took 10 days for the closest repair crew to arrive in Tonga and Internet connectivity via the cable was only restored one month later.[20] Access to high-speed Internet in Fiji was not affected during this period because it was connected to three other international submarine cables at the time. The domestic cable extension that connected the two outer islands in Tonga was also damaged following the volcanic eruption and needed to be repaired later. This experience highlights the infrastructure challenge for island nations in natural disaster zones.[21]

The Tonga Cable had been damaged previously in 2019 by a ship's anchor and the repairs took 14 days.[22] Although the events of January 2022 renewed calls for a backup system to be put in place for Tonga, the company in charge of the cable noted that the cost of deploying a backup cable was an issue. While traditional satellite connections were used as backup, their performance was lower than that of the submarine cable.[23] The satellite Internet company Starlink donated 50 terminals to provide high-speed Internet via low earth orbit satellites (see section II.A.1.b) to remote islands and the worst-affected communities in the immediate aftermath of the volcanic eruption.

Source: UNCTAD.

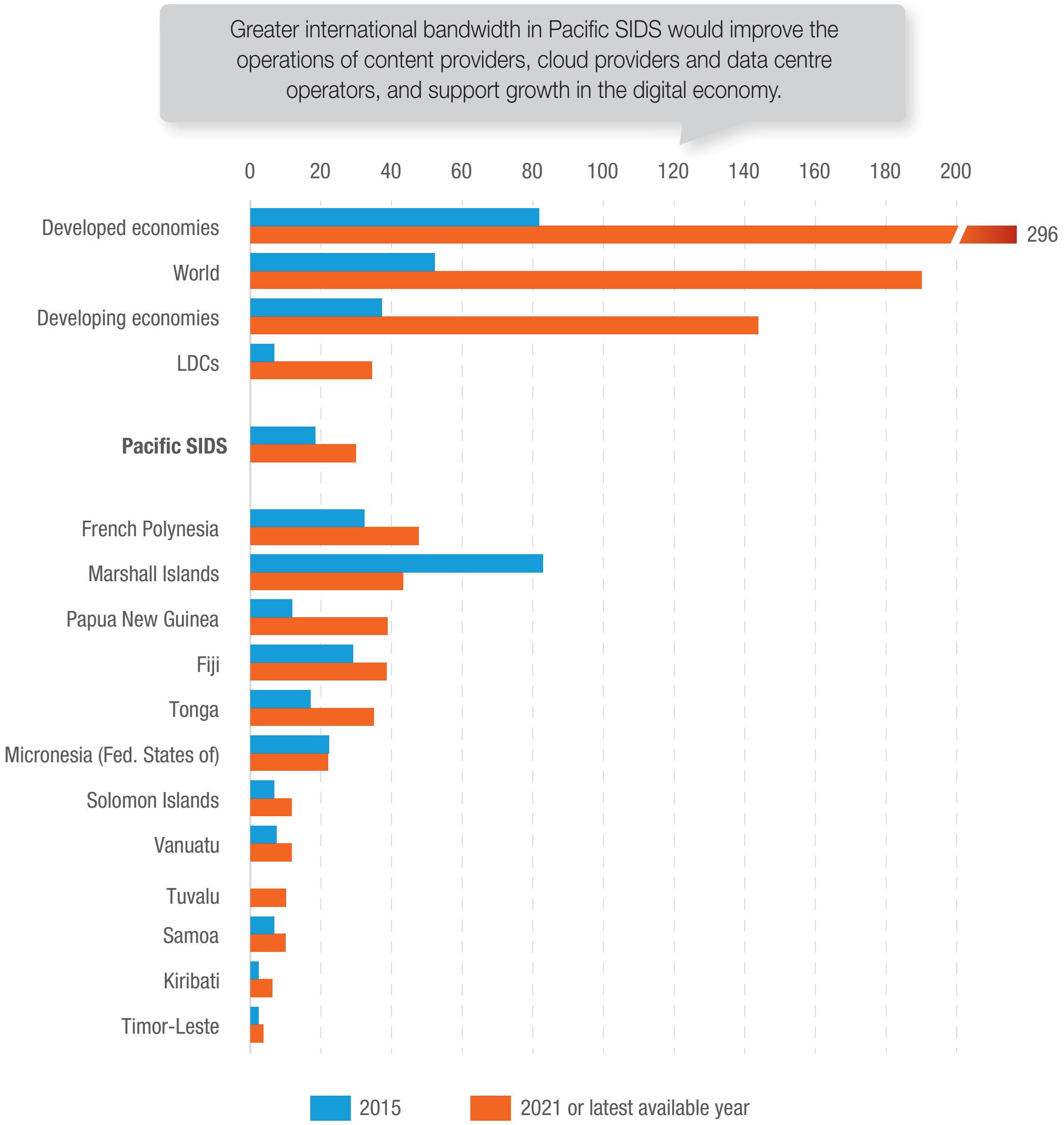
b. Satellites

For decades, communication satellites have been the primary means of enabling telecommunications between Pacific SIDS and other parts of the world (UNESCAP, 2019).[24] One of the main advantages of satellite technology is the ability to cover large areas. As thousands of isolated islands and atolls are spread across 33 million km^2, satellite technology has been an ideal connectivity solution because it is easy to install the antenna. However, satellite communications systems are very costly to install, have high maintenance costs and are not always reliable, especially during heavy rain.

While all Pacific SIDS continue to use satellite technology (see table II.1), the main purpose has shifted from international and domestic connectivity to redundancy and backup services (UNESCAP, 2019). Despite this shift, satellite connectivity remains relevant for telephone services and the provision of Internet access to remote communities (PIFS, 2020). It is expected that satellites will continue to play a role in the overall connectivity ecosystem in the Pacific, despite the relatively low number of satellite-based broadband subscriptions. According to data from the International Telecommunication Union (ITU), there were 124 satellite subscriptions in Fiji in 2020, 212 in Vanuatu and only 2 in Kiribati in 2019.[25] The relatively high cost of satellite Internet subscriptions is a major factor behind the low demand for these services. For instance, the average starting price of satellite Internet packages from one provider offering its services throughout the region – Juch-Tech Inc. – represents between 30 and 50 per cent of monthly GNI per capita in Fiji, Kiribati and Vanuatu.[26]

More recently, traditional satellite broadband systems have been complemented by low earth orbit satellites (see box II.1). This nascent technology allows the satellites to gravitate closer to earth and reduces latency. The large number of satellites also offers better resilience. SpaceX's Starlink constellation of more than 2,000 active satellites is currently the most advanced system,[27] while competitors such as Amazon and OneWeb have joined the race for satellite-based Internet. However, monthly fees remain an obstacle for many users. For instance, Starlink's service fees of about $99 per month in Fiji, Kiribati and Vanuatu are still not much lower than traditional satellite services.[28]

Figure II.2. International bandwidth per Internet user, global, by country grouping, Pacific SIDS, selected years
(Kilobits per second)



Source: UNCTAD calculations, based on ITU (2022d), Statistics: Global and regional ICT data, update of 25 January. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx; and ITU (2022f), World telecommunication/ICT indicators database 2022, July Edition. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.

Notes: The latest years with available data per grouping and country are the following: 2021 (all groupings except Pacific SIDS), 2017 (Pacific SIDS) and among the listed countries in the figure – 2020 (Kiribati), 2018 (Fiji) and 2017 (all countries except Kiribati and Fiji). Country groupings are those of the source, exceps of this figure must take into account the difference of years with available data as well as the fact that ITU 2021 data for groups include estimations. The drop of bandwidth capacity per Internet user in Marshall Islands between 2015 and 2017 is related to the dramatic rise in Internet users and a constant level of international bandwidth.

c. International bandwidth capacity

International bandwidth is an important indicator of the state of an economy's digital infrastructure, in particular its capacity and links with global Internet networks to exchange data traffic.[29] Bandwidth capacity affects the operations of content providers, cloud providers, interconnection providers and data centre operators. Some providers have invested heavily in developing their own bandwidth capacity to be independent from public carriers and to control quality and price. These include Google

(Alphabet), Facebook (Meta), Amazon and Microsoft. International bandwidth is also important to national Internet service providers such as traditional carriers, wholesalers and mobile operators.[30]

The Pacific generally lags behind other country groupings in relation to international bandwidth capacity (see figure II.2). In 2021, Internet users in developing economies had access to 144 Kbit/s. The latest available data for most Pacific SIDS is for 2017 and cannot be compared directly with data from 2021 for other country groupings. However, data available for 2017 show that Internet users in Pacific SIDS had access to 30 Kbits/s.[31] Growth in the availability of international bandwidth in Pacific SIDS in the period 2015–2017 was slower than in most other country groupings in the same period.[32] The relatively low capacity in the region mainly reflects limited submarine cable connections (see section II.A.1.a). This results in low levels of subscriptions for broadband services (see section II.B.1.a), a limited customer base for content providers, and a limited number of data centres (see section II.A.2.b). These issues will likely become less prominent as international bandwidth capacity in the region is expected to increase with further access to intercontinental submarine cables.

2. Middle-mile connectivity

a. Internet exchange points

An Internet exchange point (IXP) is a physical location where different networks connect to exchange Internet traffic via common switching infrastructures and, as such, forms a key element in the global Internet infrastructure. The networks that participate in IXPs include Internet service providers, content providers, hosting companies and governments. IXPs are dispersed across countries, enabling local networks to exchange information efficiently, as they eliminate the need to exchange local Internet traffic overseas. Access speeds for local content can improve as much as tenfold with an IXP as traffic is routed more directly (Internet Society, 2015).

As of April 2022, there were 725 IXPs in the world, with an average of 9.7 per country for developed economies, compared with 2.8 in developing economies (see table II.2). For Pacific SIDS, the corresponding number was only an average of 1.4, which is comparable to LDCs and SIDS overall. Only a small number of Pacific SIDS or territories had established IXPs: Guam[33] had three, Papua New Guinea had two, and Fiji, New Caledonia, Timor-Leste, Tonga and Vanuatu had one each.

Table II.2. Number of Internet exchange points per country, by country grouping (average) and selected Pacific SIDS, April 2022

Country grouping	
Developed economies	9.7
World	4.9
Developing economies	2.8
Pacific SIDS	1.4
SIDS	1.4
LDCs	1.4
Selected countries	
Guam	3
Papua New Guinea	2
Fiji	1
New Caledonia	1
Timor-Leste	1
Tonga	1
Vanuatu	1

Source: UNCTAD calculations, based on Peering DB (2022), The interconnection database. Available at https://www.peeringdb.com; Packet Clearing House (2022) and UNESCAP (2022b).

Note: Data source for world and groups (except Pacific SIDS) is only the Packet Clearing House.

