The Mobile Economy
Pacific Islands 2015

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Executive Summary

The mobile industry in the Pacific Islands has grown rapidly over recent years, despite the challenges of a region that is one of the most remote and geographically demanding. The unique mobile subscriber base in the region reached 4.1 million by the end of 2014, up from 2.3 million in 2009. This is an annual growth rate of 12.6%, well ahead of the global and developing region averages.

*GSMA Intelligence estimates that the total number of active SIM connections at end 2013 was 6.3 billion.

The region is also beginning to see an increasing technology migration in its mobile networks and devices, with both an increasing proportion of 3G (and to a lesser degree 4G) connections, as well as smartphone ownership. Mobile broadband connections are expected to see an almost four fold increase by 2020 across the region, growing from 1.1 million in 2014 to 4.1 million, reaching almost half of the total connection base, helped by ongoing network build outs and more affordable devices.

Despite the progress to date, subscriber penetration rates in the Pacific Islands continue to trail behind those in other regions, both in terms of the broader Asia Pacific region as well as other developing regions such as Sub-Saharan Africa. By the end of 2014, unique subscriber penetration stood at 37%, a figure that is forecast to increase to around 42% by 2020. This will still leave the region trailing the developing market average of 55%.

Market liberalisation and the creation of more enabling regulation has helped spur growth in the region in recent years. The more modest rate of subscriber growth over the next few years largely reflects difficulties in extending connectivity to the outlying regions and islands, issues around affordability for low income populations, and the challenge many of the smaller markets face in supporting more than one operator.

However, if the connectivity gap between the Pacific Islands and the rest of the Asia Pacific region is not to widen further, smaller and less developed markets need a more supportive regulatory framework, with possible government collaboration or incentives, to ensure sufficient investment in the future. Robust and implementable national broadband plans can play an important role as part of a broader focus on ICT development in local economies.

Spectrum is a precious and finite resource and fundamental to the delivery of mobile services. With global data traffic set to see an almost ten-fold increase by 2019, the ITU predicts that mobile broadband networks globally will need between 1340MHz and 1960MHz of spectrum to meet the anticipated demand in 2020. In many countries in the region, concrete commitments to the harmonised allocation and assignment of sub-1GHz spectrum are yet to be fulfilled. Coordinating and accelerating the analogue to digital switchover (DSO) and freeing the Digital Dividend spectrum bands for mobile broadband will be essential steps in bridging the digital divide and meeting the strong demand for data services going forward.

The GSMA has identified four frequency ranges within which the spectrum requirements for future mobile broadband use could best be satisfied. These bands, which include a portion of the C-Band (3.4-4.2GHz), should be identified for International Mobile Telecommunications (IMT) at the World Radiocommunication Conference in 2015 (WRC-15). The C-band is one of the few bands where a harmonised portion could be made available for potential future mobile broadband use worldwide and which is large enough to support very high levels of data traffic and the fastest data rates. Governments in the Pacific Islands may be reticent to support an identification because local mobile data demands are less intense and the C-Band is heavily relied upon for fixed satellite services (FSS). An IMT identification at the international level simply provides more flexibility to each country to react to their specific market conditions, and does not act as an additional constraint to existing services. It will not impact C-band satellite services in the Pacific Islands for as long as they are deemed necessary.

The Pacific Islands may also need an alternative to the C-band to provide capacity in the future, to cater for demand from both domestic usage and tourism. The 2.7-2.9GHz band is a realistic and attractive option, with several countries from Europe, APAC and Africa supporting its identification for IMT. The Pacific Islands should also consider supporting the proposal for a sub-700MHz UHF IMT identification at WRC-15, as proposed in the USA and Canada. This band represents the most cost efficient way to cover the whole islands with mobile broadband connectivity. Other regions can then benefit from lower price equipment when capacity becomes a problem and these alternative spectrum bands are required.

The mobile ecosystem is directly responsible for driving major economic progress and welfare across the Pacific Islands. In 2014, mobile technology was responsible for 4.7% of the region's GDP, representing nearly US$2 billion in value added terms. The mobile ecosystem directly accounted for more than a third of that value, with indirect and productivity impacts accounting for the rest.

The period to 2020 will see mobile networks becoming the gateway to the internet for many of the people in the region who remain unconnected today, overcoming in some cases barriers such as geographical remoteness which seemed unassailable just a few years ago. Broader and easier access to the internet will enhance economic and social prospects for many and drive strong growth in the period to 2020. The economic contribution of mobile technology will grow at a faster rate than the rest of the region's economy, claiming over 6% of the region's GDP by 2020.

