GSMA™

The Mobile Economy Pacific Islands 2023

GSMA

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Executive Summary

Mobile drives digital transformation in the Pacific Islands

Mobile technologies underpin digital transformation in the Pacific Islands as authorities take steps to help economies recover from the Covid-19 pandemic and manage threats from climate change and natural disasters. Mobile is the first (in most cases only) form of internet connectivity for many consumers and businesses across the region.

In the past few years, mobile subscriber penetration and smartphone adoption have increased but remain considerably lower than the global average. Improving access to connectivity and closing the mobile internet usage gap are essential for socioeconomic development and to ensure that no one is left behind.

Digital connectivity – with 5G at the core – is set to shape the way people live and businesses operate, accelerating socioeconomic advancement across areas such as healthcare, education, digital commerce, transport and tourism. 5G is still in its early stages in the Pacific Islands; only Guam and the Northern Mariana Islands had launched commercial 5G services as of March 2023. However, operators have already taken steps to prepare for the 5G era, including making their networks 5G-ready. By 2030, the number of 5G connections in the Pacific Islands will reach 1.5 million, equivalent to 17% of total mobile connections. In the meantime, there is an opportunity to migrate more customers from legacy (2G and 3G) networks to 4G, growing adoption beyond 50% in the coming years.
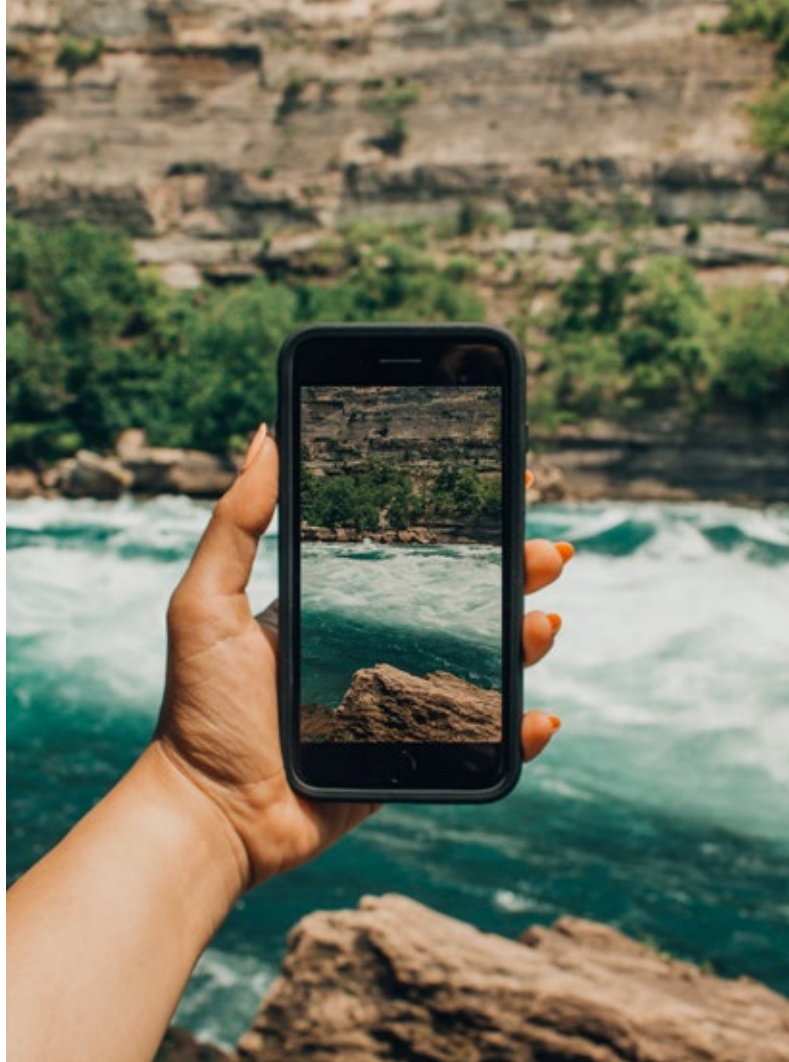
By 2030, the number of 5G connections in the Pacific Islands will reach 1.5 million, equivalent to 17% of total mobile connections

Key trends shaping the mobile ecosystem

The 5G journey begins

4G coverage and adoption are still growing and will continue to play an important role over the rest of this decade and beyond in the Pacific Islands. While the focus of operators in the region is on increasing 4G uptake, it is important to recognise that each successive technology generation advances the capabilities and efficiency of mobile networks. As a result, the onus is on all stakeholders in the mobile ecosystem to ease the transition to 5G and usher in the benefits it offers. 5G can play an important role in accelerating the digital transformation of enterprises in the Pacific Islands. Meanwhile, delivering improved home broadband via 5G represents a more immediate opportunity for operators.

Operators size the open RAN opportunity

The rise of open architecture networks, including open RAN, has garnered much attention in recent years. Besides increasing supplier diversity, cost savings are frequently touted as a key value proposition for open RAN. While evidence of open RAN deployments in the Pacific Islands remains limited, operator intent is likely to grow over the next few years as the open RAN ecosystem develops. However, for open RAN to scale, obstacles to deployment need to be tackled.

Climate risks drive use of renewable energy

Countries in the Pacific Islands are at the forefront of the threat from rising sea levels. At the same time, the region's unique landscape means base stations are usually geographically disbursed, separated from each other and powered by different electricity grids. Larger distances between sites and an 'island-like' network architecture increase maintenance and backhaul costs for operators and add to the challenges associated with energy management. This has resulted in independent energy sourcing and backup power becoming prevalent across the region. Operators are increasingly turning to renewable energy sources such as solar panels for their operations.
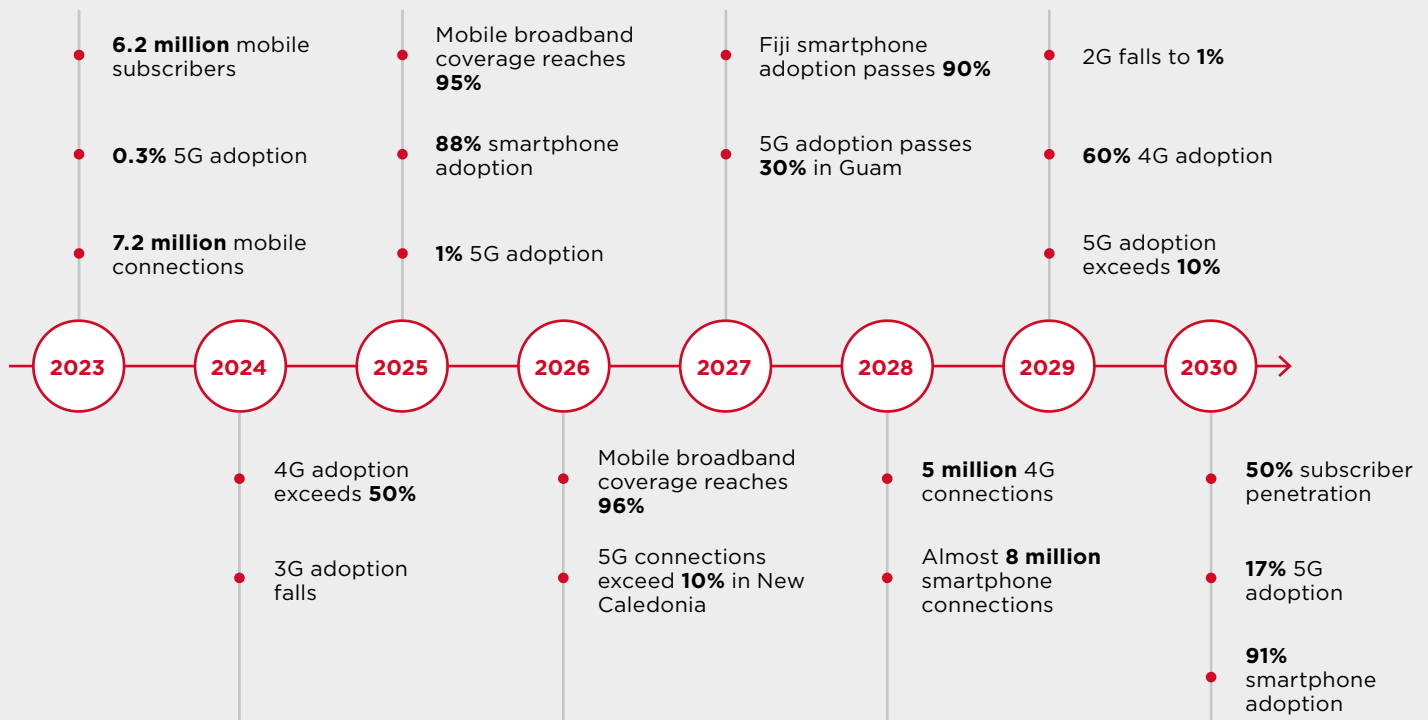
Efforts continue to spur innovation and support entrepreneurship

There is growing support for innovation across the Pacific Islands, with the emergence of tech hubs and a developing ecosystem of entrepreneurs and new ventures looking to adapt emerging technologies to the particular challenges of the region. However, barriers to growing the innovation ecosystem remain, including geographical remoteness, the limited size of individual markets and debt vulnerability.

Fintech opportunities for operators can help expand financial services

In its early stages, the fintech sector in the Pacific Islands has shown promising growth in terms of initiatives and developments. The Pacific Financial Inclusion Programme (PFIP) has helped extend financial services to around 1.8 million people. Mobile technology and enabling policies have been instrumental to growth, but further ecosystem collaboration is needed to ensure the sustainability of services and expand the range of fintech products.

Pacific Islands: key mobile industry milestones to 2030

2023
- **6.2 million** mobile subscribers
- **0.3%** 5G adoption
- **7.2 million** mobile connections

2024
- 4G adoption exceeds **50%**
- 3G adoption falls

2025
- Mobile broadband coverage reaches **95%**
- **88%** smartphone adoption
- **1%** 5G adoption

2026
- Mobile broadband coverage reaches **96%**
- 5G connections exceed **10%** in New Caledonia

2027
- Fiji smartphone adoption passes **90%**
- 5G adoption passes **30%** in Guam

2028
- **5 million** 4G connections
- Almost **8 million** smartphone connections

2029
- 2G falls to **1%**
- **60%** 4G adoption
- 5G adoption exceeds **10%**

2030
- **50%** subscriber penetration
- **17%** 5G adoption
- **91%** smartphone adoption

Policies to spur digital transformation

Digital connectivity and technologies offer the Pacific Islands the opportunity to transcend the limitations of physical size and constraints of geography. Governments need to lead the way by implementing digital public services and policy/regulatory levers that promote innovation and investment, facilitate deployment, enable access to spectrum and ensure adequate security measures are in place.

In the 5G era, mobile connectivity will play an even greater role in society, reflecting the potential for the technology to enable a range of new use cases and applications for citizens, enterprises and the public sector. In this context, governments and policymakers across the region should prepare for the 5G opportunity, using a whole-of-government approach. This involves governments and industry stakeholders collaboratively charting the path for

5G with a clear spectrum roadmap that sets out the stages to ensure sufficient spectrum to support 4G while meeting the future needs of 5G.

Meanwhile, as people become increasingly reliant on connectivity they need to be able to use online services safely and securely. To this end, collaboration is paramount among local and regional stakeholders to help combat the spread of disinformation and prevent cybercrime.