UNESCAP notes that IXPs have had a positive impact on affordability, latency and traffic capacity in the Pacific.[34] The establishment of the IXP in Papua New Guinea in 2017 led to an estimated 10 per cent decrease in the price of Internet services. In Fiji, latency between local operators improved significantly from 60 milliseconds to 2 milliseconds after setting up an IXP in 2017. However, local benefits are not necessarily assured because the distribution of benefits also depends on the equal treatment of domestic and international participants using the IXP (UNCTAD, 2021b). As most Pacific SIDS do not have IXPs, an initiative to establish a regional IXP has been in progress under the auspices of UNESCAP (see box II.2).

Box II.2. Initiative for a regional Internet exchange point in the Pacific

In 2018, Pacific SIDS requested the support of the UNESCAP secretariat and partners, through the Asia-Pacific Information Superhighway initiative, to assess the technical feasibility of establishing a Pacific IXP to improve Internet quality (latency and speed) and regional broadband performance. The secretariat collaborated with regional partners to conduct a feasibility study in 2019 and an operational modality study in 2020 to identify the options and requirements for establishing a Pacific IXP. Subsequently, the secretariat facilitated country consultations on the Pacific IXP in Fiji, New Zealand and Samoa in 2020–2021 to establish the subregional IXP via an intercountry agreement.[35]

In November 2021, a capacity training workshop on operationalizing the Pacific IXP proposal was organized in Bangkok, Thailand. The workshop had two objectives. The first was to share two key documents with stakeholders: (i) the final guidelines on the operationalization strategy plan for building the Pacific IXP in the overall framework of the Asia-Pacific Information Superhighway; and (ii) a draft operational costing study on establishing the Pacific IXP for Fiji, New Zealand and Samoa. The second objective was to review a draft Memorandum of Understanding.[36]

The Asia-Pacific Information Superhighway Steering Committee adopted the draft action plan for implementing the Asia-Pacific Information Superhighway initiative, 2022–2026 at its fifth session on 25 November 2021. One of the three pillars in the action plan is Connectivity for All, which includes promoting Internet quality and digital connectivity on establishing IXPs. The expected outputs by 2026 are to have developed guidelines for operating subregional IXPs and to have endorsed a memorandum of understanding on establishing IXPs. The Steering Committee agreed to submit the draft action plan to the Committee on Information and Communications Technology, Science, Technology and Innovation at its fourth session in 2022 for its consideration and adoption.[37]

Source: UNCTAD.

b. Data centres

Data centres and secure servers form another key part of the digital economy infrastructure. These facilities provide the infrastructure required to maintain and operate servers for both businesses and governments. The lack of domestic data centres implies a greater need to rely on cloud services using data centres located abroad, which can mean higher latency and higher costs for international Internet traffic.[38] The availability of data centres can be considered a gauge of the overall digitalization of an economy because it reflects demand not only by the ICT sector but also by other sectors – such as finance, transportation or legal – that have high demand for digital services (ITU, 2021).

As of October 2022, only two countries among Pacific SIDS had one or more colocation data centres: New Caledonia with three and French Polynesia with one (see table II.3).[39] Secure servers provide protection for online transactions – such as through data encryption[40] – and are important for retailers and other businesses to conduct network transactions. They are often located at data centres and have become essential for e-commerce as they respond to the growing need for cybersecurity and can help overcome the privacy and security concerns of Internet users around issues such as phishing and hacking.[41]

Table II.3. Number of colocation data centres, by country grouping and selected Pacific SIDS, 2022

	Number	Per million people
Country grouping		
SIDS	68	5.6
Developed economies	3963	3.0
World	4915	0.7
Develping economies	952	0.2
LDCs	30	0.1
Selected countries		
New Caledonia	3	10.3
French Polynesia	1	3.5

Source: UNCTAD calculations, based on Data Center Map (2022) and UNCTADstat (2022). Available at https://unctadstat.unctad.org.

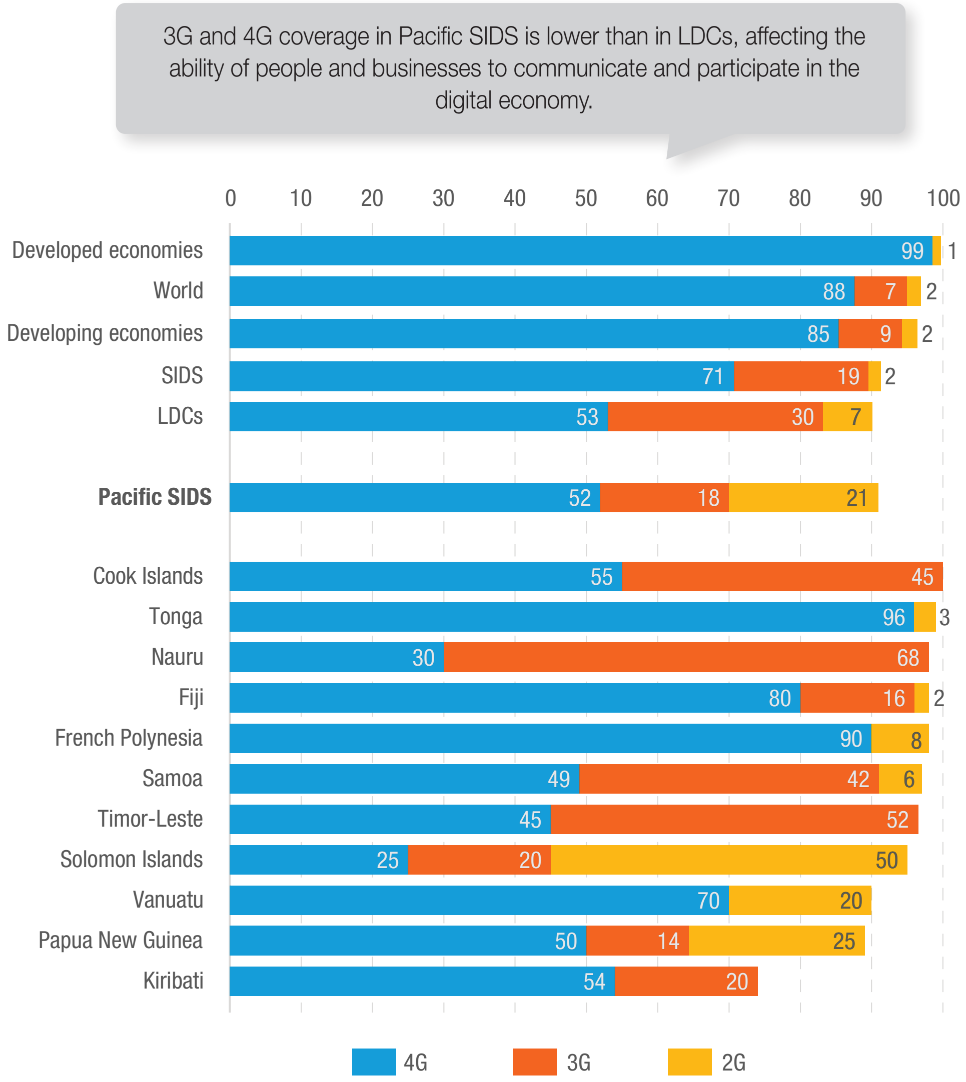
Notes: The Data Centres Map's available data are based on entries which are primarily added and maintained directly by the service providers themselves. This database indicates only countries with at least one or more data centres. Therefore, if a country does not appear, it can be either because it has no data centre or the data are not available. The results per million people for groupings are population-weighted averages.

3. Last-mile connectivity

a. Mobile network coverage

For the development of e-commerce and the digital economy, reliable national digital infrastructure that is equitably distributed is as important as international connectivity. In most developing countries, backbone transmission networks carry data around the country, while mobile broadband connections (mostly limited to 2G, 3G or 4G) provide last-mile connectivity. ITU found that only 28 per cent of people living in LDCs lived within 10 km of a transmission network and nearly 15 per cent lived more than 100km away (ITU, 2021). In Pacific SIDS, 91 per cent of the population lived in areas covered by 2G, almost 70 per cent in areas covered by 3G and 52 per cent by 4G in 2020/21 (see figure II.3).[42]

Figure II.3. Population coverage of mobile network technology (2G, 3G and 4G), by country grouping and selected Pacific SIDS, 2021 or latest available year
(Per cent)



Source: UNCTAD calculations, based on ITU (2022d), Statistics: Global and regional ICT data, update of 25 January. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx and ITU (2022f), World telecommunication/ICT indicators database 2022, July Edition. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.

Notes: Only countries with available data in 2020 or 2021 for all technologies, i.e. 2G, 3G and 4G, are listed in the figure. The 4G technology refers to the Long-Term Evolution/Worldwide Interoperability for Microwave Access mobile network. Country groupings are those of the source (2021), except Pacific SIDS (2020). The 2021 data cover the following countries: Tonga, French Polynesia, Timor-Leste, Vanuatu and Kiribati; the 2020 data covers the remaining countries. The values for 2G and 3G networks show the incremental percentage of population that is not covered by a more advanced technology network (example of Solomon Islands: 25+20+50=95 per cent of the population are covered by 2G, 25+20=45 per cent are covered by 3G and 25 per cent are covered by 4G).

For e-commerce, 3G and 4G networks are most relevant as they provide sufficient speed to make use of Internet services through mobile devices. In Pacific SIDS, 3G and 4G coverage remains below the level of other country groupings, including LDCs. Significant disparities exist between countries, partially driven by differences in the dispersion of populations over different islands and remote rural areas. Tonga has a more concentrated population and almost the entire population was covered by 4G in 2021. In contrast, Solomon Islands has a more dispersed population over many islands and only 25 per cent was covered by 4G in 2020.

As 5G deployment is still limited in the Pacific (see section II.A.3.b), 4G remains the fastest and most viable option for last-mile connectivity in the near future. The proportion of the population in Pacific SIDS covered by 4G technology grew from 28 per cent in 2015 to 52 per cent in 2020, which is the second-lowest growth rate after developed economies. This overall figure is partly driven by relatively limited 4G deployment in Papua New Guinea. In 2015, 4G was not yet available in Kiribati, Nauru, Samoa, Timor-Leste and Tonga; and very limited in Fiji, Vanuatu and Solomon Islands. By 2021, many of these countries had successfully introduced or significantly increased 4G coverage. Tonga had the highest coverage, with 96 per cent of the population having access to 4G in 2021.

b. 5G mobile broadband

5G mobile technology offers superior bandwidth capacity and much higher Internet connection speeds compared with 3G or 4G (see section II.A.3.c) and is expected to dramatically improve Internet experiences and revolutionize opportunities for online activities.[43] 5G mobile networks are being rolled out fast, with connections forecast to reach 25 per cent of all connections globally by 2025, compared with only 8 per cent in 2021 (Global System for Mobile Communications Association (GSMA) Intelligence, 2022a). The forecast for the Asia-Pacific region (excluding Australia, China, Japan, Singapore and the Republic of Korea) is 9 per cent by 2025 (GSMA Intelligence, 2022b). Among Pacific SIDS, 5G technology has so far only been rolled out in Guam and Northern Mariana Islands. However, network coverage is still limited.[44] According to GSMA Intelligence (2022a), 5G should become available in Samoa in 2023. The latest forecast for Pacific SIDS is that 5G connections will represent no more than 1 per cent of all connections by 2025 (GSMA Intelligence, 2019b).