The economic footprint of the mobile industry can also be seen through the number of jobs it supports in the region. In 2014, the mobile ecosystem directly and indirectly provided employment to over 25,000 people, with the figure projected to increase to over 30,000 by 2020. The industry also makes a very large contribution to the funding of the public sector in the form of general taxation with around US$220 million contributed across the islands in 2014. By 2020 this amount will have grown to around US$280 million if we assume that tax rates remain at current levels.

Mobile phones are bringing internet access to previously unconnected populations across the world, especially in developing regions where there is a lack of alternative access technologies. This is particularly the case in the Pacific Islands, with fixed line penetration in most markets in the low single digits. At the end of 2014, around 15% of the population across the Pacific Islands were using mobile devices to access the internet, a figure that will more than double to a third of the population by 2020.

These figures for mobile internet access are both much lower than the averages for the broader Asia Pacific region and for the developing world as a whole. There are a number of difficulties in extending mobile internet access in the Pacific Islands, with issues around affordability and expanding network coverage to remote and often inaccessible rural areas particular challenges given high levels of poverty and low population densities.

Connectivity at present is delivered through a combination of mobile, satellite, undersea cables and fixed networks, and these technologies will continue to serve as the backbone of communications in the region in the future. The geographic and physical limitations of fixed networks and the relative expense of satellite services means mobile has the best opportunity to drive connectivity and internet access throughout the Pacific Islands.

However, mobile operators, regulators and other industry stakeholders should recognise the scope for partnerships and the ongoing role for complementary alternative technologies (particularly satellite) in addressing the connectivity challenges in the region. The unique challenges to infrastructure roll out in the region, as well as a lack of scale in many small island states, may require innovative new business and partnerships in order to reduce the cost of services and so make mobile accessible to the still unconnected populations in the region

Mobile services are increasingly seen as a driver of socio-economic development in the region, particularly in the areas of financial inclusion, disaster preparedness and response, and bridging the gender gap. In many Pacific Island countries today, fewer than 10% of adults are thought to have access to basic financial services, mainly due to challenging geography, poor infrastructure and the high costs associated with delivering services to sparse populations. Mobile money services have been launched and significant progress has been made in several countries in bringing financial services to the unbanked throughout the Pacific Islands.

The Pacific Islands is one of the world's most environmentally vulnerable regions, as highlighted by the impact of the devastating cyclone in Vanuatu that struck the country on March 13th. Mobile operators and governments are increasingly using mobile services to coordinate disaster preparedness, response and assessment activities across the region.

Mobile has already made an important contribution to growth and development across the Pacific Islands, but has the potential to do much more. Realising the full transformative potential of the mobile industry in the region will require increased collaboration between all players in the region. This includes cooperation between the mobile operators and other ecosystem players; as well as collaboration with governments, regulators and other industry stakeholders.

The Pacific Islands refers to a large area of the Pacific Ocean in which there are in excess of 20,000 islands, with a broad range of countries and territories. This report focuses on twenty-one island states which together provide over 99% of the mobile subscribers in the region, and specifically excludes both Australia and New Zealand.

	POPULATION (000)	UNIQUE SUBSCRIBERS (000)	CONNECTIONS (000)
American Samoa	55	28	55
Cocos (Keeling) Islands	0.6	0.2	0.3
Cook Islands	21	6	9
Fiji	890	591	1,020
French Polynesia	281	138	242
Guam	169	88	155
Kiribati	105	17	22
Marshall Islands	53	17	26
Micronesia	517	83	104
Nauru	10	5	9
New Caledonia	261	208	268
Niue	1	0.7	1
Norfolk Island	2	0.8	1
Northern Mariana Islands	55	19	29
Palau	21	10	19
Papua New Guinea	7,554	2,342	3,638
Samoa	193	118	240
Solomon Islands	579	275	368
Tonga	106	39	67
Tuvalu	10	3	6
Vanuatu	261	104	180

MOBILE ECONOMY PACIFIC ISLANDS

Unique subscribers and SIM connections

2014 **4.1M**

2014 **37%** PENETRATION RATE

2020 **5.1M**

2020 **42%** PENETRATION RATE

CONNECTIONS Excluding M2M

2014 **6.5M** → **58% PENETRATION RATE**

2020 **8.5M** → **69% PENETRATION RATE**

Subscriber growth set to slow, highlighting need for collaborative action

2009-14 **12.6%**

2014-20 **3.8%**

Regional subscriber growth was well ahead of global average, at a CAGR of over 12.6% 2009-14
But growth set to slow to below global average, with a CAGR of 3.8% 2014-20