> Governments and policymakers across the region should prepare for the 5G opportunity, using a whole-of-government approach
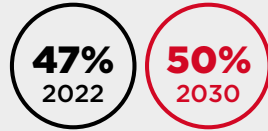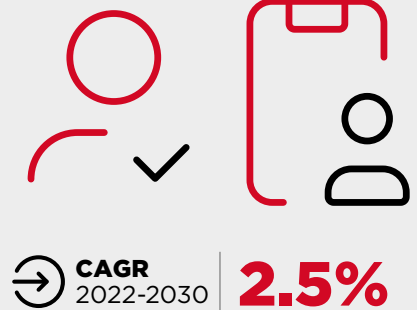
The Mobile Economy Pacific Islands

Unique mobile subscribers

2022 **6.0m**
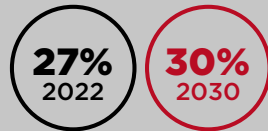2030 **7.3m**

47% 2022
50% 2030

Penetration rate
Percentage of population

CAGR 2022-2030 | **2.5%**

Mobile internet users

2022 **3.5m**
2030 **4.5m**
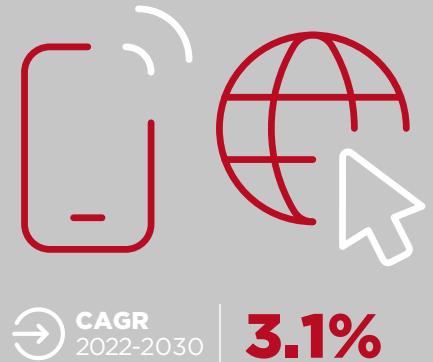
27% 2022
30% 2030

Penetration rate
Percentage of population

CAGR 2022-2030 | **3.1%**

SIM connections
(excluding licensed cellular IoT)

2022 **7.0m**
2030 **8.8m**

Penetration rate
Percentage of population

54% 2022
60% 2030

CAGR 2022-2030
2.8%

4G Percentage of connections
(excluding licensed cellular IoT)

2022 **48%**
2030 **59%**
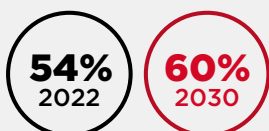
5G Percentage of connections
(excluding licensed cellular IoT)

2022 **0.2%**
2030 **17%**

Smartphones
Percentage of connections
(excluding licensed cellular IoT)

2022 **80%**
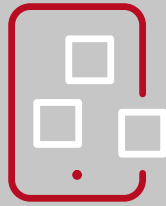
2030 **91%**

Licensed cellular IoT connections*
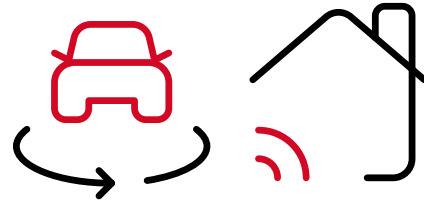
2022 **64,400**

2030 **102,500**

* For Fiji and Papua New Guinea

Operator revenues and investment

2022 **$1.3bn** | Total revenues

2030 **$1.6bn**

Operator capex

$1.9bn

2023 ⟶ 2030

Mobile industry contribution to GDP

2022 **$2.1bn** 3.7% of GDP

2030 **$2.7bn**

Public funding

2022 **$296m**
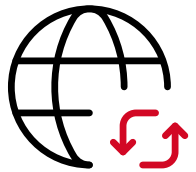
Mobile ecosystem contribution to public funding (before regulatory and spectrum fees)

Employment

23,000 jobs

Supported by the mobile ecosystem in 2022

01

The mobile industry in numbers

Unique mobile subscribers in the Pacific Islands will reach 7.3 million by 2030

The Pacific Islands region is seeing steady mobile subscriber growth, with almost 1 million additional subscribers forecast over the next seven years. Although this will take subscriber penetration to 50% by 2030, it will be considerably less than the global average of 73%.

Mobile subscriber penetration rates vary considerably across the Pacific Islands. While American Samoa, Fiji, Guam, Niue and Palau already have penetration rates of more than 70%, rates in the Cocos Islands, Micronesia and Tuvalu are still below 30%, highlighting the challenge of extending coverage over multiple dispersed islands.

Figure 1

Pacific Islands: mobile subscribers and penetration

Million, percentage of population
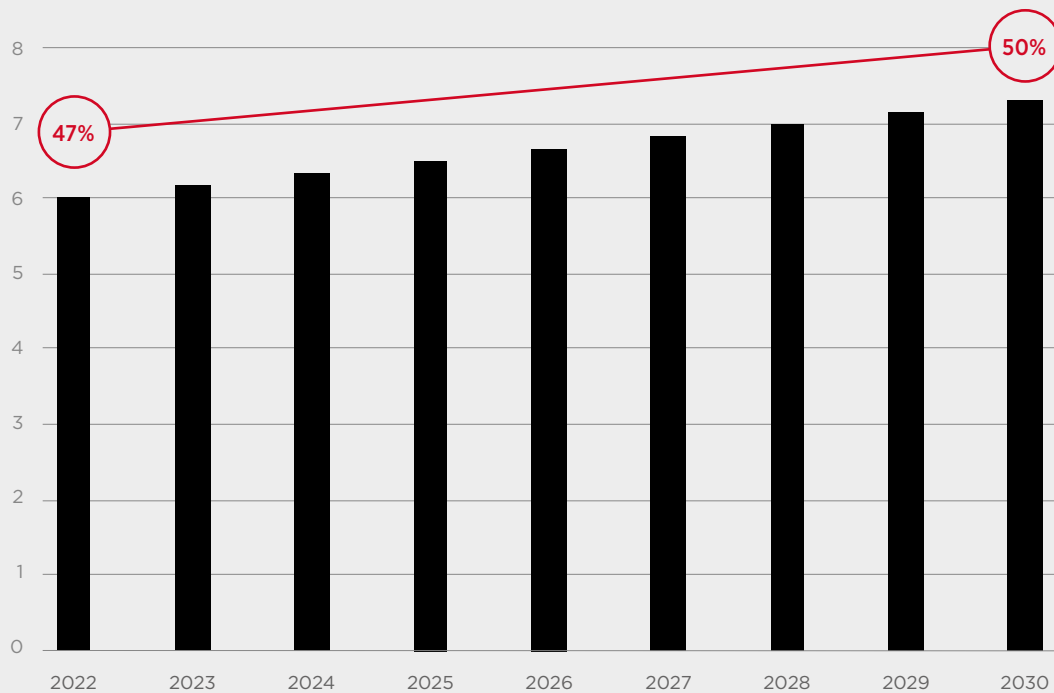
Source: GSMA Intelligence

More than a quarter of the population across the Pacific Islands now use the mobile internet

Operators' continued investment in mobile broadband networks, despite challenging conditions in the region, has seen the mobile internet connectivity coverage gap[1] shrink to 14% in 2022, compared to 33% in 2018. However, the usage gap[2] has widened over the same period, as internet adoption has not kept pace with network rollout. By the end of 2022, the usage gap stood at 59%, compared to 44% in 2018.

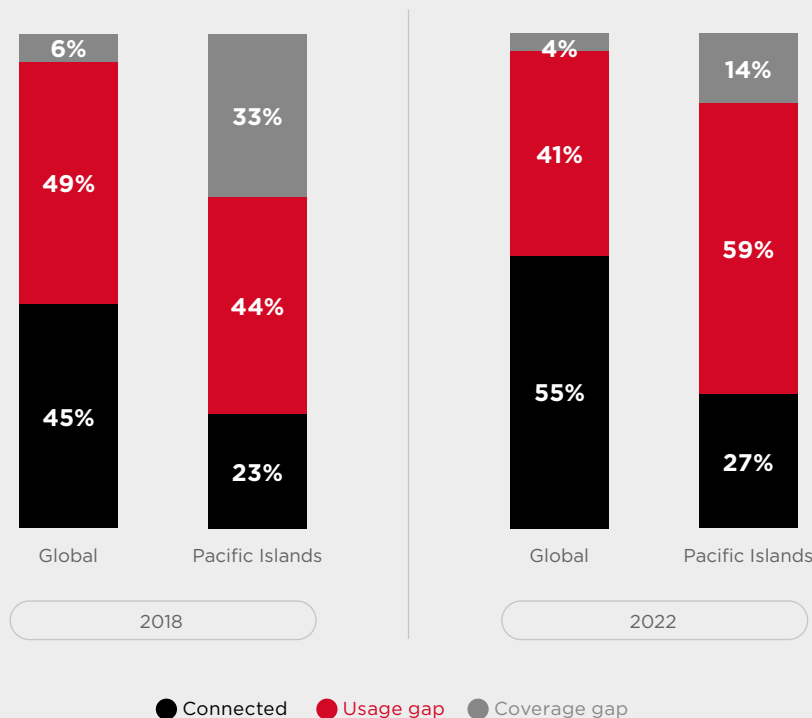Reasons for the usage gap include the affordability of mobile service and devices compared to income, a lack of digital skills, and online safety and security concerns. Mobile internet adoption is forecast to reach 30% by 2030. This will leave a usage gap of 69%, as all but the most remote populations will live within range of a 3G or 4G network.

Closing the usage gap to bring the benefits of the internet to more citizens and businesses is a priority for governments and other stakeholders in the region. This means tackling the main non-infrastructure barriers to mobile internet adoption, especially for vulnerable groups.

Figure 2
Mobile internet connectivity, 2022

Percentage of population

	2018		2022

2018
- Global: 6% Coverage gap, 49% Usage gap, 45% Connected
- Pacific Islands: 33% Coverage gap, 44% Usage gap, 23% Connected

2022
- Global: 4% Coverage gap, 41% Usage gap, 55% Connected
- Pacific Islands: 14% Coverage gap, 59% Usage gap, 27% Connected

● Connected ● Usage gap ● Coverage gap

Source: GSMA Intelligence

1. Those not covered by a mobile broadband (3G and above) signal
2. Those not using the mobile internet, despite living within coverage

5G arrives but 4G continues to grow

4G coverage and adoption are still growing and will continue to play an important role in the region's connectivity landscape for the rest of this decade. 4G adoption is expected to continue rising until 2027. Meanwhile, 3G adoption peaked in 2021 and is forecast to steadily decline over the rest of this decade.

While the focus of operators in the Pacific Islands in the near term is on increasing 4G uptake, the 5G era has already begun in Guam and the Northern Mariana Islands. 5G adoption for the region will reach 17% by 2030.

Figure 3
Pacific Islands: mobile adoption by technology

Percentage of total connections
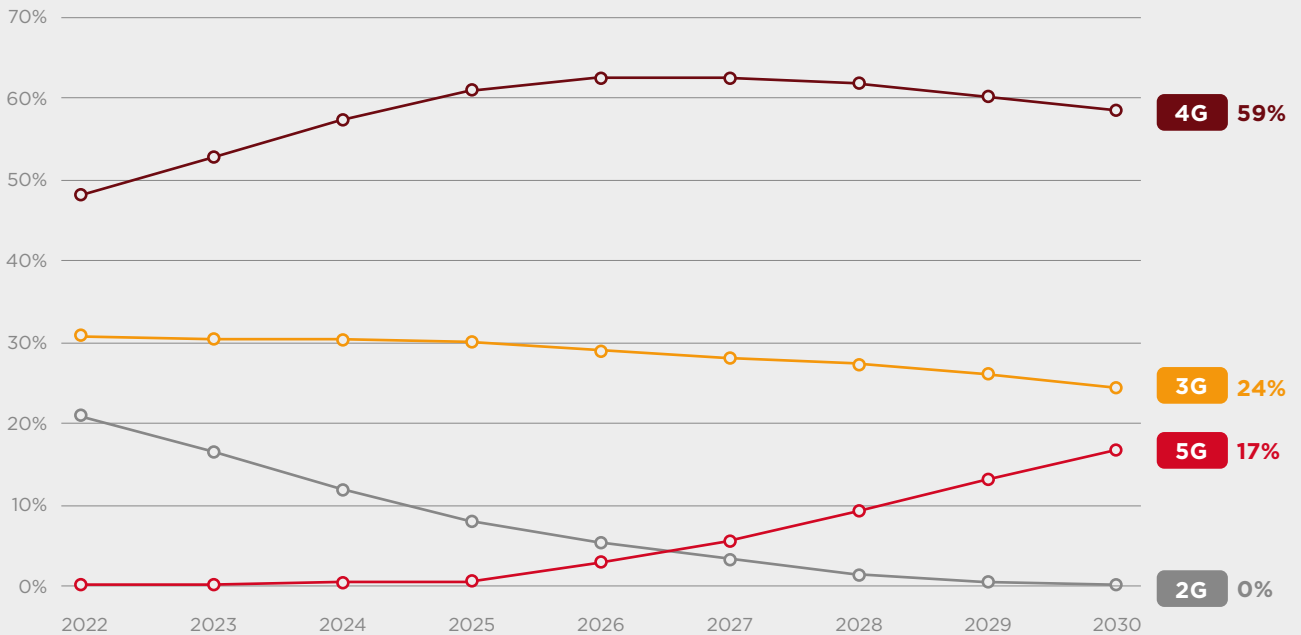
Source: GSMA Intelligence

5G connections in the Pacific Islands will total 1.5 million by 2030

Some countries in the Pacific Islands are preparing for 5G rollout, but legacy networks (2G and 3G) will remain dominant in several other countries for the foreseeable future. By 2030, 5G will account for 17% of total connections in the Pacific Islands, compared to the global average of 54%.