The rise of 5G connectivity may have the additional benefit of enabling the use of fixed wireless access.[45] Even though fixed wireless access has not been commercially successful in the past, newer iterations based on 5G technology can enable network operators to deliver cheaper ultra-high-speed broadband (wireless) to suburban and rural areas as an alternative to fixed-line digital subscriber line and fibre cables (Ericsson, 2021).[46]

c. Internet connection speed

With the arrival of high-speed Internet connections through fibre-optic cables, 4G and 5G technologies, the use of the Internet-enabled ICT devices has changed dramatically over the past decade. The development from basic activities such as sending emails and browsing information to more data-intensive activities – such as social media engagement, e-commerce, online movie streaming, video calls or semi-autonomous vehicles – would not have been possible without parallel improvements in Internet connection speeds.

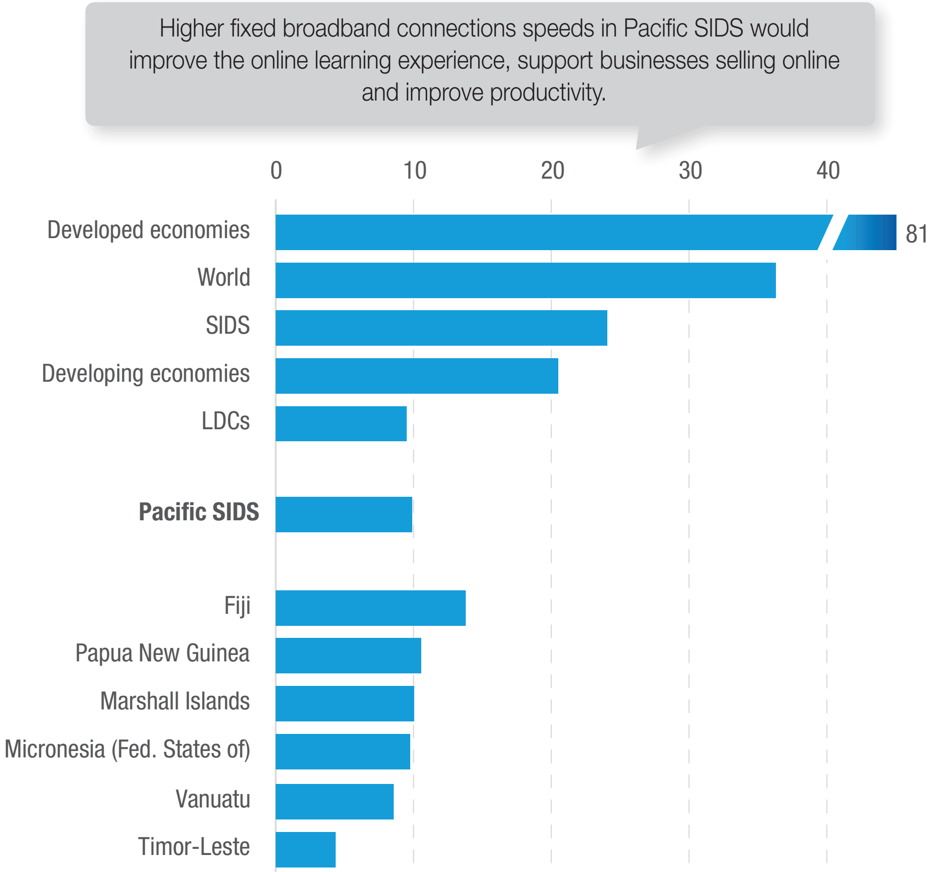
Statistics for the Pacific region are limited. Based on Ookla data (April 2022), the median mobile broadband download speeds of Papua New Guinea and Fiji were 22.78 Mbit/s and 22.21 Mbit/s, respectively, which situated them between the median speeds of developing countries (19.93 Mbit/s) and SIDS (24.94 Mbit/s). The fastest mobile Internet connections were registered in developed economies (median speed of 50.85 Mbit/s).[47]

More comprehensive data are available on fixed broadband connection speeds. In early 2022, the median download speed for six Pacific SIDS was 9.90 Mbit/s, still half that of the median speed for all SIDS or developing countries (see figure II.4). The fastest fixed broadband connection was in Fiji (13.77 Mbit/s) and the slowest in Timor-Leste (4.34 Mbit/s). Compared with developed countries, Pacific SIDS, like many LDCs, still lag overall.

Mobile broadband connections were faster than fixed broadband connections in both Fiji and Papua New Guinea. This is in line with findings from UNCTAD (2021b), which showed LDCs on average recorded higher mobile broadband connection speeds.[48] However, these numbers should be interpreted with care. The number of speed tests may influence the value of the median speed of Internet connections. In addition, the methodology to collect data for fixed broadband can include speed measurements made via mobile applications connected to Wi-Fi. The latter technology in many developing countries is based on shared mobile broadband connection (via USB/dongle) rather than fixed broadband. This is also likely to be the case for most other Pacific SIDS, as the Internet is mostly accessed through mobile broadband connections. In developed economies, where fixed broadband Internet is more widespread, the opposite is observed, where the median connection speed of fixed broadband is higher than for mobile broadband.

The importance of mobile broadband use in developing countries, including in Pacific SIDS (see section II.B.1.a), implies that further extension and upgrades to 5G for existing mobile networks will be beneficial for Internet users. Upgrading to 5G will bring larger capacity and faster speeds for data transmissions. It is also possible that 3G and 4G mobile networks will not be able to run applications of the future effectively.

Figure II.4. Fixed broadband connection speeds, by country grouping and selected Pacific SIDS, 2022
(Megabits per second)



Source: UNCTAD calculations, based on Ookla (2022), Speedtest global index.Available at https://www.speedtest.net/global-index.

Notes: Countries' speeds are median download speeds (definition and calculations of the source). World and country groupings are based on UNCTAD calculations (medians of the countries' speeds in each grouping). Data concern April 2022, except for the Federated States of Micronesia (January 2022) and Vanuatu (March 2022).

B. ICT AFFORDABILITY AND USE

Opportunities to participate in and benefit from the digital economy require more than just having the right ICT infrastructure in place. People and businesses need to be able to access relevant communication technologies at affordable prices and have the ability to make productive use of such access. In this context, there are significant divides within and among countries in relation to capacities to both connect to and use the Internet. This section takes stock of ICT connectivity, smartphone adoption, affordability of services and devices, and Internet use in the Pacific.

1. Telephony and Internet

a. Subscriptions

i. Mobile telephony

When comparing types of subscriptions for connectivity for Pacific SIDS, mobile telephony has the highest number of subscriptions. This is followed by mobile Internet data and fixed broadband (see figure II.5). This trend is in line with other country groupings.[49] However, in actual numbers, mobile telephony subscriptions in Pacific SIDS reached only 62 subscriptions per 100 people in 2020, which is significantly lower than subscriptions in other country groupings. There are also notable differences among countries in the region. For example, Palau had 133 subscriptions per 100 people – a level typically seen in developed countries – whereas the Federated States of Micronesia was the second lowest in the world with 19 subscriptions per 100 people.[50]

The average subscription rate does not necessarily reflect the proportion of people who subscribe to and use a mobile telephony service. One individual can have several subscriptions. Reasons for multiple subscriptions may include separate work and personal lines; multiple lines to benefit from cheaper calls or Internet data packages with different network providers; or as a backup to network congestions or failures. For instance, in Vanuatu, there is a significant number of dual SIM handsets and continued use of multiple networks due to bundled discount offerings by the two main telecom operators.[51] This also occurs in other countries. In Fiji for example, it is common to have SIM cards from each of the two main network providers to take advantage of free calls to users of the same network provider. Another alternative which may affect the interpretation of subscription rates is when several individuals within a family or community share one SIM card, which is likely to be a more widespread practice in poorer, rural and more remote areas.

ii. Mobile Internet

In most developing countries, mobile broadband is the primary way for people to access the Internet. Figure II.5 shows that Pacific SIDS, on average, have the lowest penetration rate in mobile broadband Internet use among all country groupings (27 subscriptions per 100 people in 2020).[52] Penetration rates do, however, vary significantly among Pacific SIDS.[53]

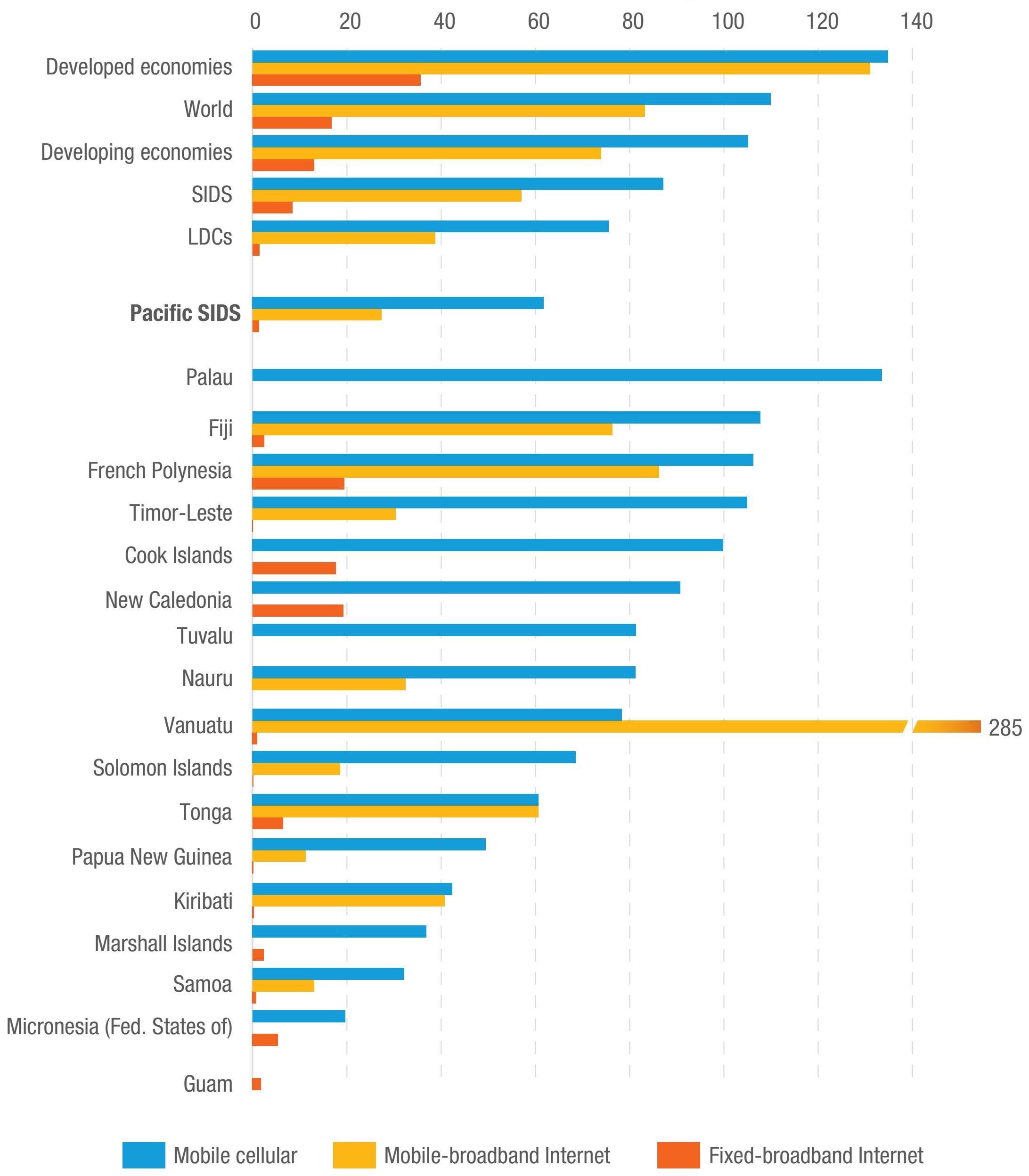
The region has seen rapid growth in mobile Internet subscriptions since 2010 when penetration rates in Pacific SIDS were close to zero.[54] According to UNESCAP (2018), regulatory reform played an important role in boosting penetration rates for mobile broadband subscriptions in the Pacific. Reforms included the introduction of further competition in the telecommunications sector and resulted in improved access to and affordability of mobile broadband services. In the case of French Polynesia, a new submarine cable deployed in 2010 significantly increased mobile broadband adoption.