Accelerating moves to mobile broadband networks and smartphone adoption

Mobile broadband connections to increase

2014 **17%**

2020 **48%**

1.3M 2014

4.9M 2020

Smartphones

By 2020 there will be 4.9 million smartphone connections, up from only 1.3 million at the end of 2014

Mobile addressing economic and social challenges across the region

Delivering digital inclusion to the still unconnected populations across the region
Mobile internet subscriber penetration: 16% 2014
34% 2020

Delivering financial inclusion to the still unbanked populations
11 live services in 6 markets across the Pacific Islands as of April 2015

Delivering innovative new services
Growing range of new services and apps launched in recent years

Mobile ecosystem contribution to GDP

2014 **US$2bn** 2020 **6.2% GDP**

US$2.8bn

Public funding

Mobile ecosystem contribution to public funding in region before regulatory fees

US$220M 2014

US$280M 2020

Employment

Jobs directly supported by mobile ecosystem

12,000 JOBS 2014

16,000 JOBS 2020

Plus an additional **15,000** indirect jobs supported in 2014

1 The mobile industry in the Pacific Islands

1.1 Regional overview

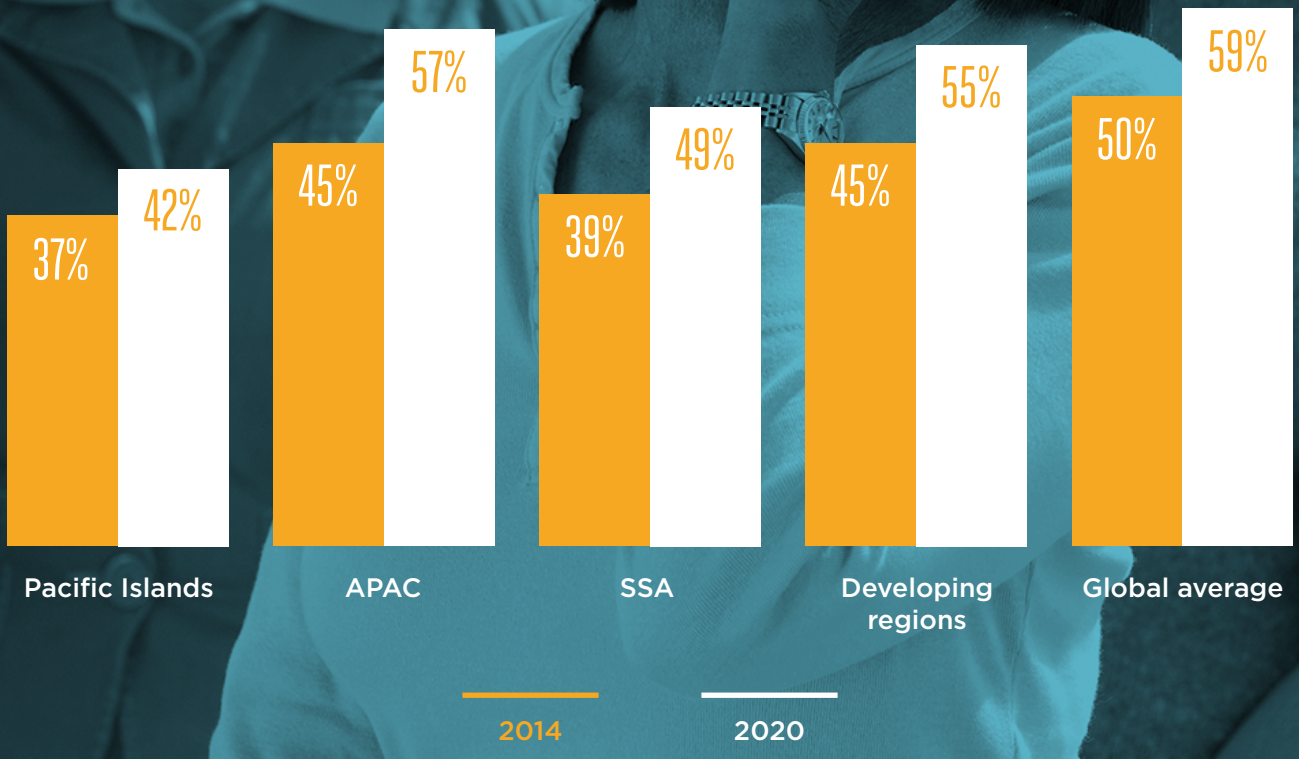
The Pacific Islands cover a wide geographic area with a large number of small islands and comprises mostly of developing economies. Countries vary significantly in size, ranging from Papua New Guinea ('PNG') with a population of 7.6 million, to Niue and the Norfolk Islands with populations of only one or two thousand. Much of the region is relatively remote and geographically challenging, with a combination of small island countries with large distances from the central island, or in other cases larger islands with difficult and often inaccessible terrain. Connectivity at present is delivered through a combination of mobile, satellite, undersea cables and fixed networks, and these technologies will continue to serve as the backbone of communications in the region in the future. However, the geographic and physical limitation of fixed networks and the relative expense of satellite connectivity means mobile has the best opportunity to drive connectivity and internet access throughout the Pacific Islands.