5G will help deliver enhanced connectivity and digital transformation in the Pacific Islands, supporting efforts to improve livelihoods. It will also facilitate access to new digital services, such as the metaverse. Some countries in the region have already announced plans to take advantage of the opportunities the metaverse offers.

Figure 4
5G adoption in 2030

Percentage of total connections

	Global average 54%	5G connections (2030)
Advanced 5G markets		
GCC Arab states	95%	89m
Developed Asia Pacific*	93%	280m
North America	91%	438m
Greater China	88%	1,647m
Europe	87%	637m
Emerging 5G markets		
Latin America	57%	463m
CIS	41%	167m
Rest of MENA	40%	273m
Rest of Asia Pacific	32%	1,074m
Pacific Islands	17%	1.5m
Sub-Saharan Africa	16%	213m
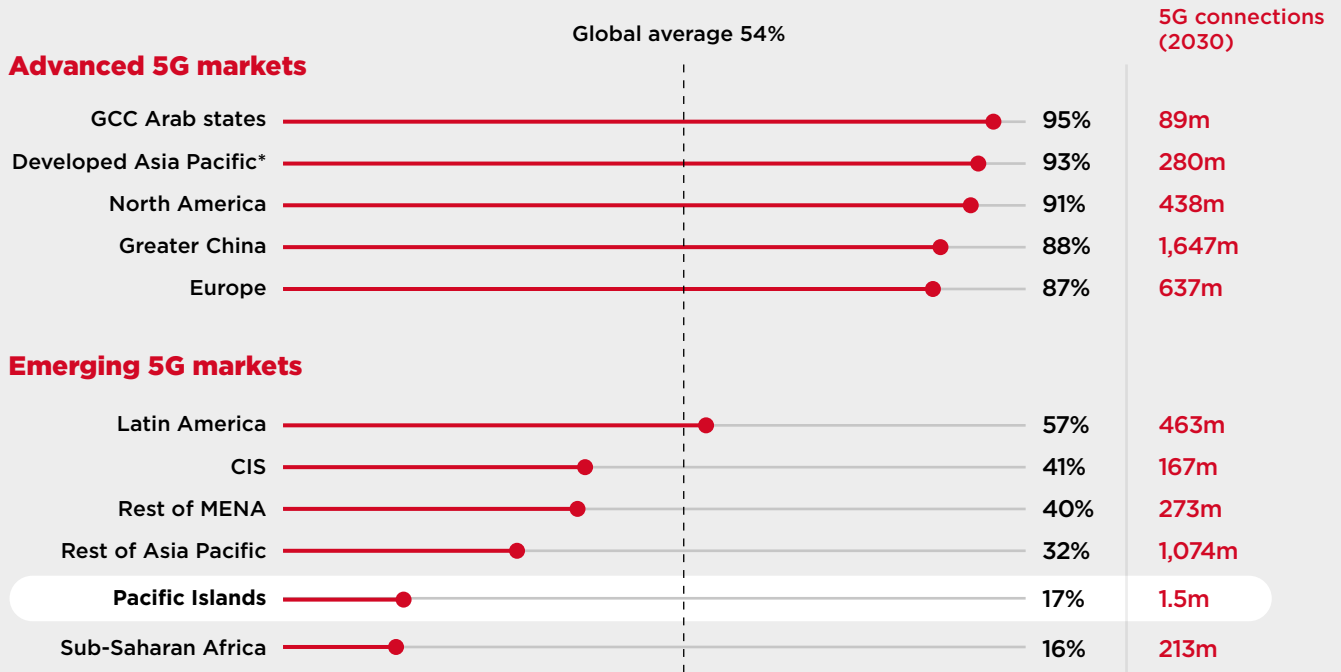
*Australia, Japan, New Zealand, Singapore and South Korea
Source: GSMA Intelligence

Smartphone connections will total 8 million in the Pacific Islands by 2030

Smartphone adoption will grow by 10 percentage points, on average, over the period to 2030 in the Pacific Islands. The increase in smartphone connections is consistent across the region, with smartphones accounting for 90% or more of mobile connections in most markets by 2030.

The promising uptake of smartphones reflects the increasing affordability of devices and growing demand for connectivity.

Figure 5
Smartphone adoption

Percentage of connections (excluding licensed cellular IoT)

	Global	Fiji	French Polynesia	Guam	New Caledonia	Papua New Guinea	Samoa	Solomon Islands	Vanuatu
2030	92%	94%	92%	93%	92%	90%	92%	90%	90%
2022	76%	84%	83%	84%	82%	80%	82%	79%	80%

● 2022   ● 2030
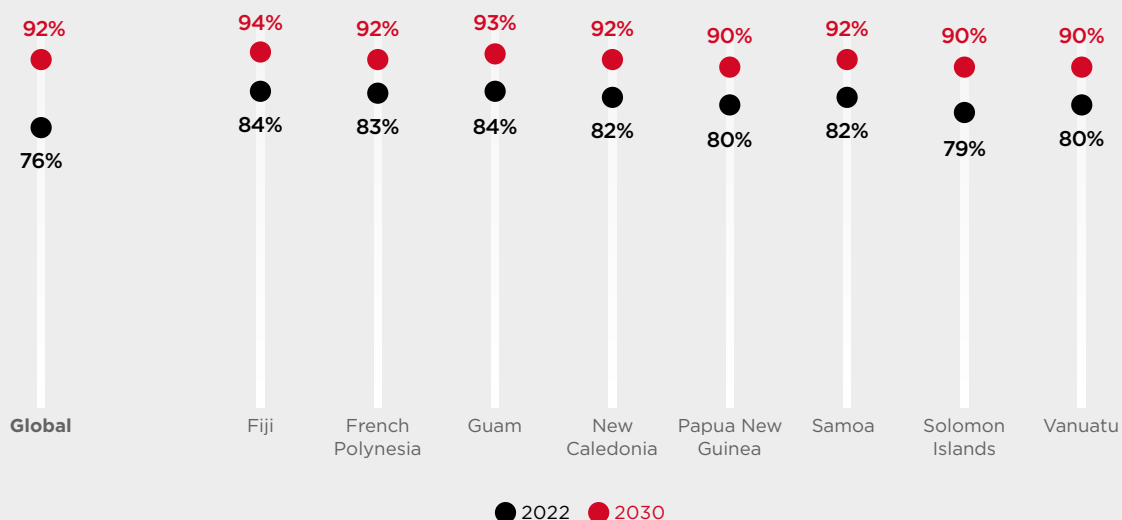
Source: GSMA Intelligence

Fiji leads the region in licensed cellular IoT connections

Fiji leads in terms of cellular IoT connections in the Pacific Islands, reflecting its digital innovation and transformation initiatives. The cellular IoT market is still only beginning in other markets, including Papua New Guinea, which is the second largest cellular IoT market in the region.

Countries such as the Cook Islands have implemented cellular IoT solutions in the utility sector for smart metering and energy management. Cellular IoT solutions are also being used in sectors such as agritech and climate tech.

Figure 6

Pacific Islands: licensed cellular IoT connections

● Fiji   ● Papua New Guinea
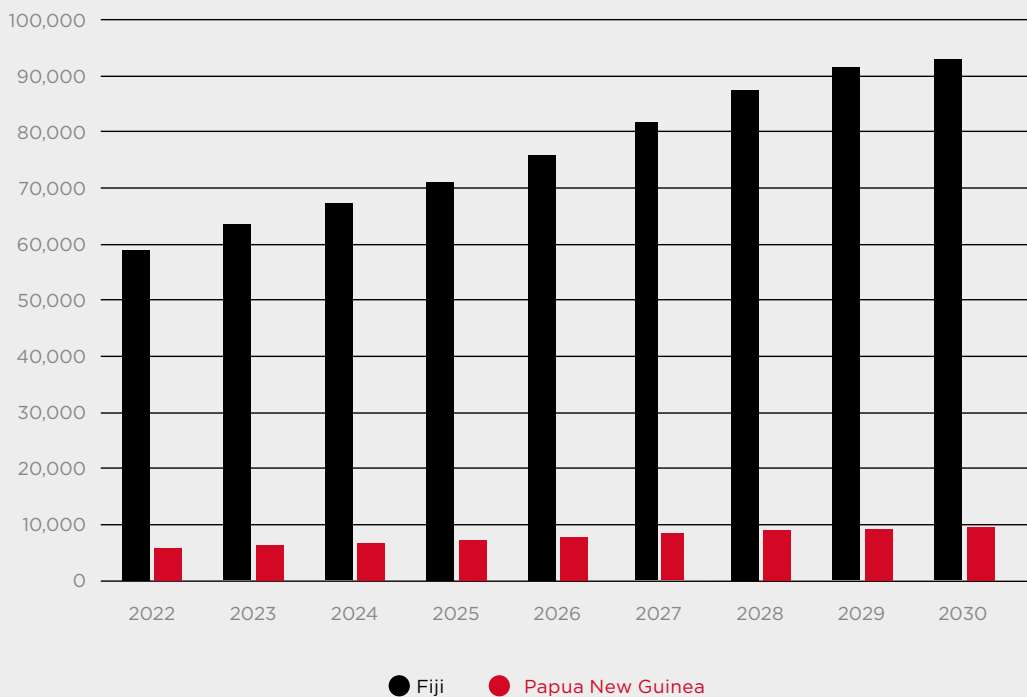
Source: GSMA Intelligence

Revenue growth to remain positive to 2030

Operator revenue growth took a hit during the pandemic but rebounded following the easing of restrictions. The revenue growth rate is expected to moderate over the coming years (reflecting competitive pressures) but will remain in positive territory, helped by increasing use of data services.

As mobile markets in the region mature and revenue growth from core telecoms services begins to plateau, operators will need to diversify their service offerings to create new revenue streams.

Figure 7

Pacific Islands: mobile operator revenue and year-on-year growth

Billion
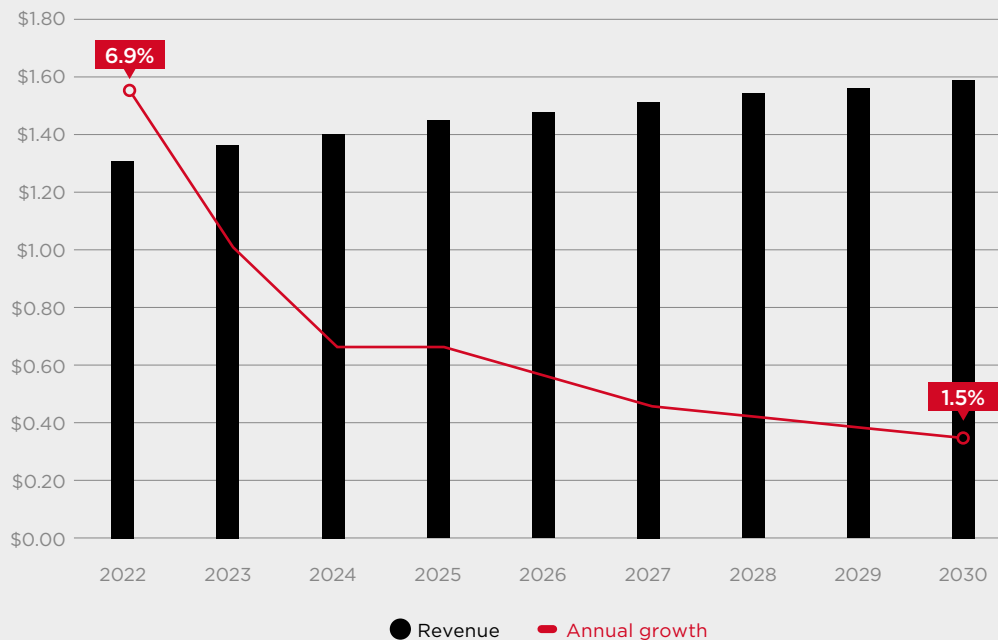
Source: GSMA Intelligence

Operators in the Pacific Islands will spend $1.9 billion on networks during 2023–2030

With ongoing 4G expansion and emerging 5G network buildout, operators will ramp up their investments in network infrastructure over the coming years. As a result, capex will peak in the medium term and gradually trend downwards towards the end of this decade as operators shift their focus to scaling new services.