iii. Fixed Internet broadband

Globally, fixed broadband subscription penetration is generally much lower than for mobile broadband subscriptions. This difference is particularly acute in the Pacific and LDCs (see figure II.5). Low subscription penetration for fixed broadband is not a problem in itself because the uptake of Internet in the general population in many developing countries coincided with the broad availability of Internet-enabled mobile devices. This would suggest that countries could move directly to mobile broadband without ever subscribing to fixed broadband services. However, mobile and fixed broadband are not necessarily interchangeable. Connectivity speeds and traffic volumes still rely on backbone networks

Figure II.5. Mobile cellular and Internet subscription rate, by type, country grouping and selected Pacific SIDS, 2021 or latest available year
(Per 100 people)

With most people accessing the Internet through mobile phones, increasing mobile broadband subscriptions in Pacific SIDS would lead to more inclusive access to the digital economy.



Source: UNCTAD calculations, based on ITU (2022d), Statistics: Global and regional ICT data, update of 25 January. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx; and ITU (2022f), World telecommunication/ICT indicators database 2022, July Edition. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.

Notes: 2021 data concern all country groupings (except Pacific SIDS), French Polynesia, Timor-Leste, Vanuatu, Tonga and Kiribati. 2020 data concern the Pacific SIDS as a group and individually all other Pacific SIDS (except French Polynesia, Timor-Leste, Vanuatu, Tonga and Kiribati). Country groupings are of the source, except Pacific SIDS.

that form the basis of fixed broadband coverage. Furthermore, mobile broadband has limitations. The digital economy is increasingly associated with activities that require access to considerable bandwidth with fast upload and download speeds – for example, the use of web meeting and conference tools such as Zoom, Microsoft Teams, Skype and Webex. These services are increasingly used in many workplaces and require upload and download speeds that are not always available in all locations.

Fixed broadband access for Pacific SIDS was similar to access in LDCs and lower than in SIDS overall. The rate for Pacific SIDS was one subscription per hundred people in 2020.[55] Cook Islands, New Caledonia and French Polynesia are the exceptions and recorded between 18 and 20 subscriptions per 100 people. The low level of subscriptions to fixed broadband in other Pacific economies is likely because of a generally low demand for fixed connectivity and a wider spread of Internet-enabled mobile devices compared with more costly computers and laptops. Additionally, this trend is driven by the logistical and financial challenges related to laying submarine and terrestrial fibre-optic cables for remote and widely dispersed islands. These locations are therefore reliant on expensive satellite broadband Internet. This, in turn, translates into higher retail prices and negatively affects affordability of fixed broadband services.

b. Affordability of Internet plans

Affordability of broadband plans is an important determinant for potential and regular use of the Internet. This is recognized under Advocacy Target 2 of the Broadband Commission for Sustainable Development. The target is for the cheapest data-only mobile broadband and fixed broadband basket subscriptions to be less than 2 per cent of monthly GNI in low- and middle-income countries per capita by 2025.[56]

When expressed as the share of GNI, mobile Internet is generally more affordable than fixed broadband (see figure II.6). In 2021, the target of less than 2 per cent of GNI for mobile Internet was reached in high-income countries and almost reached in low- and middle-income countries. For fixed broadband this was only the case for high-income countries. In the Pacific, the cheapest available mobile Internet plan was on average more than twice as cheap as the cheapest fixed broadband plan.

However, mobile broadband in the Pacific is almost four times more expensive than the global average and 50 per cent above the cost at the SIDS level. Only Tonga and Nauru are close to reaching the 2 per cent target set by the Broadband Commission for Sustainable Development.[57] In some countries, mobile Internet is still prohibitively expensive – the cost is almost 10 per cent of GNI per capita in Solomon Islands and the Federated States of Micronesia, and close to 20 per cent in Papua New Guinea.

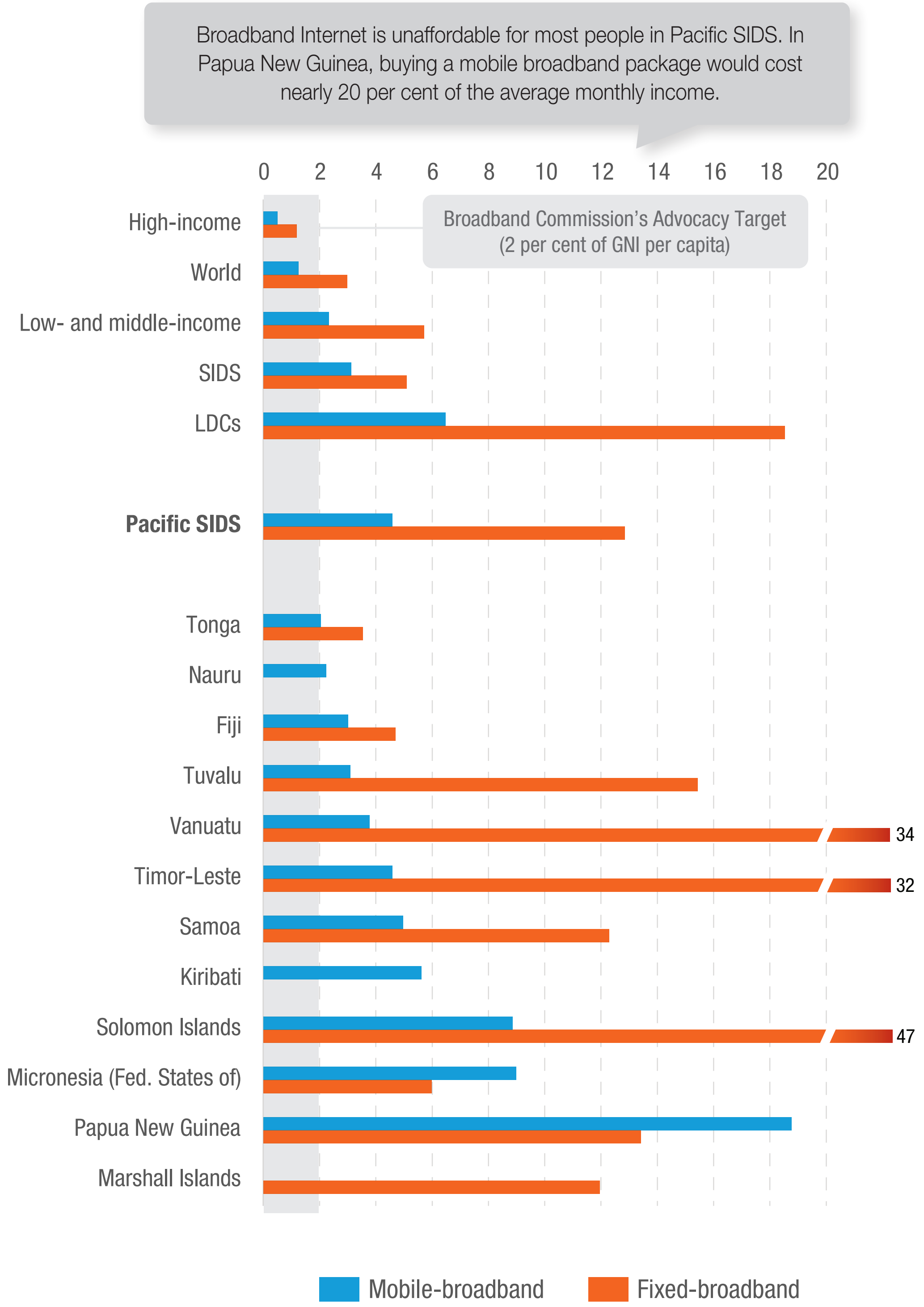
2. Smartphone adoption and affordability

Many people in developing countries use smartphones and feature phones as the primary way to access the Internet. For instance, Facebook users in Fiji and Papua New Guinea own more smartphones than computers.[58] The adoption of a smartphone depends on several factors, including affordability of the device (see section II.B.2.b) and mobile broadband services (see section II.B.1.b), and transmission networks (see section II.A.3).

a. Adoption

The smartphone adoption rate (expressed as the share of smartphone connections among all mobile connections) in the six Pacific SIDS for which data are available fell below the global average of 60 per cent in 2018. The adoption rate varied from 22 per cent in Papua New Guinea to almost 50 per cent in French Polynesia in the same year (see figure II.7).[59] This gap was even more pronounced when compared to high-income countries, where smartphone adoption reached almost 80 per cent in 2020 (GSMA Intelligence, 2021). The rate of smartphone adoption in Fiji doubled between 2014 and 2018 but growth was considerably lower in other Pacific SIDS and even negative in the case of New Caledonia. However, GSMA forecasts that smartphone adoption in the Pacific could reach 70 per cent by 2025, catching up with global and Asia-Pacific adoption rates (GSMA Intelligence, 2019b). This forecast was based on the assumption that the price of smartphones will decline and that new vendors of low-cost smartphones will emerge in the region.