The Pacific Islands are amongst the most underdeveloped regions in the world in terms of mobile connectivity. By the end of 2014, only 37% of the population subscribed to mobile services, which is well below the global average of 50%, as well as other developing regions such as Sub-Saharan Africa (SSA) (with 39%). Unique subscriber growth is forecast to be modest over the next few years, approaching 42% by 2020. This will leave the region trailing the broader Asia Pacific where penetration will be over 57%, and the developing world average of 55%.

Source: GSMA Intelligence

Unique subscriber penetration - regional comparison

(Millions)



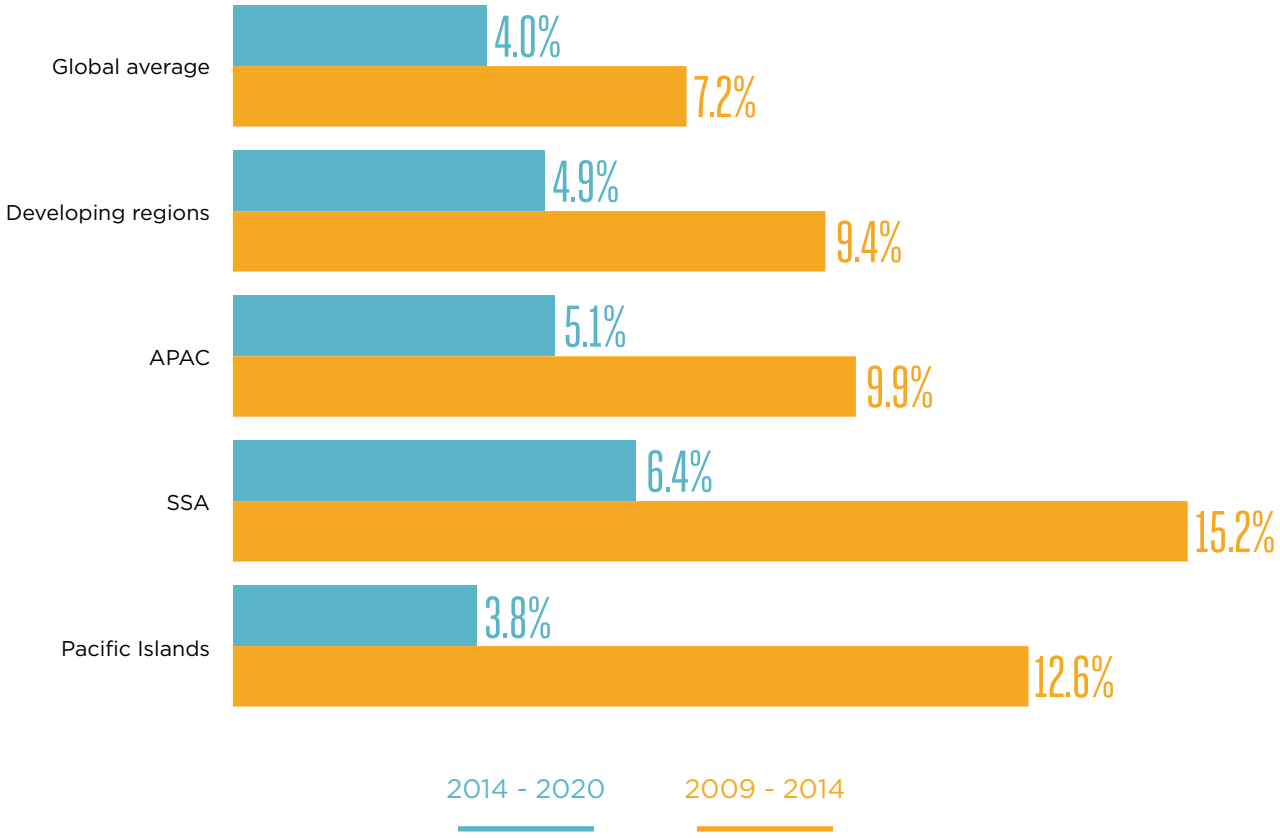
1.2 Subscriber growth set to slow

Over the last few years, the Pacific Islands have seen relatively rapid unique subscriber growth, reaching 4.1 million in 2014, up from 2.3 million in 2009. This is a compound annual growth rate (CAGR) of 12.6%, which is well ahead of the global and developing region average, and