Figure 8
Pacific Islands: mobile operator capex

Billion

● Capex   ▬ Capex as % of revenue
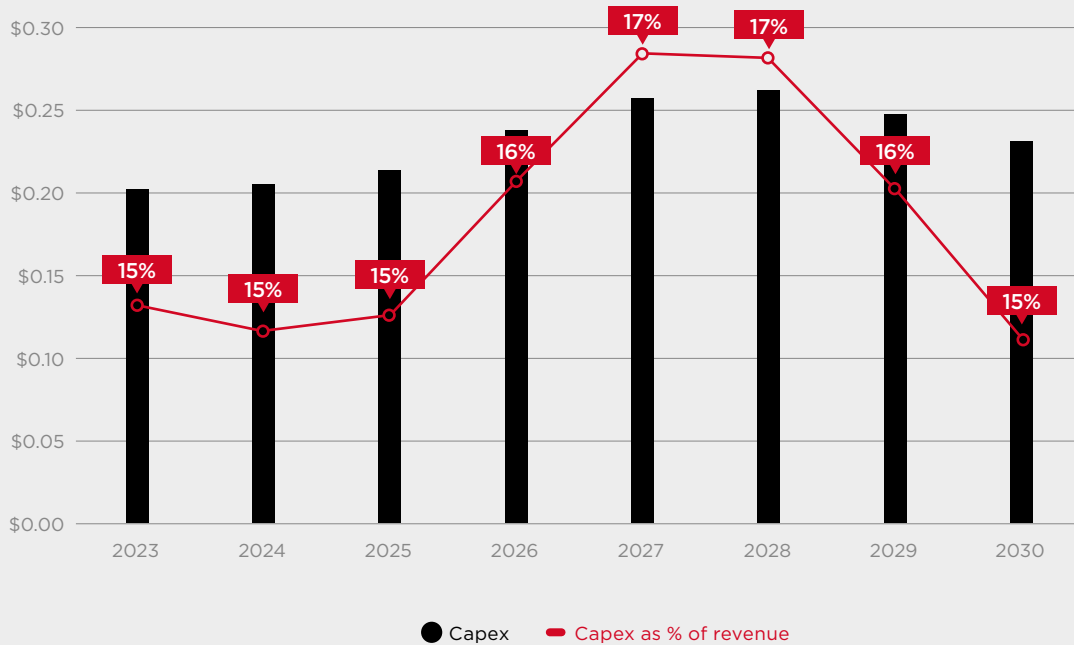
Source: GSMA Intelligence

The mobile sector added $2.1 billion of economic value to the Pacific Islands economy in 2022

In 2022, mobile technologies and services generated 3.7% of GDP in the Pacific Islands – a contribution that amounted to $2.1 billion of economic value added. The greatest contribution came from mobile operators and the rest of the mobile ecosystem ($1 billion), followed by productivity effects ($900 million).

Mobile operators and the wider mobile ecosystem also supported more than 23,000 jobs directly or indirectly in the Pacific Islands.

Figure 9

Total economic contribution of the mobile industry in the Pacific Islands, 2022

Billion, percentage of GDP

Source: GSMA Intelligence

By the end of the decade, mobile's economic contribution will reach $2.7 billion

By 2030, mobile's contribution will reach almost $3 billion in the Pacific Islands, driven mostly by the productivity and efficiency gains brought about by the increased take-up of mobile services and continued expansion of the mobile ecosystem.

Figure 10

Economic impact of mobile in the Pacific Islands
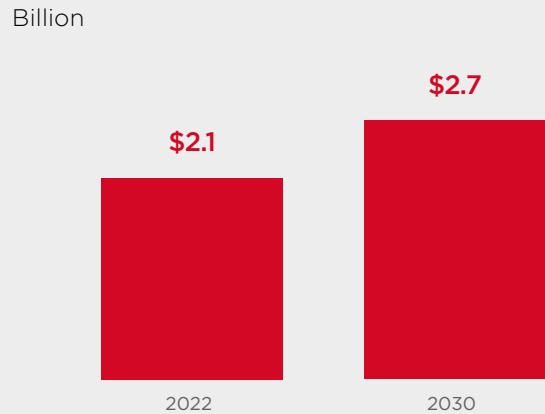
Billion

Source: GSMA Intelligence

The fiscal contribution of the mobile ecosystem reached almost $300 million in 2022

In 2022, the mobile sector in the Pacific Islands made a substantial contribution to the funding of the public sector, with almost $300 million raised through taxes on the sector. A large contribution was driven by corporate tax and employment taxes, generating $151 million, followed by services and handset VAT at $145 million.

Figure 11

Fiscal contribution of the mobile industry in the Pacific Islands, 2022

Million
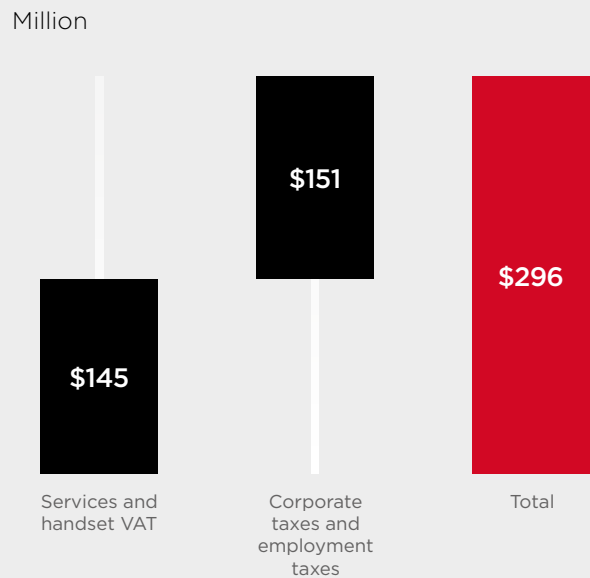
Source: GSMA Intelligence

5G will drive increasing economic impact by 2030

5G has not yet been launched in most of the Pacific Islands. However, as it is deployed and used going forward, it will bring productivity and efficiency gains, driving significant economic impact. This will reach $120 million in 2030.

The benefits of 5G will spread across economic sectors depending on their ability to incorporate 5G use cases in their business. Around 45% of the benefits are expected to originate from the manufacturing sector, and 37% from the services sector, driven by applications including smart factories, smart cities and smart grids.

Figure 12
5G contribution by industry in the Pacific Islands, 2030

Percentage of total benefit

Utilities management, construction, oil and gas, agriculture **14%**

ICT **4%**

Services (public administration, finance, healthcare, education) **37%**

Manufacturing **45%**
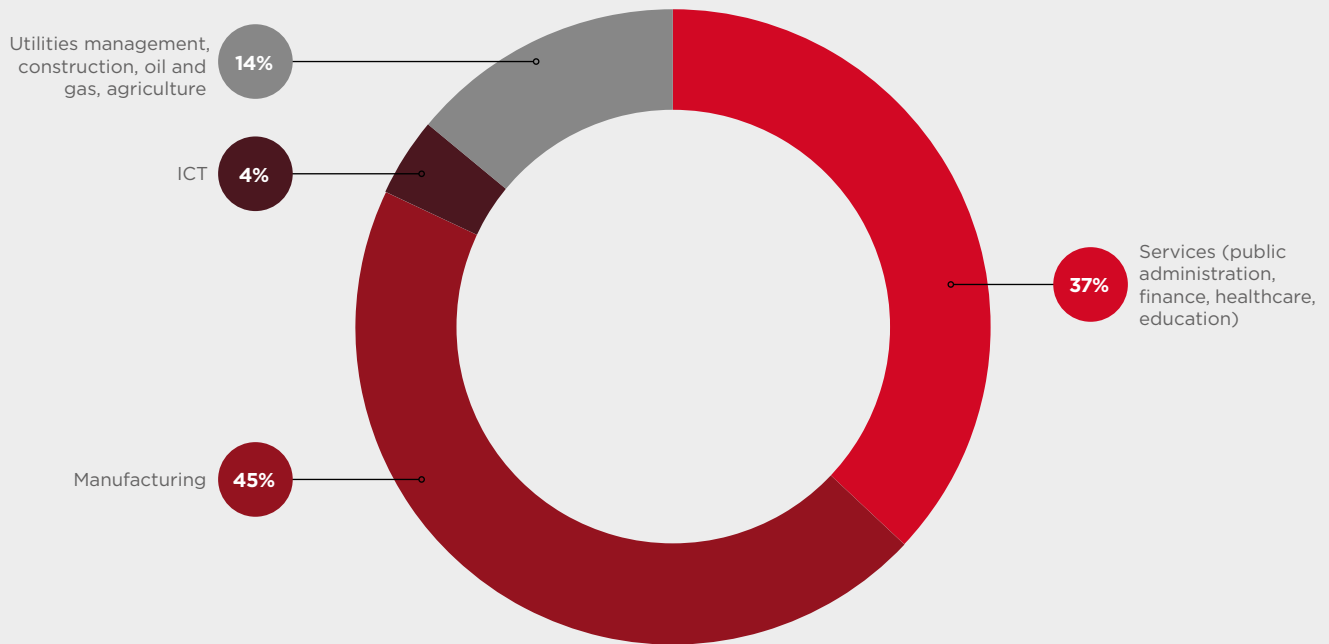
Source: GSMA Intelligence

02

Mobile industry trends

2.1
The journey to 5G begins

4G coverage and adoption continue to grow and will have an important role over the rest of this decade and beyond. While the focus of operators in the Pacific Islands will be on increasing 4G adoption in the near term, it is important to recognise that each successive technology generation advances the capabilities and efficiency of mobile networks. As a result, the onus is on all stakeholders in the mobile ecosystem to ease the transition to 5G and usher in the benefits it offers. Digital connectivity, with 5G at the core, will shape the way people live and businesses operate, including the potential for the following:

- **Improving connectivity for homes and enterprises.** Fixed broadband penetration is in the low, single digits across most of the Pacific Islands. Where fixed connections do exist, they are often prohibitively expensive. 5G fixed wireless access (FWA) offers a significant upgrade on previous 4G variants, bringing increased capacity and speeds. Around 40% of commercial 5G launches worldwide include a 5G FWA offering – a relatively high proportion at this early stage of the generational cycle.

- **Enabling the digital transformation of enterprises.** Mobile operators already play an active role in supporting enterprise digitisation in the Pacific Islands. For example, Telstra's mining services arm installed a private LTE network for Newcrest Mining at the Lihir Gold Mine in Papua New Guinea. 5G's enhanced capabilities can help accelerate digital transformation in the region, bringing significant improvements to existing use cases and enabling new opportunities.

- **Meeting the growing connectivity needs of consumers.** Demand for connectivity is growing rapidly in the Pacific Islands, with some mobile operators reporting a 50% annual increase in mobile data traffic.[3] The need for high-performance networks will only rise as people increasingly use their mobile devices to access a growing portfolio of locally relevant content and services.[4]

Preparing for 5G

Although only Docomo Pacific (Guam and Northern Mariana Islands) and GTA (Guam) have launched commercial 5G services in the Pacific Islands, operators in several other countries have begun their 5G preparations. The network transformation required to reap the full benefits of 5G is a multi-year journey for operators, so they need to begin laying the groundwork. For example, American Samoa-based BlueSky Communications enlisted Ericsson in late 2022 to upgrade its radio and core networks to support 3G, 4G and 5G non-standalone connectivity. Mobile operators are also looking to their peers in more advanced countries to share their experience and expertise to support the transition to 5G, demonstrated by discussions between SK Telecom and PalauCel.[5]

One of the major challenges in proceeding with 5G rollouts in the Pacific Islands is that the 5G era has come at a time when legacy networks (2G and 3G) still account for a significant share of mobile connections. These networks use valuable low and mid-bands which can be put to better use in more efficient 5G networks. To drive the migration to newer networks, operators and their partners need to accelerate VoLTE deployments and improve the affordability of 4G and 5G devices. This should put them in a stronger position when they formulate plans to retire legacy networks. While this is some way off in most countries in the Pacific Islands, New Caledonia's OPT ceased deploying 2G sites in 2019 and began retiring 2G equipment in 2022, with a view to shutting down its 2G network completely in 2025. The operator is in a position to do so as more than 90% of the mobiles on its network are 4G compatible.