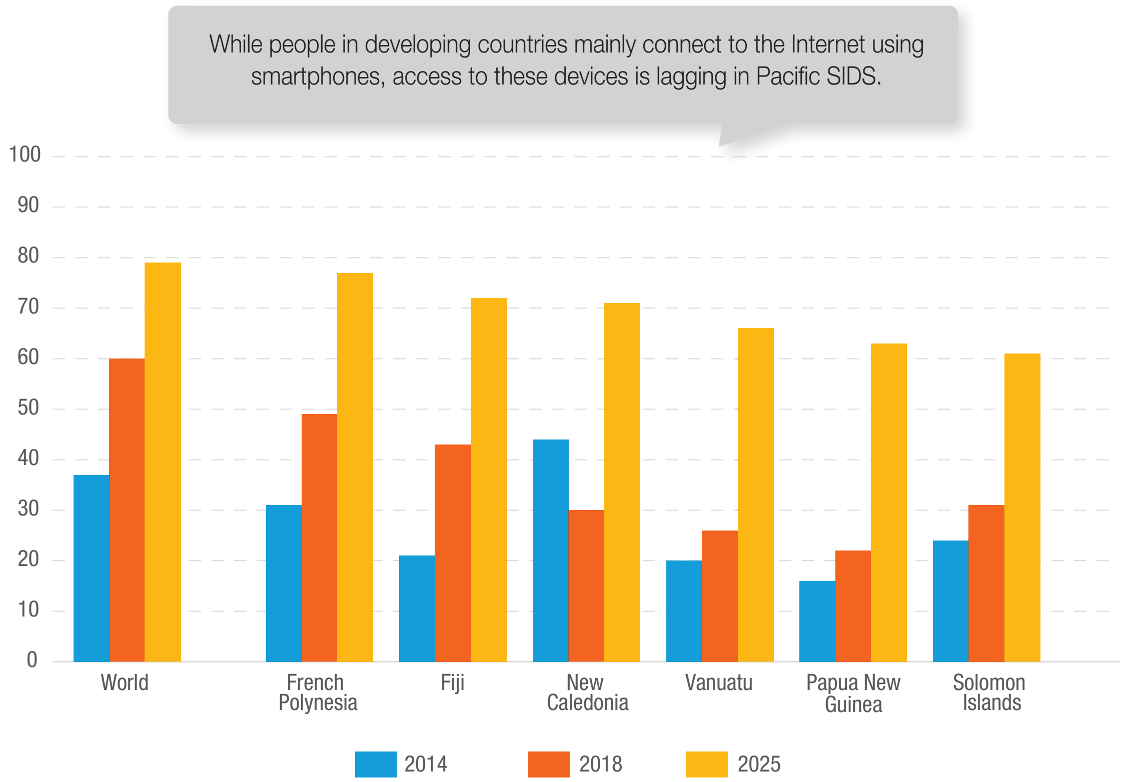
Figure II.6. Price of broadband as a share of monthly GNI per capita, by country grouping and selected Pacific SIDS, 2021
(Per cent)



Source: UNCTAD calculations, based on ITU (2022a), ICT prices: ICT price baskets [historical data series, March 2022 release]. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/ICTprices/default.aspx.

Notes: Fixed broadband: Price of an entry-level fixed broadband basket, defined as the cheapest fixed Internet subscription available domestically, with a minimum of 5 GB monthly data allowance and an advertised download speed of at least 256 Kbit/s. Mobile broadband: price of an entry-level data-only basket, defined as the cheapest data-only mobile broadband subscription available domestically, with 3G technology or above and a minimum monthly data allowance of 2 GB. Country groupings are those of the source (medians), except Pacific SIDS (median).

Figure II.7. Smartphone adoption, global and selected Pacific SIDS, selected years
(Per cent)



Source: UNCTAD calculations based on GSMA Intelligence (2015a, 2015b, 2019a and 2019b).

Notes: Smartphone adoption is the percentage share of smartphone connections to all mobile (SIM) connections. Country grouping is from the source. The 2025 data are GSMA forecasts.

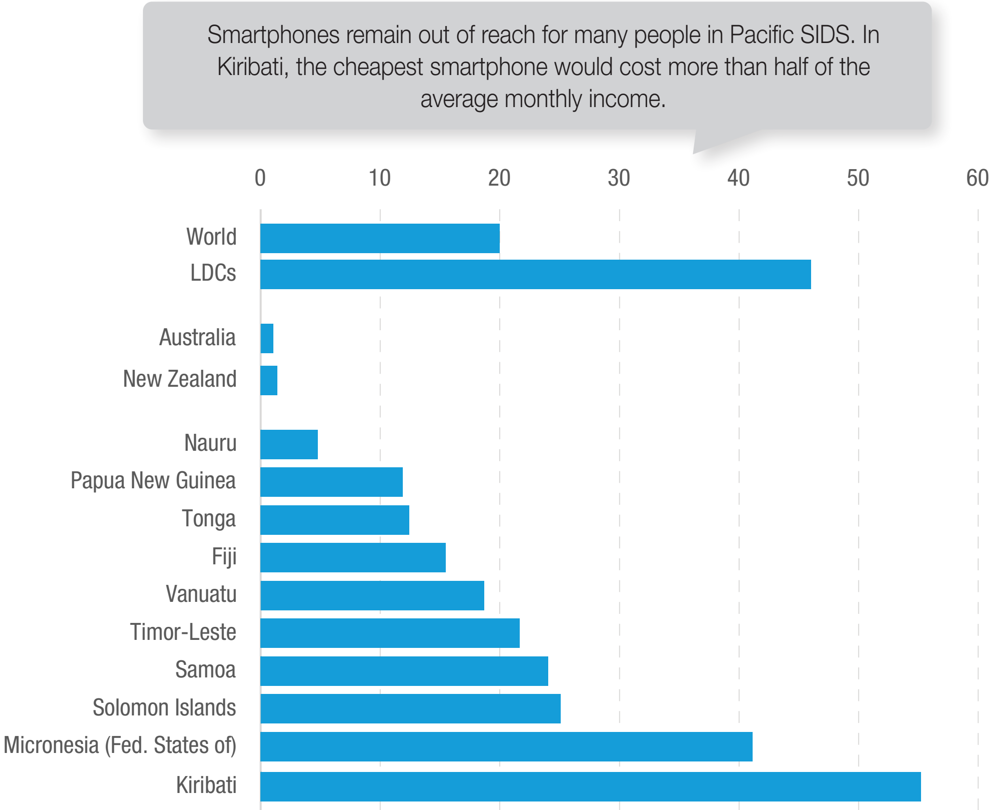
Box II.3. Smartphone affordability and the role of telecom operators

Many factors influence the price and affordability of smartphones. Mobile network operators in the Pacific can play an important role in the offers and prices of smartphones. Between 2021 and 2022, the price of the cheapest available smartphone decreased significantly in Papua New Guinea (from $135 to $28), Samoa (from $139 to $76) and Solomon Islands (from $79 to $49). This change in prices resulted mainly from a shift to more entry-level smartphones. In Samoa and Solomon Islands, the cheapest available smartphones in 2022 were also sold by different operators compared with 2021.

Smartphone offers can often be better adapted to the level of digital literacy and Internet activities of consumers. A smartphone with advanced features is likely to be more expensive, while its functionalities may not be fully exploited, especially by first-time users. Targeting devices for basic Internet use could therefore lead to cheaper entry-level smartphones or feature phones ('not-too-smart smartphones'). For example, the cost of a feature phone in Samoa and the Federated States of Micronesia was significantly lower than the cost of a smartphone in 2021. In Vanuatu, on the other hand, the cheapest available smartphone and feature phone in 2022 were offered at a similar price by the same operator, Vodafone (ATH). This could be interpreted as an effort to adapt entry-level devices to the digital skills of consumers.

Source: UNCTAD, based on Alliance for Affordable Internet (2021a), 2021 prices and affordability of smartphones and feature phones by country [data set]. Available at https://a4ai.org/research/device-pricing-2021/. and Alliance for Affordable Internet (2022), 2022 prices and affordability of smartphones and feature phones by country [data set]. Available at https://a4ai.org/research/device-pricing-2022/.

Figure II.8. Cost of the cheapest available smartphone as a share of monthly GNI per capita, by country grouping, Australia, New Zealand and selected Pacific SIDS, 2022
(Per cent)



Source: UNCTAD calculations, based on Alliance for Affordable Internet (2022), 2022 prices and affordability of smartphones and feature phones by country [data set]. Available at https://a4ai.org/research/device-pricing-2022/.

Note: Country groupings are of the source.

b. Affordability

Affordability of Internet-enabled smartphones is a key barrier to using mobile Internet, especially in developing countries (GSMA, 2022).[60] Despite the global shortage of microchips and supply chain issues, the global average cost of the cheapest smartphone went from 22 per cent to 20 per cent of average monthly income between 2021 and 2022 (Alliance for Affordable Internet, 2022). In five out of ten Pacific SIDS with available data, the cost of a smartphone was above 20 per cent of the average monthly income in 2022, which can reasonably be considered as unaffordable (see figure II.8).

Important differences are observed in the region. In Nauru, the cost of the cheapest smartphone represented 5 per cent of monthly GNI per capita. However, in Kiribati it was ten times higher at 55 per cent – half of an average monthly income. It is important to note that smartphone prices can vary significantly from one year to another as telecom operators change their offers and this can have a big impact on affordability (see box II.3).

3. Internet use

Thus far, this chapter has looked at some of the key indicators that play a role in determining Internet use, which forms the basis for e-commerce and the digital economy. Affordable and reliable Internet connectivity allows users to access websites, send and receive emails, use instant messaging apps and social media, and buy and sell goods and services on e-commerce platforms. Given its importance, the Broadband Commission for Sustainable Development has raised the targets for broadband Internet user penetration to 75 per cent worldwide, 65 per cent in low- and middle-income countries and 35 per cent in LDCs by 2025.[61]

Data on Internet use in the Pacific is scarce and mostly outdated. With this proviso, Pacific SIDS did show strong progress towards the Broadband Commission for Sustainable Development targets in the following periods: 2011 to 2020 (Kiribati and Timor-Leste), 2011 to 2018 (Fiji) and 2011 to 2017 (all remaining Pacific SIDS).[62] Some countries have either already reached or are close to reaching their targets (see figure II.9). Pacific SIDS still lag significantly behind SIDS in general (21 per cent and above 60 per cent in 2021, respectively).[63] To a large extent, this can be explained by the high share of the offline population in Papua New Guinea.[64]

4. Digital gender divides

Efforts to achieve gender balance across society, including in the digital sphere, contribute to broad socioeconomic progress and progress towards SDG 5: Gender Equality. Many women remain excluded from the digital economy, especially in LDCs, because of multiple barriers to mobile phone ownership and access to and use of the Internet. These barriers are complex and diverse and arise from inequality in incomes, discriminatory gender norms, as well as the education and digital skills gap.

As noted by the Alliance for Affordable Internet (2021b), the exclusion of women in the digital sphere translates to lost economic opportunities, which in turn means unrealized potential for economic growth and development as well as tax revenue for governments. This exclusion also has adverse implications for the full range of women's human rights and the overall sustainable development agenda.