only behind Sub-Saharan Africa (with 15.2%). Going forward, the next few years will see relatively modest growth, largely due to difficulties in extending connectivity to the outlying regions and islands, and the challenge of affordability in a region with widespread poverty. The region will be home to 5.1 million subscribers by 2020, with a CAGR of 3.8%, below the developing world average of 4.9%.

Source: GSMA Intelligence

Unique subscriber growth rates

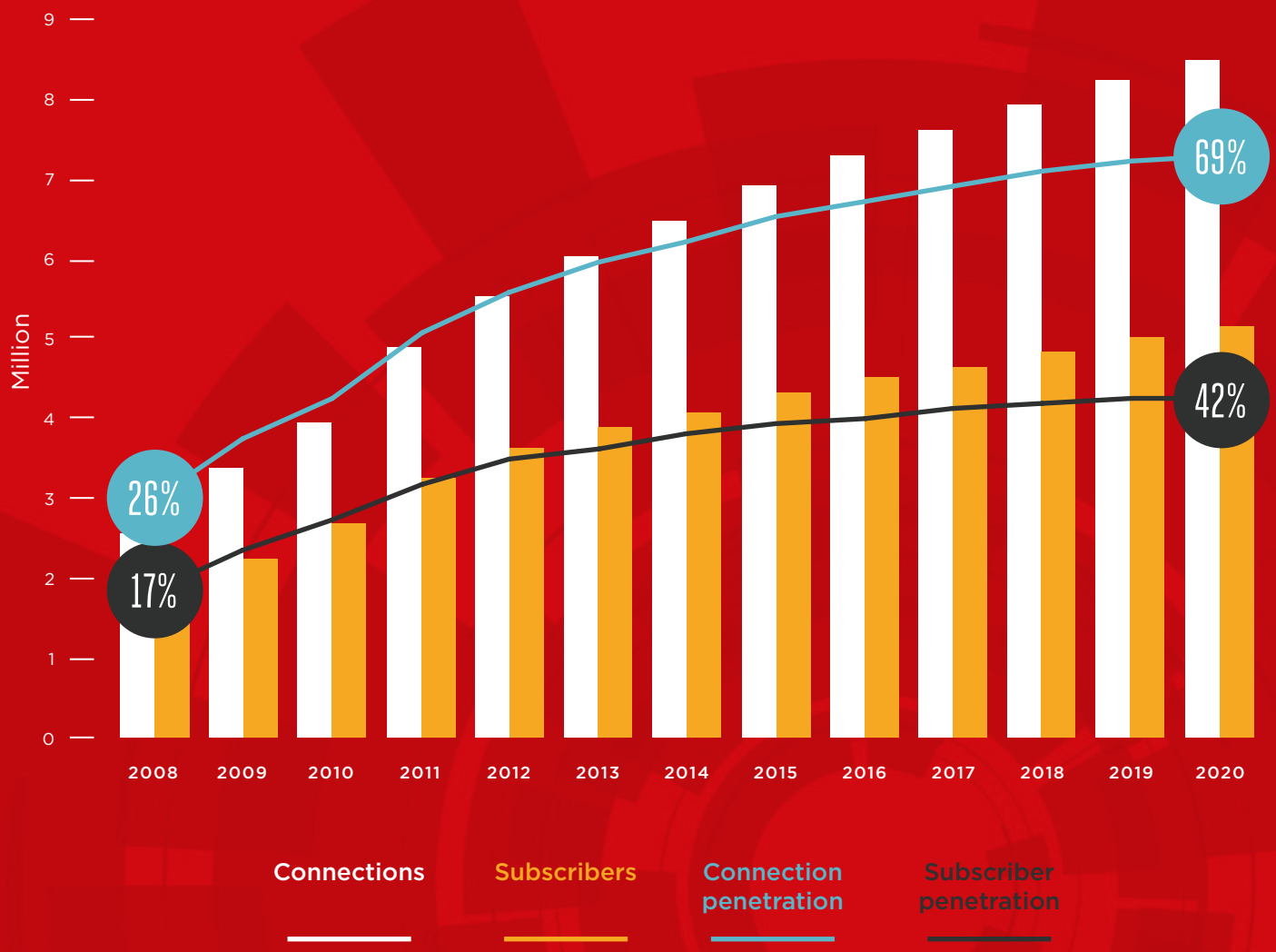
(CAGR)



As is common in other developing markets, mobile subscribers across the Pacific Islands tend to have multiple SIM cards in order to take advantage of promotional offers, as well as to avoid cross-network call charges. Levels of multi-SIM ownership vary with local market conditions, such as the level of competition between operators and availability of attractive tariffs. On average, each unique subscriber in the region has just over 1.5 SIM cards, compared to the global average of 1.8.