3.   "Vodafone Fiji receives $55m cash injection", Developing Telecoms, August 2022
4.   See for example: "Solomon Telekom to launch OTT service using Switch Media platform", CommsUpdate, May 2021
5.   "SK Telecom to Help Upgrade Palau's Communication Infrastructure", TelecomReviewAsia, August 2022

The introduction of 5G will also have significant implications for backhaul networks, which must evolve to support significantly higher data speeds, improved resiliency and a greater variety of network deployments. While fibre might be the optimum technology, wireless backhaul solutions have a key role to play in meeting 4G and future 5G traffic demand, especially in places where fibre is not economically viable. The deployment of additional terrestrial backhaul links using existing and new spectrum bands with wider channel sizes will be an important part of the evolution of wireless backhaul networks. This can be supported by alternative technology solutions, such as optical links to help expand capacity and extend coverage.

Digicel uses Alphabet's Project Taara to improve mobile backhaul

Digicel is using Taara's optical wireless communication links to provide high-speed mobile broadband connectivity to its subscribers in Fiji and Tonga. The links use narrow beams of light to create a high-bandwidth connection of up to 20 Gbps over distances of up to 20 kilometres. In June 2022, Digicel deployed Taara links in areas where fibre was unavailable, providing faster speeds to customers who were experiencing congestion on multiple microwave links at a single site due to growth in data demand. Taara's optical wireless links enabled a resilient network connection, with a hybrid network architecture that reliably routes traffic to existing radio infrastructure during adverse weather conditions.

Figure 13

By 2030, 5G will account for more than 20% of total connections in 11 countries in the Pacific Islands

5G as a percentage of total connections, 2030

New Caledonia	59%
Northern Mariana Islands	51%
Guam	47%
Kiribati	41%
Nauru	35%
Palau	33%
Samoa	30%
French Polynesia	28%
American Samoa	28%
Cook Islands	27%
Fiji	23%
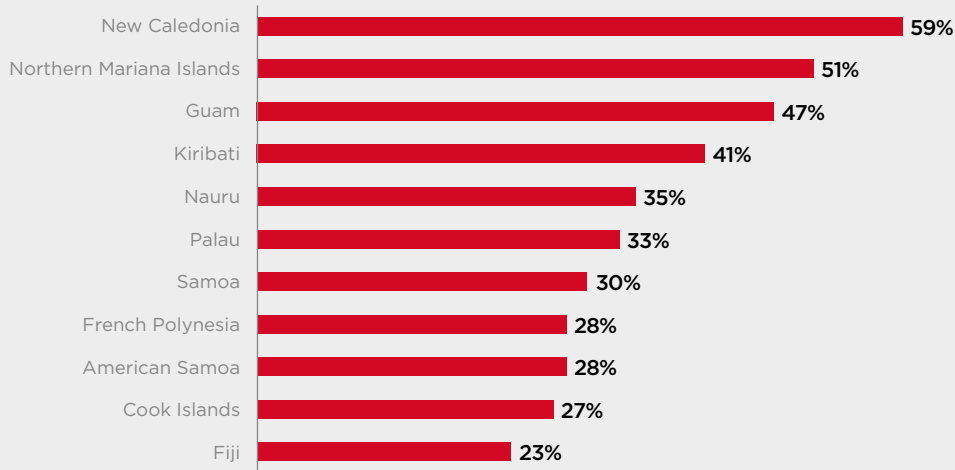
Source: GSMA Intelligence

2.2
Open RAN momentum builds, but challenges remain

The rise of open architecture networks, including open RAN, has garnered much attention in recent years. Besides increasing supplier diversity, cost savings are frequently touted as the main value proposition for open RAN. Open RAN vendors have an interest in promoting this message considering the 5G capex burden that operators face. Opex savings are also in play if open RAN can support operators in adding a layer of network automation on top of their existing network management systems.

With these benefits in mind, at least 91 operators from 47 countries had (as of August 2022) active open RAN trials, deployments or commitments. The expansion of open RAN should not be seen as just a European or US project. Several operators in less mature markets in Asia and Africa are also experimenting with RAN architectures that use open interfaces – a sign of a potential paradigm shift.

Figure 14

Open RAN is not just for high-income markets

Commitments and deployments as of August 2022

Region	Number of operators with commitments	Number of operators with commercial deployments
Asia Pacific	24	5
Europe	14	3
MENA	11	1
North America	8	4
Sub-Saharan Africa	4	8
Latin America	7	
CIS	2	

● Number of operators with commitments ● Number of operators with commercial deployments
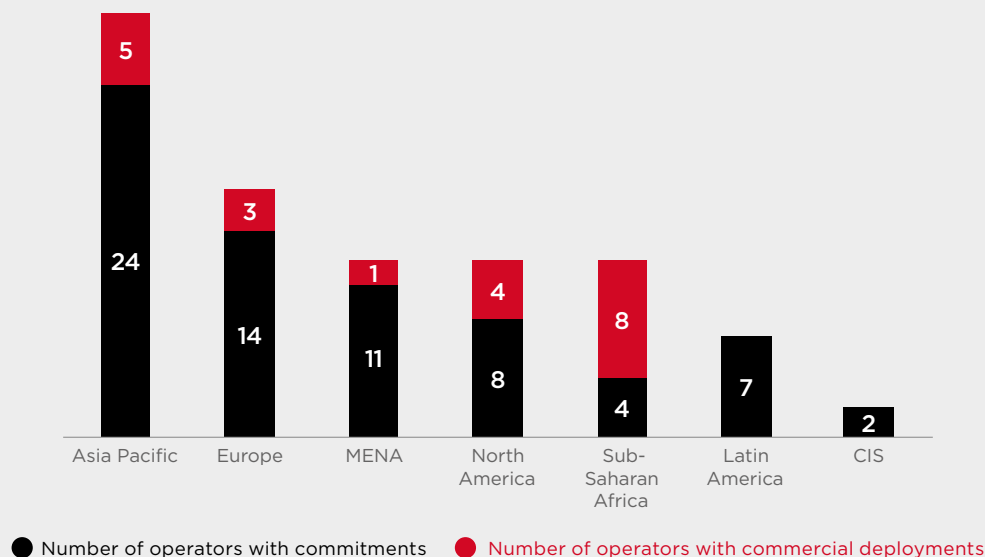
Source: GSMA Intelligence

Evidence of open RAN deployments in the Pacific Islands remains limited, but operator intent is likely to grow over the next few years as the open RAN ecosystem develops. At MWC23, Japanese operator NTT Docomo unveiled its new OREX (Open RAN Ecosystem Experience) brand as part of its strategy to strengthen support for other mobile operators looking to deploy open RAN. This includes providing peers with open RAN lab access and common test scripts. The Pacific Islands could benefit from OREX, given the presence of Docomo Pacific, a wholly owned subsidiary of NTT Docomo.

There is also interest from the US and Australia in supporting open RAN deployments in the Pacific Islands.[6] This builds on Telstra's acquisition of Digicel Pacific, which was finalised in mid-2022. Collaboration between smaller local network operators, partnerships, jointly operated centres of excellence, open RAN test labs, and knowledge sharing can all help efficiently spread open RAN deployments in the region.

Telstra partners with Australian government on Digicel Pacific acquisition

In October 2021, Telstra teamed up with the Australian government to acquire Digicel Pacific for $1.6 billion. The acquisition was mainly funded by the Australian government through Export Finance Australia, which injected $1.3 billion. Telstra contributed $270 million, owns 100% of the ordinary equity and operates the businesses.[7] Digicel Pacific has operations in Papua New Guinea, Fiji, Nauru, Samoa, Tonga and Vanuatu.

While open RAN interest is high, deployments have been slow to materialise. This reflects the lifespan of installed RAN equipment (typically 7–10 years) and the level of trust operators have in these systems. There also remains a performance gap between traditional RAN systems and open RAN, as well as additional obstacles to open RAN deployments such as systems integration costs. The open RAN ecosystem has so far concentrated on developing 4G and 5G equipment, with limited support for legacy generations. This presents a particular challenge for regions such as the Pacific Islands, where 2G and 3G networks account for more than 50% of total mobile connections.

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6.   "Japan, U.S., Australia to build 5G networks in South Pacific", Kyodo News, December 2021
7.   "Telstra partners with government on Digicel Pacific buy", MobileWorldLive, October 2021

2.3
Sustainability is front of mind for operators

Countries in the Pacific Islands are particularly exposed to the impacts of climate change and rising sea levels. In the western Pacific Ocean, sea levels have been increasing by 2–3× the global average, resulting in a rise of almost 30 centimetres since 1990.[8] If this continues, several islands are believed to be at risk of being submerged by the sea or heavily impacted by coastal erosion.

Initiatives such as the Task Force on Climate-related Financial Disclosures (TCFD) came into existence to better understand climate risks and facilitate financing. TCFD develops consistent, climate-related financial risk disclosures for use by companies, banks and investors providing information to stakeholders. Mobile operators in the Pacific Islands are exposed to climate-related financial risks, given that valuable network assets are scattered across the region, including areas at greater risk of rising sea levels or typhoons. Networks that are damaged as a result of these risks cause disruption for customers and place an additional financial burden on operators.

The unique landscape poses an additional challenge from an energy-supply perspective. With network assets geographically scattered (especially base stations), well separated from each other and powered by different electricity grids in each island, there are increased maintenance and backhaul costs, and challenges in terms of energy management. This is in addition to the vulnerability of network infrastructure to cyclones and typhoons, which occur frequently in the region.

Historically, diesel generators have been the most economical way to generate electricity in similar off-grid or bad-grid scenarios. This is unsustainable in the long term, given the industry's commitment to reducing its carbon footprint and rising fossil-fuel energy prices. In 2019, the GSMA Board, comprising members from the largest mobile network operators in the world, set an ambition for the mobile industry to reach net-zero carbon emissions by 2050, at the latest. The mobile industry was the first sector to commit to the UN's 17 Sustainable Development Goals (SDGs), including climate action, in 2016.

Against this backdrop, operators are increasingly turning to renewable energy sources for their operations. In many cases, solar energy is particularly promising, given the decreasing cost of photovoltaic panels and improvements in battery solutions (use of more cost-effective lithium batteries rather than traditional acid battery options). In addition, the prevalence of high altitude areas in some Pacific Islands provides optimal conditions for installing solar panels. For example, Telikom Papua New Guinea utilises solar panels to make sites in mountainous areas self-sufficient in terms of energy.[9] Floating solar panels and tidal electricity generation could also provide solutions in the future, leveraging the vast bodies of water in the region.

Mobile operators lead the way in the race to net zero

Mobile operators have an important role to play in the journey to net zero by developing and implementing corporate sustainability plans that focus on energy efficiency, waste reduction, and other initiatives that reduce their carbon footprint. For example, Digicel Pacific is developing a mechanism to measure CO2 emissions as well as an ESG framework that is relevant to the Pacific region. The operator is also investing in solar panels to power some of its cell towers to help reduce reliance on fossil fuels and, by extension, reduce carbon emissions. These efforts notwithstanding, collaboration on ESG initiatives with governments and other organisations and stakeholders is crucial for success.

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8. The Impact of Sea-Level Rise and Climate Change on Pacific Ocean Atolls, USGS, 2022
9. "Telikom Papua New Guinea Grows Revenue by Improving Network Monitoring with DPS Telecom Equipment", DPS Telecom

2.4
Building a thriving ecosystem for tech start-ups

The Pacific Islands region is home to a vibrant tech start-up ecosystem, albeit one that is nascent in its development. The size of the opportunity for tech start-ups in the region will depend on several enabling factors that significantly impact the sustainability and scalability of new services.

These include economic conditions, regulation, digital infrastructure and digital talent. Providing tech start-ups with adequate investment and support is another critical enabler – an area that has seen a number of notable recent developments.

Providing investment and support to tech start-ups

Access to financial capital enables tech start-ups to explore growth opportunities, such as diversifying into new product areas and expanding into new markets. It is particularly important for them to connect with individuals who understand how early-stage tech start-ups differ from normal companies in terms of return profile and other financial metrics. This means tech start-ups can access strategic advice and support – not just additional funds.

The development of the tech scene in the Pacific Islands has been characterised by philanthropic and development funding, often in the form of grants, challenges and competition prizes, and non-equity, as opposed to venture capital and private market-led resources. Private investors have typically considered the region a higher risk area for entrepreneurial activity and investment due to narrow economies, exposure to external shocks, debt vulnerability and geographical remoteness.