Reducing the digital gender divide should be a priority for public authorities. The nature and complexity of the digital gender divide requires more research and analysis to deepen understanding of its structural barriers and drivers, and to shape deliberate and sustained policy responses needed to close the gap.

a. Mobile phone, smartphone and computer ownership

In developing countries, promoting the ownership and use of mobile phones for women (smartphones in particular) is essential to closing the digital gender divide.[65] This is recognized under SDG Goal 5.b., which aims to enhance the use of enabling technology, especially ICT, to promote the empowerment of women. Progress against this goal is measured by the proportion of individuals who own a mobile telephone (by sex).[66]

There is limited gender-disaggregated data to measure and observe the digital gender divide over time. Gender-disaggregated data on mobile phone ownership only covered 60 countries for the period 2018–2020.[67] Moreover, data on mobile phone ownership do not distinguish between a smartphone (or an Internet-enabled mobile device) and a cellular telephone. Statistics from additional sources can help fill this data gap by providing gender-disaggregated data on the ownership and use of smartphones and computers.[68]

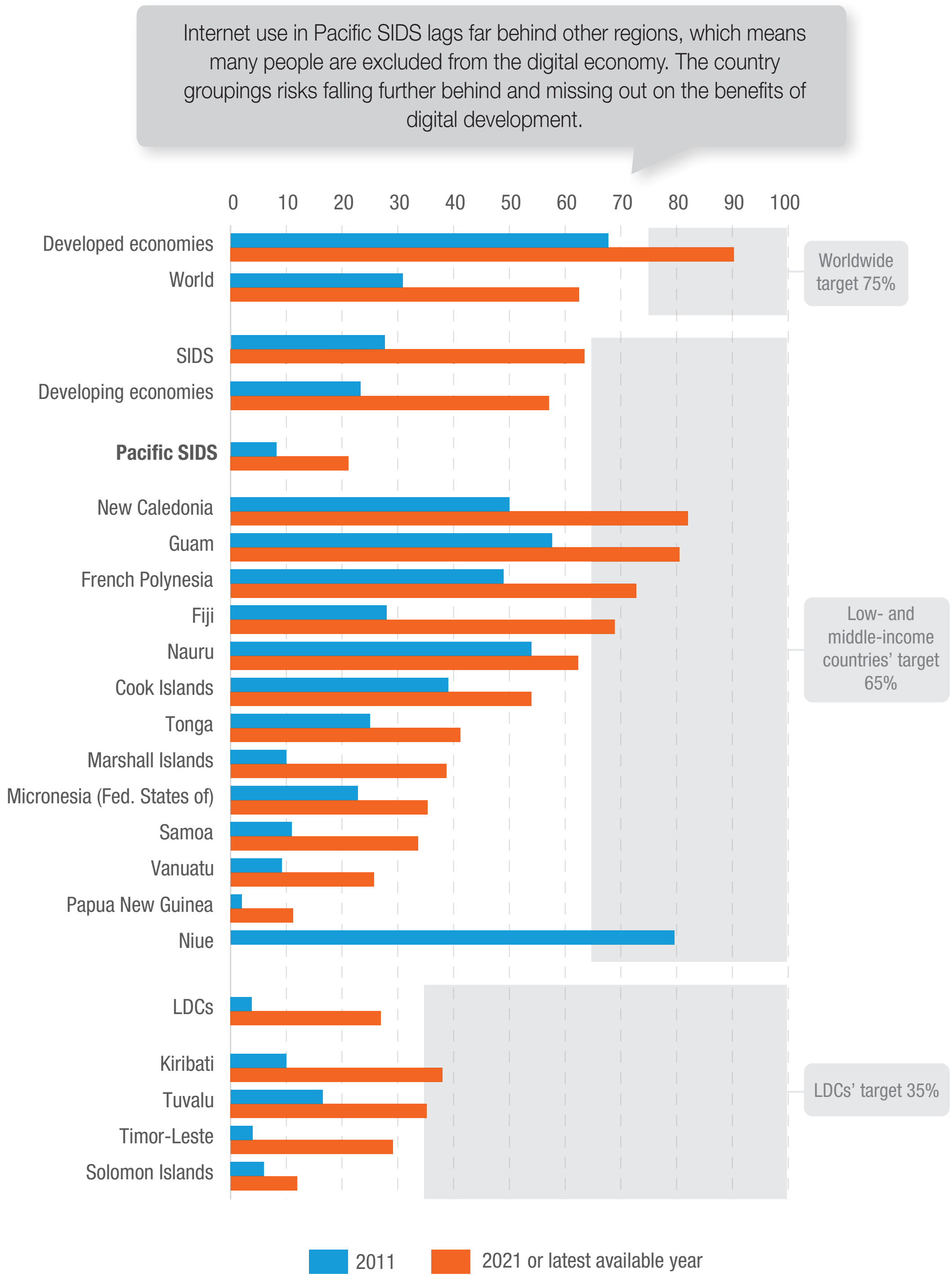
At the global level, women and men are close to achieving parity in mobile phone ownership. However, gender parity for smartphones and computers still lags (see figure II.10).[69] In SIDS and LDCs, gender parity has not been achieved for any of the three devices. Notably, the gender parity score for smartphones was higher than the score for mobile phones.[70]

While data for most Pacific SIDS are lacking, available data show that Kiribati achieved gender parity in mobile phone ownership and Tonga had almost achieved parity in 2019. In terms of smartphone ownership, 2021 data for Papua New Guinea show that slightly more women owned smartphones compared to men. Fiji still lagged, however. Computer ownership generally shows a greater gender divide. This suggests that, in addition to legislative and gender-responsive policy measures, promotion of affordable smartphones can play an important role in closing the gender gap when it comes to Internet use.

b. Internet use

Available gender parity data on Internet use show that developed economies and SIDS achieved gender parity in 2020 and 2022, respectively. However, LDCs still lagged significantly behind in 2022

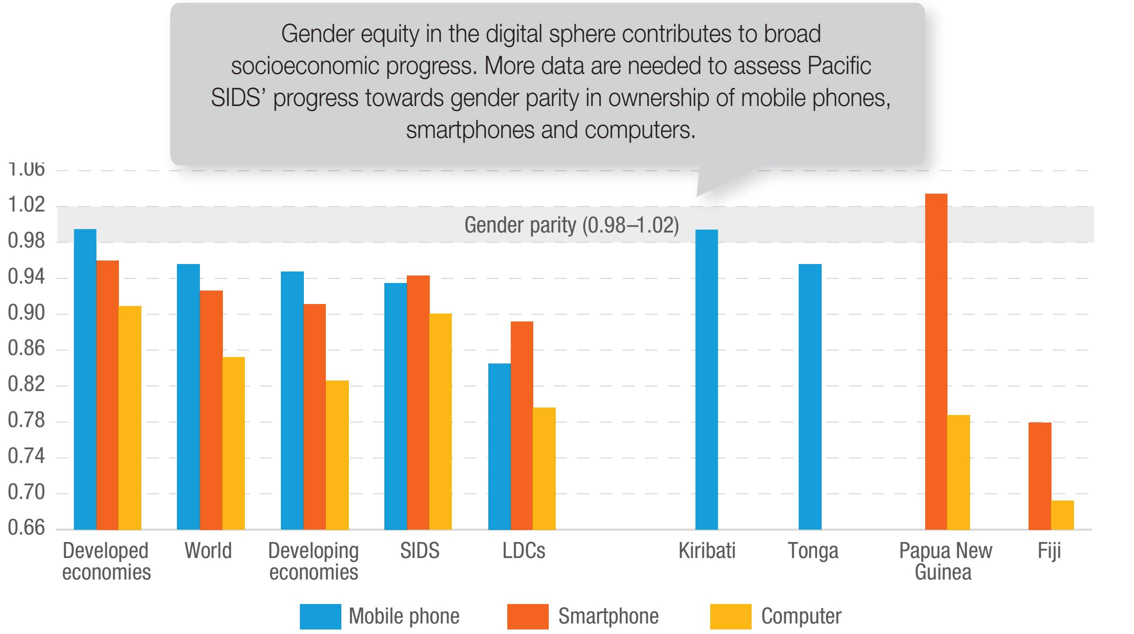
Figure II.9. Progress against Broadband Commission for Sustainable Development targets for broadband-Internet user penetration, by country grouping and selected Pacific SIDS, selected years
(Per cent of population)



Source: UNCTAD calculations, based on ITU (2022d), Statistics: Global and regional ICT data, update of 25 January. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx; and ITU (2022f), World telecommunication/ICT indicators database 2022, July Edition. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.

Notes: Latest year available: 2021 (world and all groups except Pacific SIDS); 2020 (Kiribati, Timor-Leste); 2018 (Fiji); 2017 (Pacific SIDS as a group, French Polynesia, Guam, Marshall Islands, Federated States of Micronesia, Nauru, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu); Cook Islands (2016). Niue's latest statistics covered 2011. Country groupings are those of the source, except Pacific SIDS (UNCTAD).

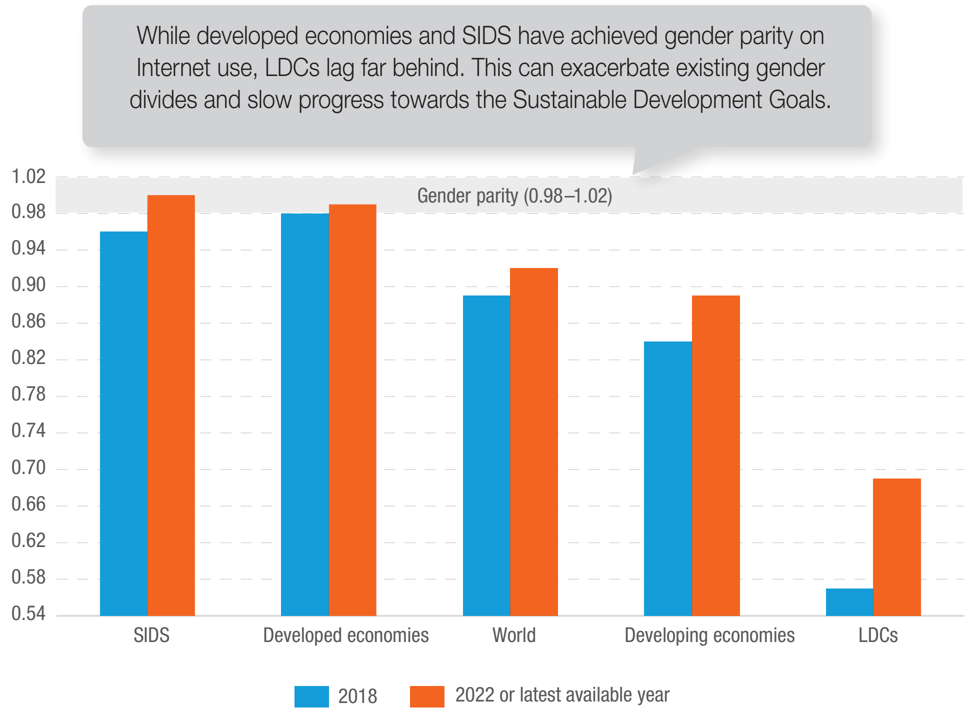
Figure II.10. Gender parity score for device ownership, by country grouping and selected Pacific SIDS, 2021 or latest available year



Source: UNCTAD calculations, based on ITU (2022b), ITU ICT SDG indicators. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/SDGs-ITU-ICT-indicators.aspx; and Humanitarian Data Exchange (2022), Survey on gender equality at home. Available at https://data.humdata.org/dataset/survey-on-gender-equality-at-home.