Source: GSMA Intelligence

Connections (excluding M2M) and subscribers - Pacific Islands



1.3 A diverse region dominated by larger markets

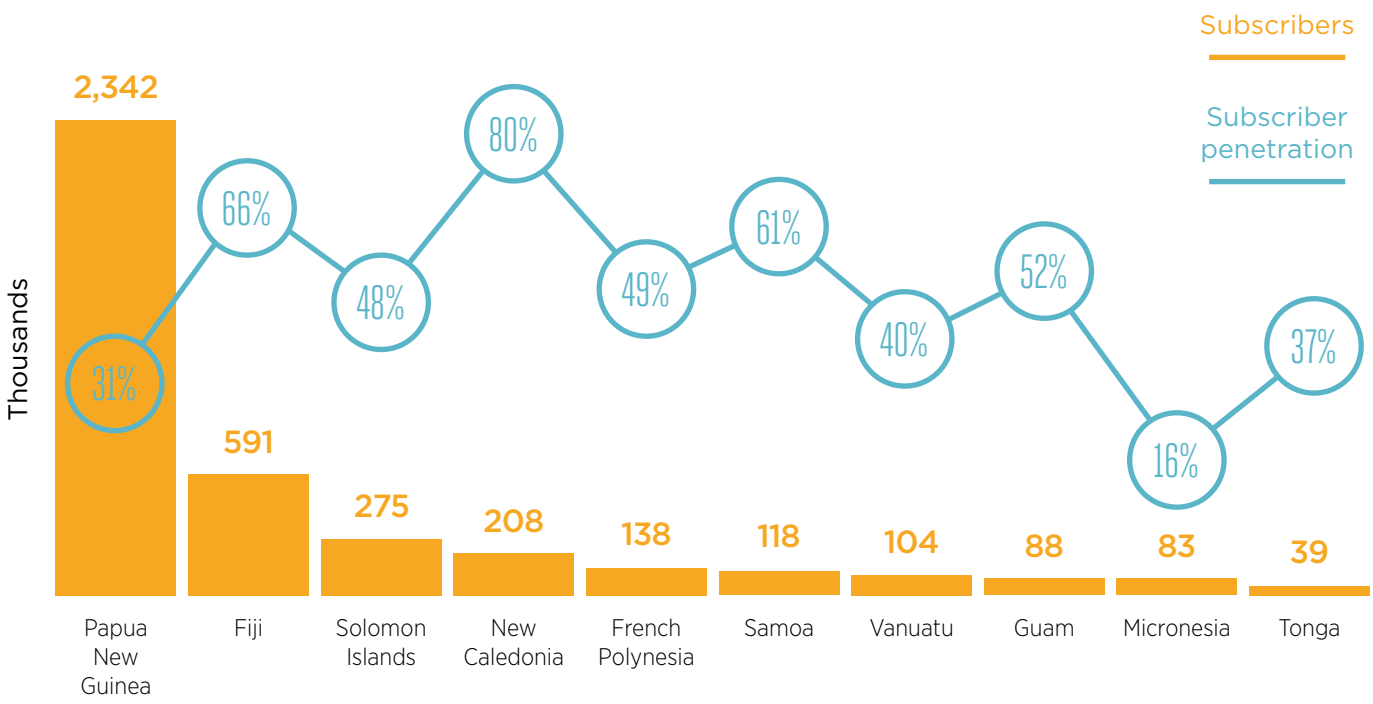
Regional average figures can disguise the diversity of mobile markets across the region, and also be distorted by the role of one or two larger markets. The region is dominated by one market – PNG – home to two thirds of the region's population (7.6 million) and almost 60% of the region's subscribers (2.3 million). PNG also has one of the lowest subscriber penetration rates in the region at 31%. This is well behind more developed markets such as New Caledonia (80%), Fiji (66%) and Samoa (61%), all of which have penetration rates well above the global average figure of 50%.