Supporting entrepreneurship across the Indo-Pacific during the Covid-19 pandemic

The GSMA Ecosystem Accelerator programme, in partnership with the Australian government's Department for Foreign Affairs and Trade (DFAT), provided technical assistance to 10 start-ups as part of an initiative to develop digital innovation in the Indo-Pacific region during the pandemic. This included three start-ups in Fiji, two in Papua New Guinea and one in Samoa.

Cyber Food is an example of a start-up that received support as part of the scheme. The online food delivery platform played a

critical role in keeping restaurants in Fiji open during the pandemic. The GSMA worked with UrbanEmerge and The Hungry Lab to provide bespoke technical assistance to Cyber Food. This led to the creation of financial models to help the company gain a better understanding of key business metrics, as well as improvements to its website and a digital marketing strategy to help with business expansion. As part of the programme, Cyber Food also attended a two-day workshop on working with mobile operators and received support in advancing gender inclusion in the business.[10]

A thriving tech ecosystem also needs a range of tech hubs and other supporting organisations to help start-ups gain scale. These organisations allow start-up founders to connect with fellow founders, investors and other experts, which can help to

overcome any commercial or technical barriers they may be facing. Eight hubs are currently operating in five countries across the Pacific Islands region (Fiji, Kiribati, Papua New Guinea, Samoa and Vanuatu).[11] This is up from the six hubs identified in 2018.

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10. "Impactful Innovations: Insights from evaluating Cyber Food", GSMA, November 2021
11. "The Indo-Pacific: A look at the 427 active hubs in the region", GSMA, November 2021

Scaling innovation in Vanuatu

Yumi Growem Vanuatu is the first programme in the Pacific Islands focused on the economic re-integration of returned seasonal workers through support for entrepreneurship. The programme, funded by DFAT and the New Zealand Ministry of Foreign Affairs and Trade, is conducted by tech hubs V-Lab and Yumiwork in partnership with Vanuatu's Department of Labour.

In the first few weeks of the programme, participants receive a preliminary assessment of their business. Participants also undergo

several training and coaching sessions during the 10-month programme to support them on business strategy, goal setting and planning.

Yumiwork also runs several other innovation programmes in addition to providing Vanuatu's first modern co-working space. Mobile operator Vodafone Vanuatu, local online forex broker Titan FX and BRED Bank Vanuatu are some of Yumiwork's main sponsors.

Strong synergies and opportunities for collaboration between operators and start-ups

Mobile operators have several assets that tech start-ups can leverage to scale. These include large customer bases, recognised and trusted brands, a range of physical and online distribution points, market expertise, and payment and communications channels.

Tech start-ups can help operators appeal to individuals who do not currently use mobile internet. Start-ups can also stimulate mobile data usage, helping operators boost core revenues while providing opportunities to capture adjacent sources of revenue in fast-growing sectors.

As an example, Digicel offers a range of services and solutions to support tech start-ups, including:

- **Enterprise solutions:** Digicel provides start-ups with internet connectivity, cloud services and managed IT services. These help start-ups stay connected, work efficiently and reduce costs.

- **Marketing tools:** Digicel offers marketing support (e.g. SMS marketing and mobile advertising) that can help start-ups promote products and services to their target audience.

- **Mobile payments:** Digicel's mobile payment solution, Digicel MyCash, enables small businesses to accept mobile payments from customers, reducing the need for cash transactions and providing a more convenient and secure payment option.

2.5
Expanding financial services through fintech

In the last decade, the Pacific Islands has seen a shift from no mobile money services to an array of mobile-based financial services including mobile banking, mobile money, micro finance, insurance, and remittances. Many countries, including the Solomon Islands, Vanuatu and Fiji, have developed national financial inclusion strategies and are working with central banks to create an enabling regulatory environment. Mobile money platforms are also becoming increasingly popular following the launch of Vodafone's M-Paisa and Digicel's mobile money services in several countries.

The Pacific Financial Inclusion Programme (PFIP) helped to extend financial inclusion to more than 1.78 million people[12] between 2014 and 2020 by enabling partnerships between mobile operators and banks. A number of stakeholders are also collaborating with telecoms and financial services players to increase access to mobile financial services in the Pacific Islands. Examples include the following:

- Vodafone Fiji and Post Fiji partnered to offer mobile money services through postal outlets. Fijians can now use their M-Paisa accounts to pay for local bus services.

- Digicel Pacific offers a low-cost, phone-based mobile wallet in Tonga, Fiji, Samoa and Vanuatu. Digicel Pacific has also partnered with Klickex, a mobile

transfer operator, to offer low-cost international remittances directly to mobile wallets in Fiji, Tonga and Samoa. Digicel's digital wallet, MyCash, enables people to send and receive money, pay bills online and send top-up or mobile phone credit. Customers in Fiji and Samoa can also buy shares or receive dividends from Fijian Holdings Limited or the Samoa National Provident Fund using MyCash. In Papua New Guinea, Digicel's CellMoni has offered mobile money services since 2019. It is available to all prepaid Digicel customers but is particularly suited to average/low-income groups in rural and remote areas, and for agricultural and livestock industries.

- In September 2021, agritech company Field Buzz, procurement company Kamapim, and microfinance institution MiBank joined forces to pilot a loan product for smallholder farmers in Papua New Guinea. The project collected agritech data via mobile phones and enabled loans for farmers. The field agents collected the farmer data and registration over the mobile-enabled Buzz app. Once registered, field agents could offer farmers extended support, and digital/financial literacy training. It also helped with generating a government-approved identification card, opening a bank account and accessing loans.[13]

Despite these initiatives, financial inclusion remains

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12. Source: UNDP Pacific Financial Inclusion Programme
13. How economic identities facilitate lending to smallholder farmers: the case of Rural Loan in Papua New Guinea, GSMA, 2022

a significant challenge in the region.[14] For service providers, operating and growing mobile financial services for a relatively small and dispersed population that mostly lives in rural areas is a daunting task. As a result, some providers have downsized or discontinued their operations. For instance, ANZ developed its goMoney service and deployed in Papua New Guinea, Samoa, Solomon Islands and Vanuatu, gaining 150,000 customers between 2013 and 2015, but shut down the service in November 2020.[15]

Nevertheless, demand for fintech services remains significant, given the low penetration of formal financial services. For instance, in the Solomon Islands, only 25% of the population has a bank account,[16] while the remaining two thirds of the population either rely on informal financial services or remain excluded. Some central banks have taken steps to support the development of appropriate and scalable fintech services to meet this demand. Examples include the following:

• The Pacific Regional Regulatory Sandbox, a collaborative platform across eight countries, enables solution providers to test their products, services and business models.

• The central banks of Fiji, Samoa, Solomon Islands, Tonga and Vanuatu are developing new payment systems, with support from the World Bank. These new payment systems aim to make mobile money services available for wider use.

• The Pacific Islands Fintech Innovation Challenge 2022 sought solutions that can increase the use of fintech products, digitise customer services, and enable e-commerce and merchant payments.

Operators need to focus on building compelling products and complementary partnerships for long-term sustainability. Given the small populations of countries in the Pacific Islands, increasing the transaction volume per customer is a key success factor. As such, mobile money services need to evolve from basic, person-to-person (P2P) transactions to supporting different daily use cases, such as utility, public-sector, welfare, tax and transport payments. For example, Digicel supports the Beehive app which enables the buying and selling of various products online in Tonga.

14. Central Bank Digital Currencies: A Potential Response to the Financial Inclusion Challenges of the Pacific. UNSW Law Research Paper No. 21-63, Asian Development Bank Economics Working Paper Series, 2021

15. The Viability of Mass Market Digital Finance in the Pacific, UNCDF, 2021

16. "How mobile money could drive financial inclusion for Pasifika women", GSMA, March 2023

03

Mobile industry impact

Mobile technology continues to play a pivotal role in the socioeconomic development of countries in the Pacific Islands. Uptake of smartphones and improving mobile internet penetration have changed the way those in Pacific Island countries engage with health services, basic education, and humanitarian services during crises. The impact of the mobile industry accelerated further during the Covid-19 pandemic, with mobile technology serving as a platform for people to access life-saving services during lockdowns.

3.1
Mobile's impact on healthcare

Mobile technologies play an important role in strengthening healthcare services in the Pacific Islands by making them more efficient and equitable, given the dispersed and remote nature of much of the region's population. For example, in Kiribati, Vodafone partnered with the Ministry of Health to spread Covid-19 awareness and vaccination programme information among citizens. Connectivity has also improved access to emergency services, diagnosis via online consultation, and communication among health workers. For example, in Fiji, Digicel's teleconference system at the main hospital in Suva helps doctors to diagnose and make crucial health decisions for patients from outer areas. In Nauru, Digicel has enabled virtual consultations to help patients and medical staff leverage specialist medical services not previously available.

Vodafone's VUNIWAI app brings healthcare home in Fiji

Fiji's telemedicine app, VUNIWAI, powered by Vodafone, connects people with a healthcare professional for consultation and appointments. The app also facilitates payments via M-Paisa and access to health data. Since its launch in 2021, the app has facilitated hundreds of online consultations and been instrumental in reducing face-to-face appointments during the pandemic.
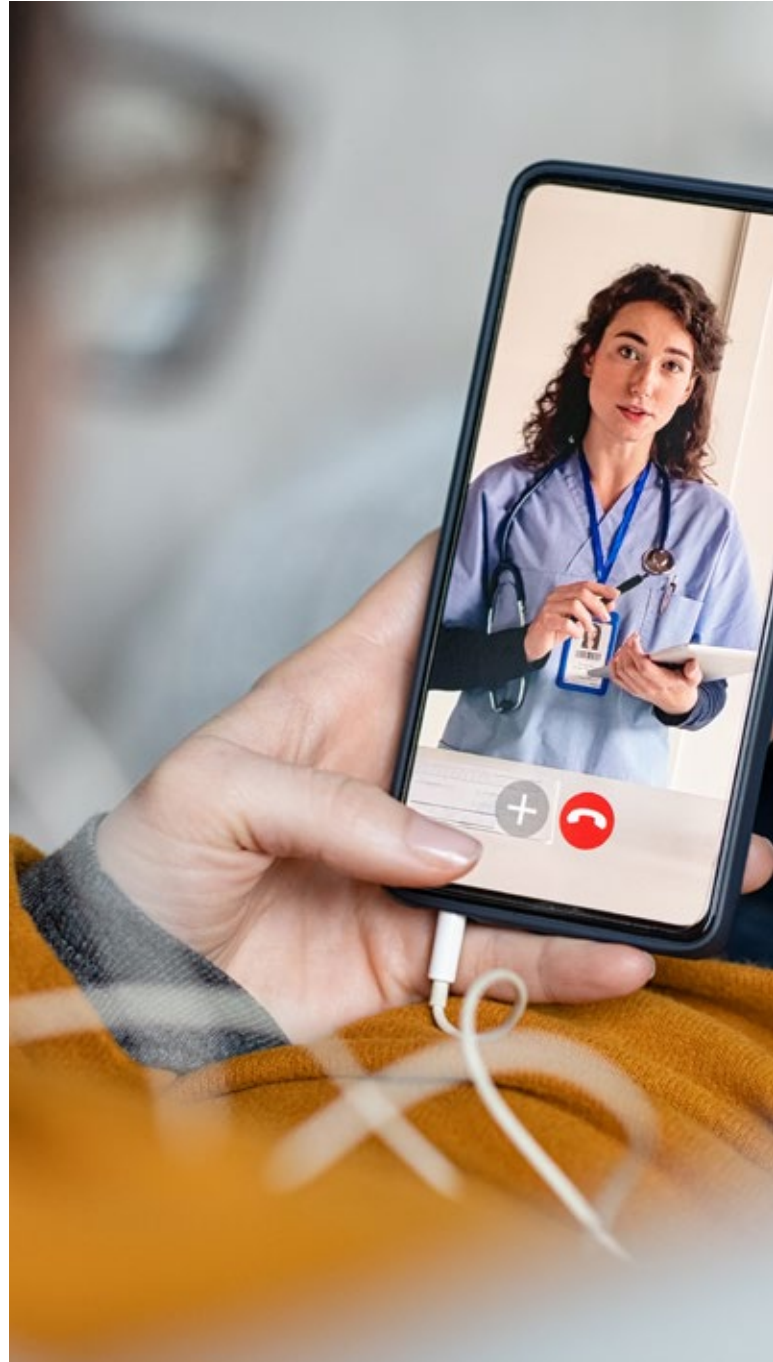
3.2
Mobile's impact on disaster management

The Pacific Islands region is prone to natural disasters such as typhoons, cyclones, earthquakes and tsunamis. The mobile industry plays a key role in providing connectivity and infrastructure in disaster response efforts and information dissemination among those affected. For instance, following Cyclone Yasa, Vodafone Fiji restored communication services in affected areas, provided satellite phones to emergency services and set up free charging stations to allow people to stay connected. With the increase in smartphone adoption, operators are developing new solutions, such as the following:

• **A mobile-based, early-warning system in Fiji**: In 2020, the Fiji National Disaster Management Office worked with telecoms companies, including Digicel and Vodafone Fiji, to develop a mobile-based, early-warning system for natural disasters. The system sends alerts to subscribers' mobile phones, providing information on impending disasters and instructions on how to stay safe.