Notes: Group medians of gender parity in ownership of mobile phone (ITU 2019 data) and smartphone/computer (Facebook 2020 and 2021 data) cover: world (40 and 125 countries respectively), developed economies (7 and 39), developing economies (33 and 86), SIDS (7 and 8) and LDCs (2 and 24). Among Pacific SIDS, ITU data were only available for Kiribati and Tonga, while Facebook had only data for Fiji and Papua New Guinea (2021).

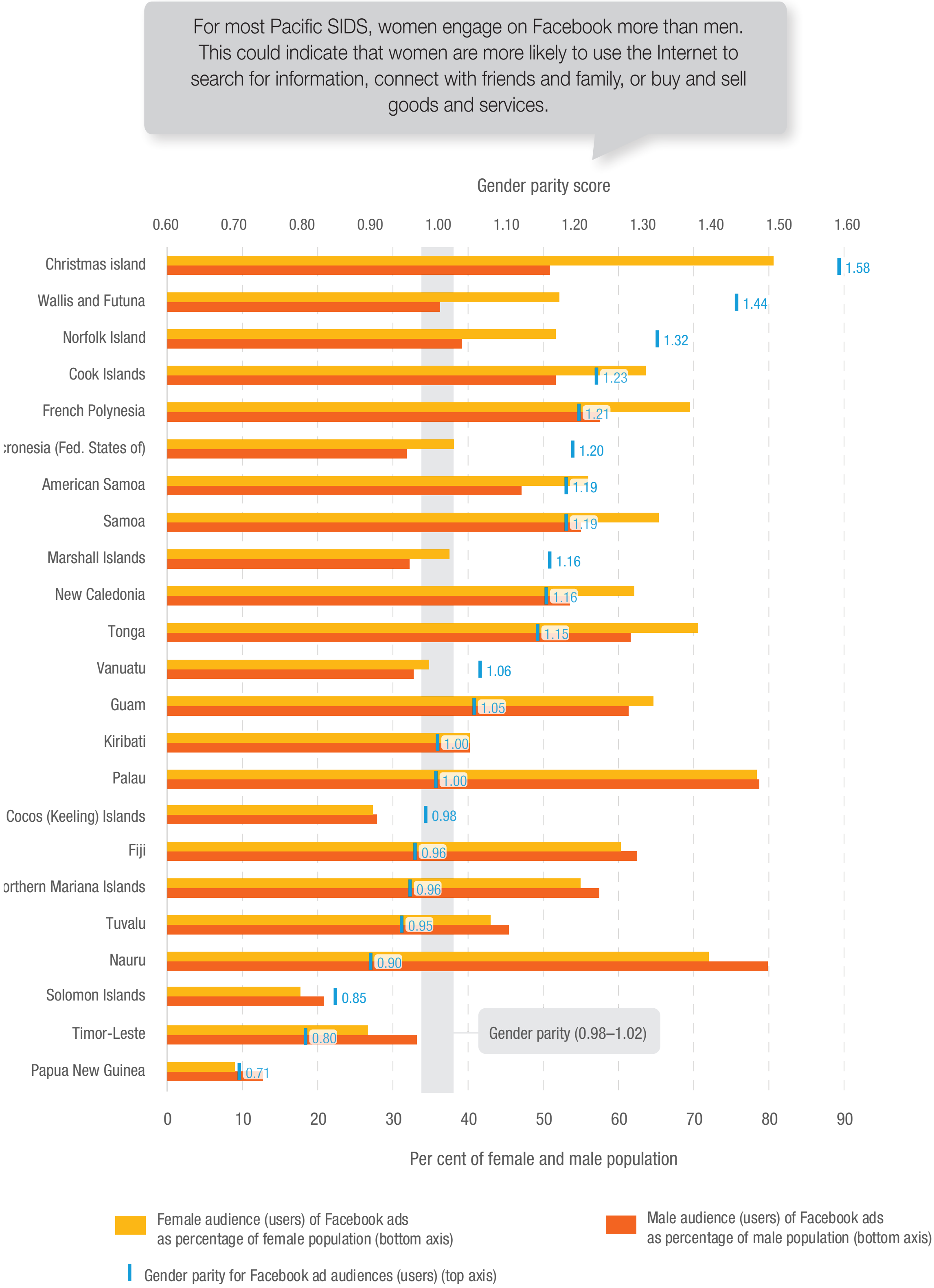
Figure II.11. Gender parity score for Internet use by country grouping, selected years



Source: UNCTAD calculations, based on ITU (2022e), Statistics: Global and regional ICT data, update of 19 September. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

Notes: 2022 data concern SIDS, World and LDCs. Data from 2020 were available for developed and developing economies. Country groupings are those of the source.

Figure II.12. Female and male ad audience of Facebook as ratio of female and male population (per cent) and gender parity score, Pacific SIDS and territories, 2022



Source: UNCTAD calculations, based on Datareportal (2022), Posts tagged Oceania. Available at https://datareportal.com/reports/?tag=Oceania.

Note: The user numbers reported by social media platforms are typically based on active user accounts and may not represent unique individuals. For example, one person may maintain more than one active presence on the same social media platform (i.e. "duplicate" accounts).

(see figure II.11). Gender-disaggregated data on Internet use for Pacific SIDS was not available from ITU.[71] However, an additional source for assessing Internet use by gender is by looking at social media data, in particular Facebook use.[72] For the majority of these Pacific economies, Facebook's ad audience data suggest that relatively more women use the Internet compared to men (see figure II.12).

C. THE PACIFIC DATA GAP

The statistical and analytical work on ICT indicators for this report identified a general lack of data for Pacific SIDS, confirming findings in other reports. The Regional E-commerce Assessment (PIFS, 2020) recognized the poor availability of data on e-commerce and the digital economy in the Pacific, with ICT statistics mainly found through international databases. The assessment emphasized the importance of robust data to support the planning, monitoring and evaluation of various ICT and e-commerce initiatives. Reliable and updated data on the number of mobile and fixed broadband Internet subscribers as well as the number of Internet users are particularly important for benchmarking and the measurement of progress of the sector. As UNESCAP (2022a) has noted, a shortage of data on digital connectivity is preventing a deeper analysis and understanding of the digital divide in these geographically disadvantaged countries. Pacific SIDS were not included in their digital transformation index because of this substantial lack of data.

To illustrate this data gap for Pacific SIDS, UNCTAD analysed 11 standard ITU indicators for ICT access and use. Figure II.13 shows that, on average, data for 8 out of the 11 indicators were available for Pacific SIDS (79 per cent), lagging behind global and SIDS averages (90 and 86 per cent, respectively). When taking only the most recent data (2020–2021) into account, data were available for only 60 per cent of the indicators, compared with 80 per cent globally. For time series analysis, data for Pacific SIDS cover an average of only 59 per cent of the time series, well below the global and SIDS levels (78 and 68 per cent respectively).[73]

The most significant gap in the ITU data set concerned mobile broadband subscriptions, with data available in the Pacific for only 40 per cent of the time series, compared with 74 per cent globally (see figure II.14). Mobile broadband subscriptions is a key indicator for e-commerce, as most Internet connections are established through mobile devices in developing economies (see section II.B.1.a). For the other key indicator relating to the number of Internet users, data for Pacific SIDS were available for only 62 per cent of the time series, compared with 81 per cent globally. When focusing only on the most recent data time point (2020 or 2021), data on Pacific SIDS are up to date for only 3 out of 11 indicators (see figure II.15), with data on Internet users available for only 10 per cent of countries.

Other sources used for this chapter also show limited data availability for Pacific SIDS. The Ookla indicator for fixed broadband connection speeds includes six Pacific SIDS, and the indicator for mobile broadband connection speeds mobile covers only two of these economies. Similarly, Facebook (Meta) data on female and male ownership of computers and smartphones includes only two Pacific SIDS, while The Mobile Economy: Pacific Islands 2019 report (GSMA Intelligence, 2019b) has data on smartphone adoption for only six Pacific SIDS. However, other indicators show stronger coverage of the region, such as the number of IXPs (Packet Clearing House, 2022), prices of smartphones (Alliance for Affordable Internet), access to electricity (World Bank), female and male audience (proxy for Internet use, Facebook (Meta)).

The general data gap for Pacific SIDS identified in this analysis would be even wider without the complementary data provided by ITU estimates. This is a serious constraint to research and analysis on e-commerce and the digital economy in the region and limits evidence-based policymaking and investment decisions. There is an urgent need to build or strengthen digital data systems in the Pacific region, including statistics that measure the digital ecosystem. According to UNESCAP (2022a), a policy priority and capacity-building focus, with commensurate allocation of funding, needs to be directed to address these data gaps. The 2050 Strategy for the Blue Pacific Continent, endorsed by Pacific Leaders in July 2022, recognizes the importance of disaggregated data and data sovereignty for improved decision-making in a well-connected region.

Regional cooperation on this issue is important. The Pacific Regional E-commerce Strategy and Roadmap (PIFS, 2021) emphasized that a regional mechanism for the collection, production, compilation and dissemination of data would be developed and capacity-building activities for national statistics offices would be required. The Pacific E-commerce Portal was launched in August 2022 and is intended to become a one-stop shop for information on e-commerce in the Pacific (see chapter V). The statistics section of the portal was developed by PIFS in collaboration with Pacific Community and UNCTAD, and includes available data on key indicators from different international sources, including the International Monetary Fund, ITU, UNCTAD and the World Bank. The portal can act as an incentive for competent national and regional authorities to improve data collection and publication in the Pacific.