PNG has one of the lowest subscriber penetration rates in the world, and in fact, the Pacific Islands is home to many other poorly penetrated markets. Of the 30 lowest penetrated markets across the globe, six are in the Pacific Islands region, namely Micronesia (16%), Kiribati (17%), Cook Islands (29%), Cocos Islands (31%), PNG (31%), and Marshall Islands (32%).

Source: GSMA Intelligence

Subscribers by country (major markets)

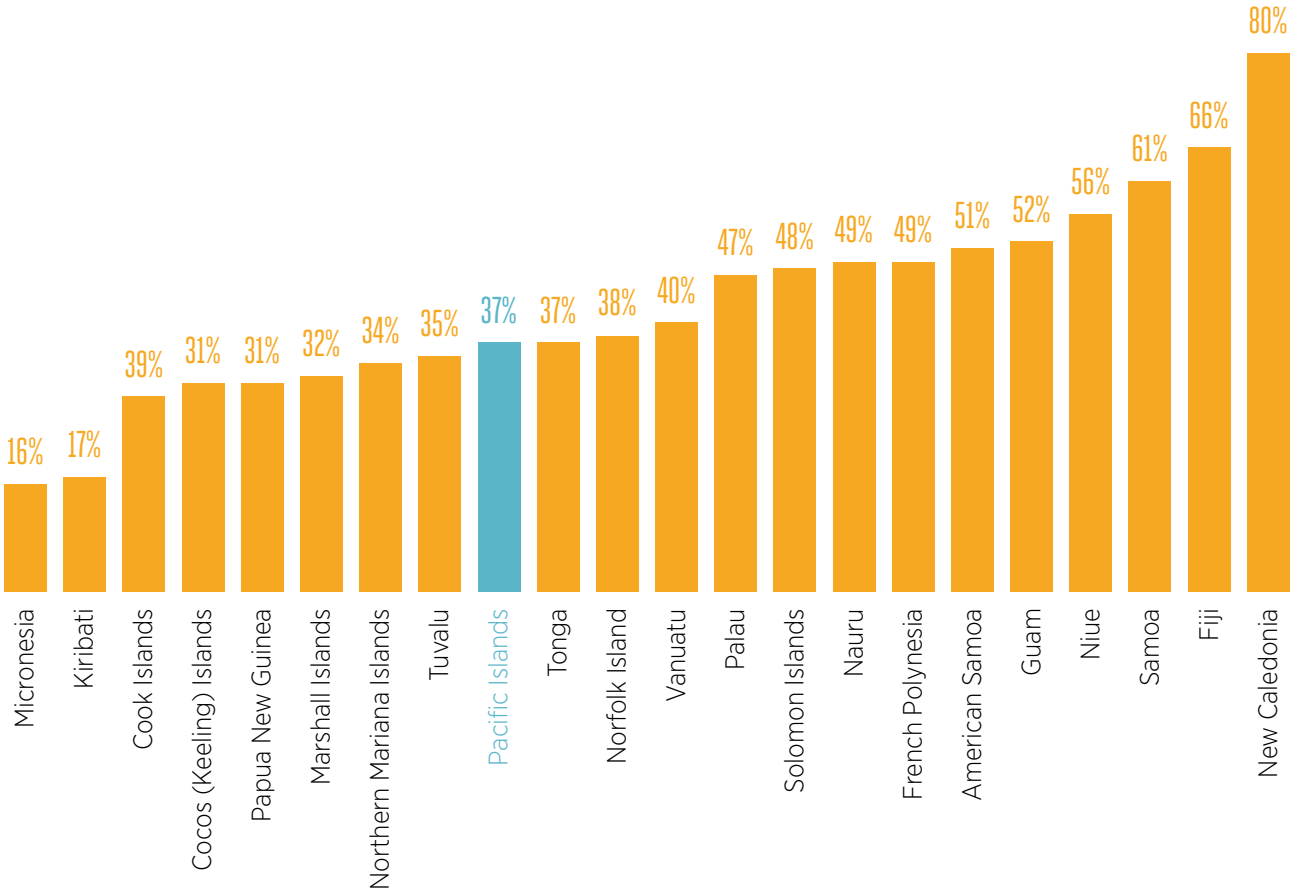
2014



Source: GSMA Intelligence

Subscriber penetration by country

2014



The Pacific Islands region is very diverse, with widely varying levels of mobile market maturity. Subscriber penetration ranges from 16% in Micronesia to 80% in New Caledonia, and connection penetration ranges from 20% in Micronesia to 124% in Samoa.

Mobile broadband uptake (as a proportion of total connections) ranges from low single digit percentages in several markets to a high of 33% in Fiji, while smartphone adoption is at its highest at 44% of total connections in New Caledonia.