• **Mobile for blockchain-powered humanitarian aid in Vanuatu and Papua New Guinea:** Following Tropical Cyclone Harold and Covid-19 restrictions, a blockchain-based cash transfer solution was used for money transfer on Tanna Island. The solution consists of three key elements: e-voucher tap-and-pay cards for beneficiaries; smartphones with a pre-installed app for vendors; and an online platform for fund disbursement to monitor transactions remotely and in real time.[17] The solution has been used to distribute cash and voucher assistance to more than 35,000 beneficiaries, supporting more than 15 partners across the public and private sectors, and local and international non-governmental organisations (NGOs).

Phone surveys reveal crucial insights following Tonga volcano eruption and tsnuami

Tonga's economy and population are still recovering from the eruption of the Hunga Tonga-Hunga Ha'apai submarine volcano in 2021. To capture the immediate and ongoing effects of this disaster, the World Bank carried out phone surveys in partnership with the governments of Australia and Tonga to better understand the situation faced by Tongan families. The phone surveys allowed remote assessment of development needs after the disaster.

The surveys were carried out twice in 2022 to help gain a better understanding of the socioeconomic impact of the multi-dimensional crises, including the tsunami and Covid-19.

This revealed severe conditions post volcano eruption, particularly impacting the poorest and most vulnerable.

Remotely assessing disaster damage by relying on satellite images does not provide the detailed individual and household-level information needed for a timely disaster response. Phone surveys as a disaster response and monitoring tool are thus valuable assets. In a region where disasters are frequent and becoming increasingly intense, assessment tools such as these mean communities can make better, more informed disaster response decisions, and life-saving response can be delivered more quickly and effectively.

17.   "UnBlocked Cash Project: using blockchain technology to revolutionize humanitarian aid", Oxfam

3.3
Mobile's impact on agritech and climate tech

Agriculture is central to many economies in the Pacific Islands. For example, 85% of the population of Papua New Guinea depend on agriculture for their livelihoods. Recognising the positive impact that digital technologies can have on raising production levels and reducing inefficiencies, agricultural-sector stakeholders are implementing a range of tools to ease pain points and deliver benefits to those on the demand and supply sides.

In Papua New Guinea, agricultural workers are increasingly using mobile-enabled digital services to receive agronomic advice, weather updates, market prices and certification standards. Moreover, agribusinesses in the country are using digital enterprise tools (e.g. Farmforce and OFIS) to monitor and gain better control of their operations.[18]

There is also growing momentum behind climate tech, particularly the solar energy space in Papua New Guinea, Samoa and Vanuatu. These islands are highly vulnerable to climate change and natural disasters, driving the need for entrepreneurial activity and digital solutions.

At COP27, the government of Tuvalu highlighted the need to look at alternative solutions for the country's survival, including the prospect of the island becoming the first digitised nation in the metaverse. The idea is that this would help to preserve Tuvaluan culture, knowledge and history in a digital space in the event that the country succumbs to rising sea levels.

The GSMA Innovation Fund for Climate Resilience and Adaptation 2.0[19]

At MWC23, the GSMA, UK Foreign, Commonwealth and Development Office (FCDO) and Swedish International Development Cooperation Agency (Sida) announced the GSMA Innovation Fund for Climate Resilience and Adaptation 2.0. Building on the success of previous funds, this will be open to start-ups, small and medium-sized enterprises (SMEs) and social enterprises in Africa, South and Southeast Asia, the Pacific Islands, the Caribbean and selected countries in Europe and Latin America.

Successful start-ups would have solutions that use digital technology in one or more of the following areas:

- Improving resilience and adaptation of vulnerable populations and ecosystems based in coastal areas, small islands or urban settings.

- Tackling challenges posed by increasingly frequent extreme weather events such as extreme drought, flooding, high winds, wildfire and higher risk of landslips and erosion.

- Nature-based solutions such as regenerative agriculture, or sustainable forests, coastal areas and wetlands that strengthen biodiversity.

- Sustainable consumption and production, by way of reducing food waste, increasing sustainability and biodiversity of fisheries, and managing air pollution.

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18. Landscaping New Opportunities for Digital Agriculture in Papua New Guinea, GSMA, 2019
19. See https://www.gsma.com/mobilefordevelopment/the-gsma-innovation-fund-for-climate-resilience-and-adaptation/

3.4
The mobile industry's impact on the SDGs

Improved connectivity and access to smartphones have positively contributed to progress with the Sustainable Development Goals (SDGs) in the Pacific Islands, particularly SDG 4: Quality Education, SDG 11: Smart Cities and Communities, and SDG 13: Climate Action.

Improving early learning and literacy

SDG 4 ensures inclusive and equitable education and promotes lifelong learning opportunities. Mobile technology contributes by allowing students, teachers and employees to learn/teach from any location and on the move. Increased use of mobile phones (with smartphones accounting for 80% of total connections in the region) and mobile internet services have improved access to online educational content. During the Covid-19 pandemic, a large percentage of those living in remote areas used mobile phones to access school resources and assignments. Mobile was an essential tool for remote learning during lockdown – even for the most remote populations. Mobile technology has also made educational content accessible from any location. Examples include the following:

- Vodafone Samoa with the Ministry of Education is facilitating online education assistance by providing Wi-Fi around university campuses and on the inter-island ferry to enable students to study and access the internet.

- Digicel is supporting early learning programmes and teacher training via online sessions in Papua New Guinea.

- The Tuvalu Learning Project aims to improve early education and literacy in Tuvalu – one of the world's smallest, most remote and climate-vulnerable countries. In such areas, strengthening literacy in all schools through teaching and learning innovation largely depends on internet connectivity over mobiles and laptops.

- In Papua New Guinea, Digicel Foundation with the National Department of Education, Digicel TV and The Voice Inc., launched a pilot educational TV channel on TV Wan called 'Be Lit' in September 2021. This is broadcast in three-hour blocks each day, focusing on areas such as science, maths and social sciences, with the aim to make education more accessible for students studying from home, as well as rural and remote schools across the country. The shows have also been made available on Digicel's messaging app, Bip. The programme aims to increase literacy and economic opportunities for young people. Digicel also provides tailored data plans for students in most countries in the region.

Boosting public service delivery

SDG 11 strives to make cities and other human settlements inclusive, safe, resilient and sustainable. Mobile technology can contribute by providing data analytics and edge computing with fast connectivity to enable smart traffic and cities and empower municipalities. Mobile has been instrumental in the digital transformation journey of the region, where most public services that are part of e-government initiatives are primarily delivered via mobile. Examples include the following:

- **DigitalFIJI**, a government platform and mobile app, provides a directory service with contact information and a feedback system for users. The app also facilitates sharing of documents and photos, and tracking of enquiries.

- **The Tonga Digital Government Support Project** aims to strengthen digital access, efficiency and security in Tonga's public service. It supports a number of whole-of-government digital initiatives, including a new National Government Portal for citizens to access services and information across all ministries and agencies.

Mobile technology has also supported public services such as e-ticketing for transport in Fiji, prepayment meters for utilities in Samoa, and digital ID for people and businesses in Papua New Guinea. 2G solutions using IoT, AI and blockchain have recently gained interest in the region. With growing connectivity and access, these technologies will be piloted in various sectors over the coming years.

Enhancing natural resource management

SDG 13 calls for urgent action to combat climate change and its impact. Mobile technology has been an enabler by increasing connectivity, improving efficiency and effecting changes in behaviour. The sustainable management of the environment and natural resources across the Pacific is vital to the region's future. For instance, in the Marshall Islands, digital projects are not only expanding online access; they are also looking to promote private sector investment in climate-resilient digital infrastructure.

In the Solomon Islands, maritime surveillance relies on improved connectivity to manage natural resources against illegal fishing and for rescues at sea. The system enables effective communication with law enforcement agencies, access to satellite news/information, and real-time access to vessel monitoring. In addition, email connectivity between the Operations Room and patrol boats at sea has improved security and more efficient transfer of information (previously, only voice connection was available; now, any form of data can be transferred).

Agriculture is vital for many countries in the Pacific Islands, as the majority of the region's population live in rural areas and rely on agriculture for food security and income. Farming activities are largely impacted by climate change in the Pacific Islands. Remote vanilla farming communities such as Iowara from Papua New Guinea are now using mobile phones to learn about climate-resilient farming techniques and to access weather forecast data. Increased training and services in this area can positively impact the community.

04

Mobile industry enablers

Digital connectivity and technologies offer the Pacific Islands the opportunity to transcend the limitations of physical size and constraints of geography. Governments need to lead the way by implementing digital public services and policy levers that promote innovation and investment, facilitate deployment, enable access to spectrum and ensure adequate security measures are in place.

Mobile connectivity is a core component of national communications infrastructure (others include submarine cables, fibre networks and satellite systems) and plays an important role in enhancing digital inclusion. Mobile connectivity is central to delivering digital transformation and improving the lives of citizens in the Pacific Islands – in particular, accelerating socioeconomic advancement across areas such as healthcare, education, digital commerce, agritech and tourism.

In the 5G era, mobile connectivity will play an even greater role in society, with the technology enabling a range of new use cases and applications for citizens, enterprises and the public sector. In this context, governments and policymakers across the region should prepare for the 5G opportunity, using a whole-of-government approach. In practice, this means:

- adopting flexible regulatory and policy frameworks (flexible, light-touch regulation and a balanced approach to fees and taxes)

- implementing policy actions to close the digital divide (investing in digital skills training, forming policies to lower handset costs, and reducing spectrum fees)