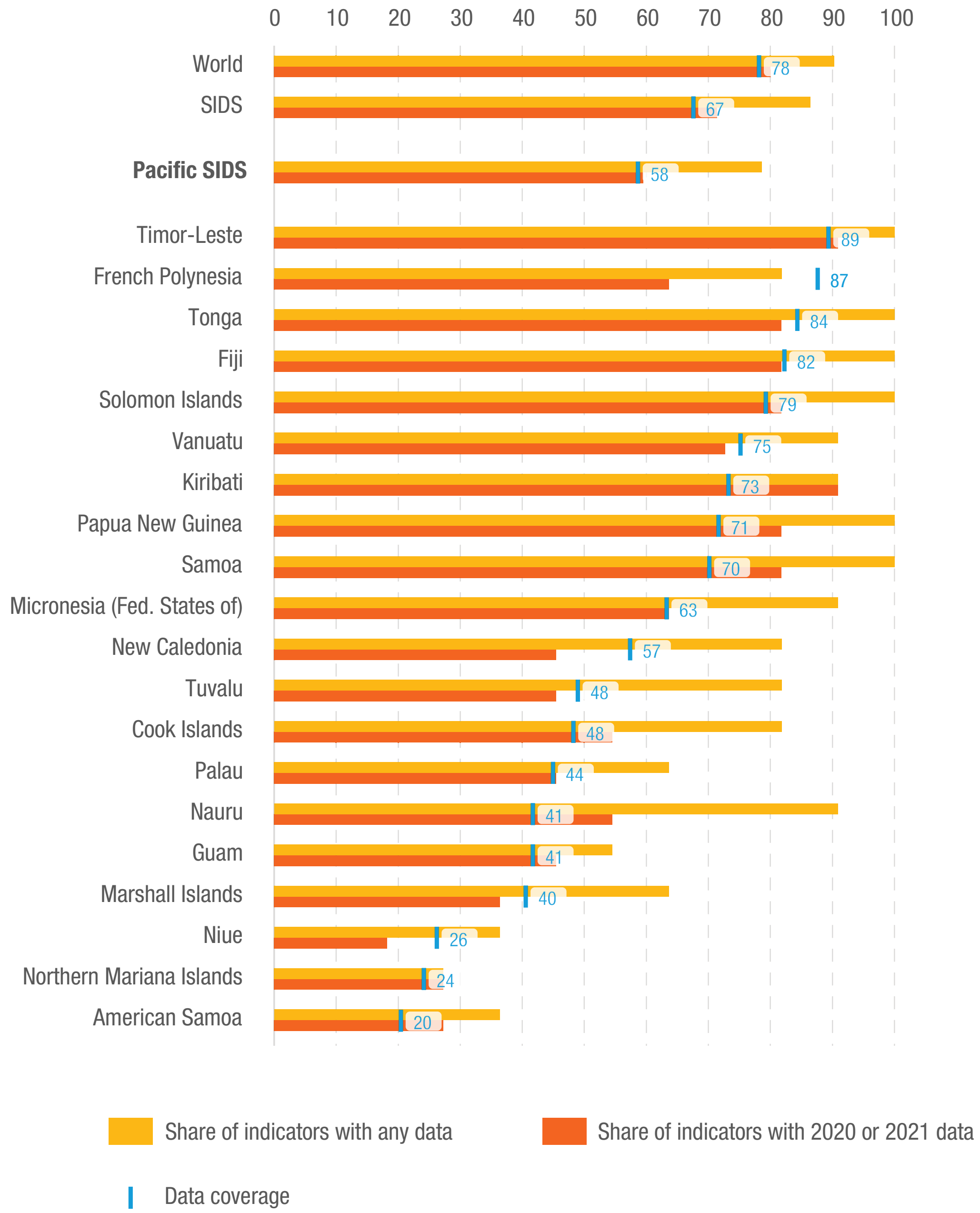
***

Digital infrastructure provides the foundation for individuals, businesses and governments to access digital content and services. It ensures the interconnectivity of different stakeholders in the digital value chain so that they can deliver economic and social value to users. In essence, if the infrastructure is not responding to societal and economic demands, there are negative impacts not only on the development of the digital ecosystem but also on developments related to education, health and work. As such, core physical assets such as submarine cables and data centres are increasingly indispensable to the functioning of societies and economies. Although important advances have been made over the last decade, the Pacific still lags behind most other developing regions in this area. At the same time, increasing levels of mobile broadband penetration and adoption of smartphone technologies point to an urgent need to address the current and future needs of the evolving digital economy. The high cost of Internet services in particular continues to represent a barrier for consumers and businesses in the region.

The development of national and regional digital infrastructure provides an opportunity to accelerate the growth of digital economies in the Pacific and to bring together physical and virtual technologies. However, developing reliable and resilient digital infrastructure is an immense challenge and will require moving from fragmented solutions to holistic digital infrastructure that brings the benefits of digitalization to all people and communities in the Pacific. With improvements to digital infrastructure already under way and further developments anticipated, people and businesses have already experienced the potential of digital technologies to lower costs, expand opportunities and support innovation. In this context, the next chapter discusses key drivers for value creation and capture in the emerging digital economy and explores how the region can benefit from digital platforms and e-commerce opportunities.

Figure II.13. Availability of data on ICT access and use, by selected country grouping and Pacific SIDS
(Per cent)

Common indicators of ICT access and use are often unavailable in the Pacific, making evidence-based policymaking a challenge. In some Pacific SIDS, less than half of common ICT indicators are available.

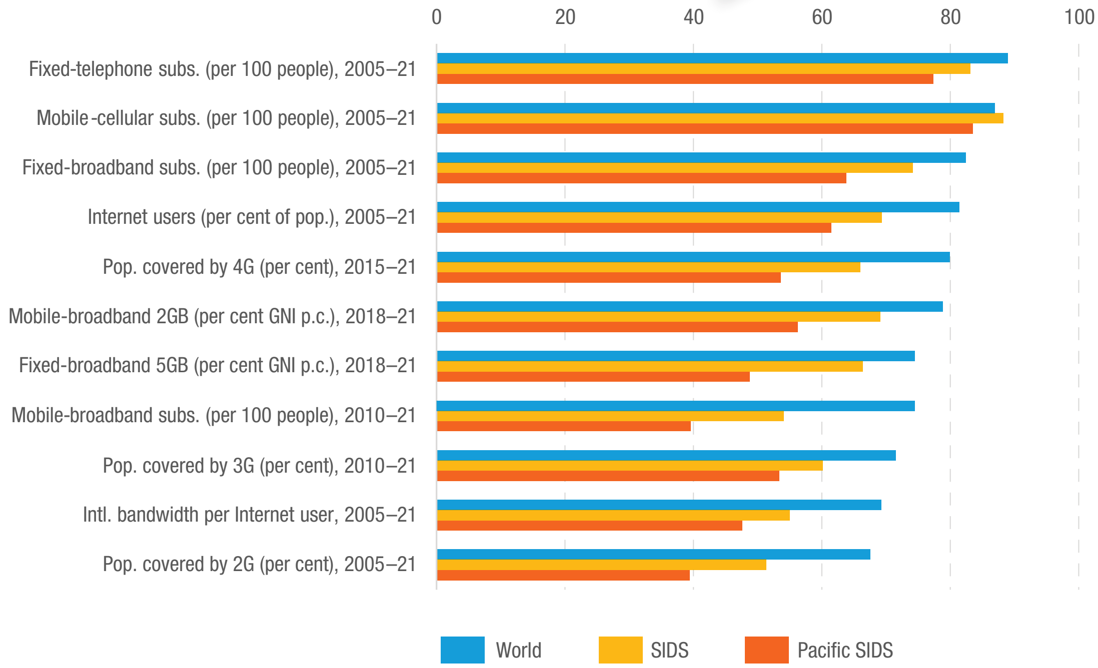


Source: UNCTAD calculations, based on ITU (2022a), ICT prices: ICT price baskets [historical data series, March 2022 release]. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/ICTprices/default.aspx: and ITU (2022f), World telecommunication/ICT indicators database 2022, July Edition. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.

Notes: Eleven indicators of ITU for ICT access and use were considered for this study. For indicators and periods analysed, refer to Figure II.14 or Figure II.15. Data coverage indicates the proportion of years for which data is available within the time series.

Figure II.14. Data availability for selected ICT indicators and periods, by selected country grouping
(Per cent)

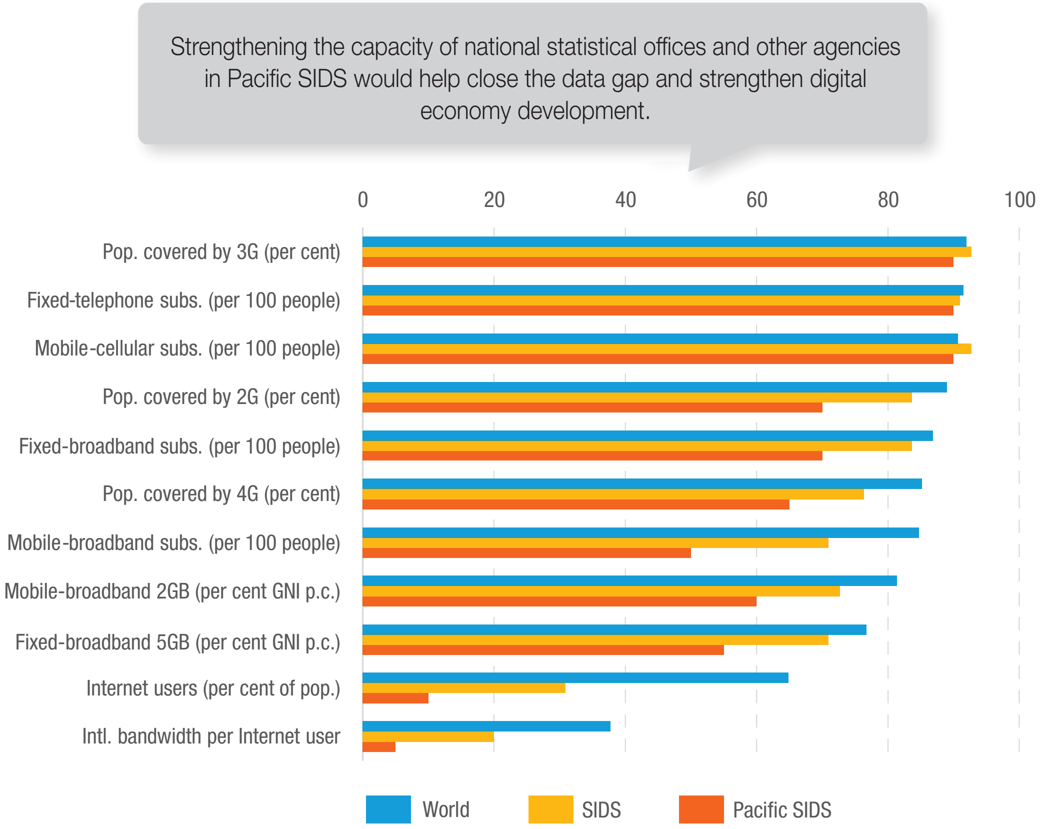
Pacific SIDS are below the global average on availability of ICT data from 2005 to 2021. Comprehensive data on connectivity, access to and use of digital technologies are needed to inform policymaking and to track the progress of development interventions.



Source: UNCTAD calculations, based on ITU (2022a), ICT prices: ICT price baskets [historical data series, March 2022 release]. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/ICTprices/default.aspx; and ITU (2022f), World telecommunication/ICT indicators database 2022, July Edition. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.

Note: Data coverage represents the proportion of years with available data as of the total period per each indicator.

Figure II.15. Data availability for selected ICT indicators, 2020 or 2021, by selected country grouping
(Per cent)



Source: UNCTAD calculations, based on ITU (2022a), ICT prices: ICT price baskets [historical data series, March 2022 release]. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/ICTprices/default.aspx; and ITU (2022f), World telecommunication/ICT indicators database 2022, July Edition. Available at https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.

Note: Data coverage represents the proportion of years with available data as of the total period per each indicator.