- ensuring safe and secure connectivity (safety and security by design, and international/ regional cooperation to combat cyberbullying, misinformation/disinformation and cybersecurity threats).
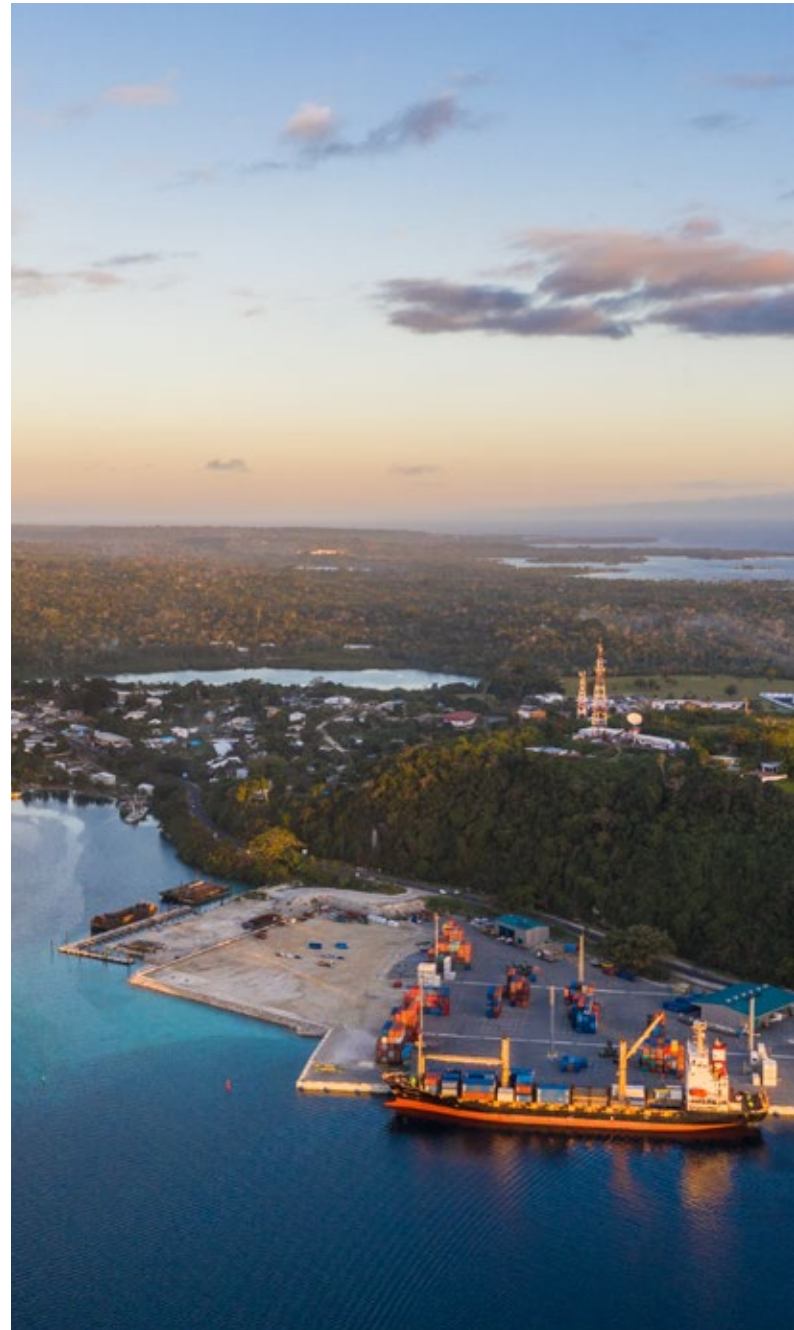
4.1
Realising the full potential of 5G through effective spectrum policy

Radio spectrum is essential to the provision of affordable, high-quality mobile connectivity. Spectrum policy decisions at international, regional and national levels are crucial in supporting the development of mobile networks and infrastructure that will generate economic growth and enable digital transformation of societies in this decade and beyond. 4G uses low and mid-bands below 3 GHz, while the diverse needs of 5G use cases can only be addressed through a combination of frequencies across low-band (below 1 GHz), mid-band (1–7 GHz) and high-band (above 24 GHz) spectrum.

Mid-band spectrum offers city-wide coverage for urban areas. The first wave of commercial 5G networks globally has focused on the 3.5 GHz band, within the mid-band range. In the longer term, additional mid-band spectrum will be needed to address growing 5G demand in a cost-effective way while reducing energy consumption and the environmental impact of network densification. By 2030, it is estimated that an average of 2 GHz of mid-band spectrum in each country will be required to realise the full potential of 5G and beyond. Low-band frequencies such as 600 and 700 MHz are also being used to provide better 5G coverage in sparsely populated areas.

The Pacific Islands region stands to benefit from the global harmonisation of spectrum bands for mobile use

The Pacific Islands region stands to benefit from the global harmonisation of spectrum bands for mobile use. Greater economies of scale will pave the way for successful 5G network development in the Pacific Islands, allowing local operators, consumers and enterprises to tap into a maturing ecosystem of equipment, devices, use cases and applications.

At the World Radiocommunication Conference in 2023 (WRC-23), there are agenda items on low- and mid-band frequencies for mobile. These offer the opportunity for administrations to take important steps towards securing future spectrum resources – such as the 600 MHz, 3.5 GHz, 4.8 GHz and 6 GHz bands.[20] Positive moves towards harmonisation will make 5G connectivity more widespread and affordable for everyone, as well as providing the opportunity for the Pacific Islands to engage with a mature ecosystem.

5G is not a race, however. Governments and regulators in the Pacific Islands can help chart the path for 5G with a clear spectrum roadmap that sets out the stages to ensure sufficient spectrum to support 4G while meeting the future needs of 5G. This includes effective backhaul policy and regulation, with careful consideration of the most effective backhaul licensing approaches and terms and conditions to support traffic growth.[21] Understanding government plans for spectrum to support new technology and uses provides industry with the time and certainty required to develop business strategies, secure capital investments and plan for network deployment.

20. See www.gsma.com/spectrum/wrc-series/
21. Wireless Backhaul Evolution, GSMA, 2021

4.2
Ensuring safe and secure connectivity

As people become increasingly reliant on connectivity in general, and mobile internet in particular, for work, education, shopping, entertainment and social activities, they need to be able to use online services safely and securely. If consumers cannot trust the integrity of online information or services, worry that sensitive personal information could be insufficiently protected online, or that they could face harassment, they are much less likely to go online or use these services.

The threats people and businesses face online are diverse and growing in number. Some cyberthreats are financially motivated, such as ransomware or phishing attacks, while others are aimed at critical infrastructure. There are also attacks that threaten society and democratic processes through spreading misinformation and disinformation. The incidence of online misinformation and disinformation is rising, partly fuelled by the increasing reliance on social media and messaging applications for news and information.[22] In some extreme cases, this results in acts of violence.[23]

While everyone is a potential target of online abuse, women and young people are among the particularly vulnerable groups. In Fiji, just over a fifth of approximately 2,800 complaints about various issues online (including abuse and harassment, hacking of social media accounts, scams and defamatory comments) lodged with the Online Safety Commission between 2019 and 2022 were reported by people aged between 19 and 25 years old.[24] Meanwhile, the GSMA Mobile Gender Gap Report 2022 found that women tend to perceive security concerns related to owning and using mobile devices, harassment from strangers, and being exposed to harmful content, as the third most important barrier to internet adoption and usage.[25]

Recent high-profile attacks on critical infrastructure highlight the vulnerability of Pacific Island nations to internal and external cyberthreats. For example, in November 2022, Vanuatu's government was hit by a cyberattack on servers in the country, which disabled the websites of the parliament, police and prime minister's office for more than 11 days. In February 2023, Tonga Communications Corporation reported a ransomware attack, encrypting and locking access to part of its administrative systems. In March 2023, Docomo Pacific reported a cybersecurity incident in its Guam operations which disabled some of its services for several hours.

Authorities in the Pacific Islands are acutely aware of the issues around online safety and cybersecurity, and the need to address these in order to build digital resilience. In 2018, the 18 member states of the Pacific Islands Forum signed the Boe Declaration on Regional Security.[26] After noting climate change as 'the single greatest threat', the declaration outlined an 'expanded concept of security' which includes cybersecurity. The declaration set the scene for cybersecurity as a shared priority for the region and one that will be necessary to enable continued economic development amid natural disasters, changes in the global security situation, and worldwide economic upheavals.

National governments and other stakeholders have launched initiatives to improve online safety in the region. For example, Meta has partnered with Save the Children to deliver the 'I Am Digital' campaign in Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu, to empower teenagers and young people to have a safe and positive experience online. In Fiji, the Online Safety Commission, established under the Online Safety Act 2018, aims to promote online safety and deter harmful electronic communication, as well as provide education and raise awareness among Fijian communities, especially parents, schools and law enforcement. In 2021, Vanuatu's parliament passed the country's first Cybercrime Act, harmonising its national legislation with international standards, and Papua New Guinea announced a new National Cyber Security Policy to focus on cyber-related matters.

22. "Pacific digital toolbox needed to hammer out misinformation", RNZ, July 2022
23. "Mob attacks on vaccination teams commonplace in PNG", RNZ, November 2021
24. "Parents, guardians do your part as online body receives 2800 complaints", The Fiji Times, February 2023
25. The Mobile Gender Gap Report 2022, GSMA, 2022
26. See www.forumsec.org

Support from international partners, such as Australia, is also an important part of the fight against cyberthreats, given the need for regional cooperation and technical skills to tackle key challenges. Examples include the following:

- The Australian government established the Pacific Cyber Security Operational Network (PaCSON) in 2017 to develop capacities that address cyberthreats. The Cyber Smart Pacific 2022 awareness programme is an example of a regional, collaborative effort led by PaCSON.

- The CERT[27] Tonga Cybersecurity Workforce Development Programme (CWDP), developed in partnership with CERT New Zealand, helps build practical skills and understanding of cybersecurity issues.

- The Cyber Safety Pasifika programme, led by the Australian Federal Police, delivers activities to law enforcement personnel in 18 Pacific Island countries in the areas of cyber safety awareness and education, development of cybercrime legislation and policy, and upskilling police in cybercrime investigations.

- Australia's eSafety Commissioner has partnered with Fiji's Online Safety Commission to foster more positive online experiences, focusing on supporting diverse and remote communities and reaching the most at-risk people with resources and tools.

- The Global Forum on Cyber Expertise (GFCE), a global platform for cyber capacity building, has established a Pacific Hub to strengthen cyber capacity building efforts in the Pacific. The hub intends to provide information and advice for Pacific governments and donors on cybersecurity and safety issues in the region.

- Digicel Pacific is working with Telstra International and other global partners to strengthen its cybersecurity capabilities to help reduce the risk of unauthorised access to its network. The operator is also investing in its own security capability, in line with its stated priority of protecting customer data.

There is clear appetite and interest among Pacific Island nations to enhance digital inclusion and use digital technologies to drive social and economic progress. However, as internet access becomes more essential, so too does cybersecurity. To this end, there is a need for continuous collaboration among local and regional stakeholders with a shared interest in protecting people online, combating the spread of disinformation and preventing cybercrime. The GSMA reports *Exploring online misinformation and disinformation in Asia Pacific* and *Safety, privacy and security across the mobile ecosystem* outline key steps for governments and other stakeholders to address these issues.

As internet access becomes more essential, so too does cybersecurity

27. Computer Emergency Response Team

The Pacific Islands

	Subscriber penetration		Smartphone adoption		Technology mix*							
					2G		3G		4G		5G	
	2022	2030	2022	2030	2022	2030	2022	2030	2022	2030	2022	2030
American Samoa	78%	80%	84%	93%	13%	0%	71%	34%	16%	38%	0%	28%
Cocos (Keeling) Islands	29%	29%	81%	90%	100%	100%	0%	0%	0%	0%	0%	0%
Cook Islands	38%	40%	81%	92%	35%	2%	31%	18%	34%	53%	0%	27%
Fiji	85%	87%	84%	94%	4%	0%	6%	1%	89%	76%	0%	23%
French Polynesia	58%	62%	83%	92%	6%	0%	42%	14%	52%	58%	0%	28%
Guam	73%	76%	84%	93%	5%	0%	42%	0%	47%	53%	5%	47%
Kiribati	44%	49%	57%	88%	36%	0%	33%	28%	31%	32%	0%	41%
Marshall Islands	64%	74%	85%	89%	70%	42%	0%	0%	30%	40%	0%	18%
Micronesia	19%	20%	79%	88%	40%	0%	30%	45%	30%	44%	0%	11%
Nauru	62%	69%	80%	92%	28%	0%	31%	26%	41%	39%	0%	35%
New Caledonia	59%	63%	82%	92%	30%	0%	26%	0%	44%	41%	0%	59%
Niue	75%	78%	78%	92%	0%	0%	0%	0%	100%	92%	0%	8%
Norfolk Island	53%	55%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%
Northern Mariana Islands	54%	58%	83%	93%	26%	8%	47%	0%	25%	41%	3%	51%
Palau	92%	95%	80%	91%	16%	2%	63%	31%	20%	33%	0%	33%
Papua New Guinea	41%	44%	80%	90%	26%	0%	31%	25%	43%	64%	0%	12%
Samoa	66%	71%	82%	92%	9%	1%	38%	3%	54%	66%	0%	30%
Solomon Islands	47%	53%	79%	90%	28%	0%	63%	93%	9%	7%	0%	0%
Tokelau	62%	67%	80%	93%	0%	0%	0%	0%	100%	87%	0%	13%
Tonga	52%	58%	80%	91%	34%	2%	36%	25%	30%	62%	0%	11%
Tuvalu	27%	28%	82%	91%	0%	0%	72%	38%	28%	53%	0%	10%
Vanuatu	48%	54%	80%	90%	26%	0%	42%	35%	32%	52%	0%	14%
Wallis and Futuna Islands	58%	61%	80%	93%	0%	0%	66%	35%	34%	46%	0%	19%

*Percentage of total connections