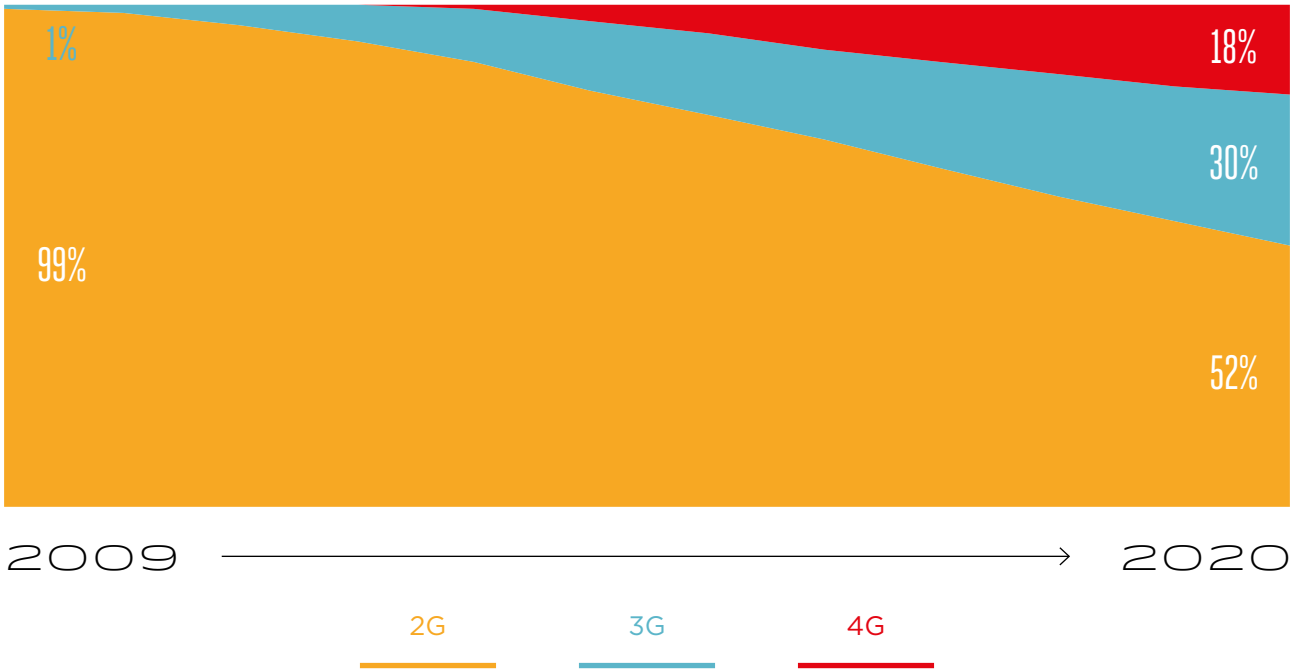
1.4 Technology migration now underway

2G remains the dominant technology in the Pacific Islands today, accounting for 83% of connections by the end of 2014. However, several markets across the region are already beginning to see a migration to higher speed mobile broadband (3G and 4G) networks. In Fiji, for example, mobile broadband connections accounted for 33% of total connections respectively at the end of 2014, with LTE already accounting for 14% of the total connection base.

However, seven markets have yet to launch 3G or 4G networks, namely the Cocos Islands, Marshall Islands, Micronesia, Niue, Norfolk Island, Palau and Tuvalu, and are currently expected to remain 2G-only through the end of the decade. In contrast, eight countries will by then have most of their connections on mobile broadband technology, albeit the vast majority of these will be 3G as opposed to 4G. The largest country, PNG, will also have made significant progress, growing its mobile broadband share of connections from 13% at the end of 2014 to 40% in 2020. As a result, mobile broadband connections are expected to see an almost four fold increase by 2020 across the region, growing from 1.1 million in 2014 to 4.1 million, reaching almost half of total connections (48%).

Source: GSMA Intelligence

Connections by technology generation



Despite the expected strong growth, mobile broadband adoption in the Pacific Islands is still forecast to be lower than many other regions. Across the developing world on average, mobile broadband (3G and 4G connections) will account for two thirds of total connections by 2020, well ahead of the level in the Pacific Islands which is just under 50%.

However, just examining the technology split of 3G and 4G, the Pacific Islands adoption of 4G as a percentage of all mobile broadband connections will be slightly higher (37%) than the average in the developing world (34%).

Source: GSMA Intelligence

Technology generation comparison

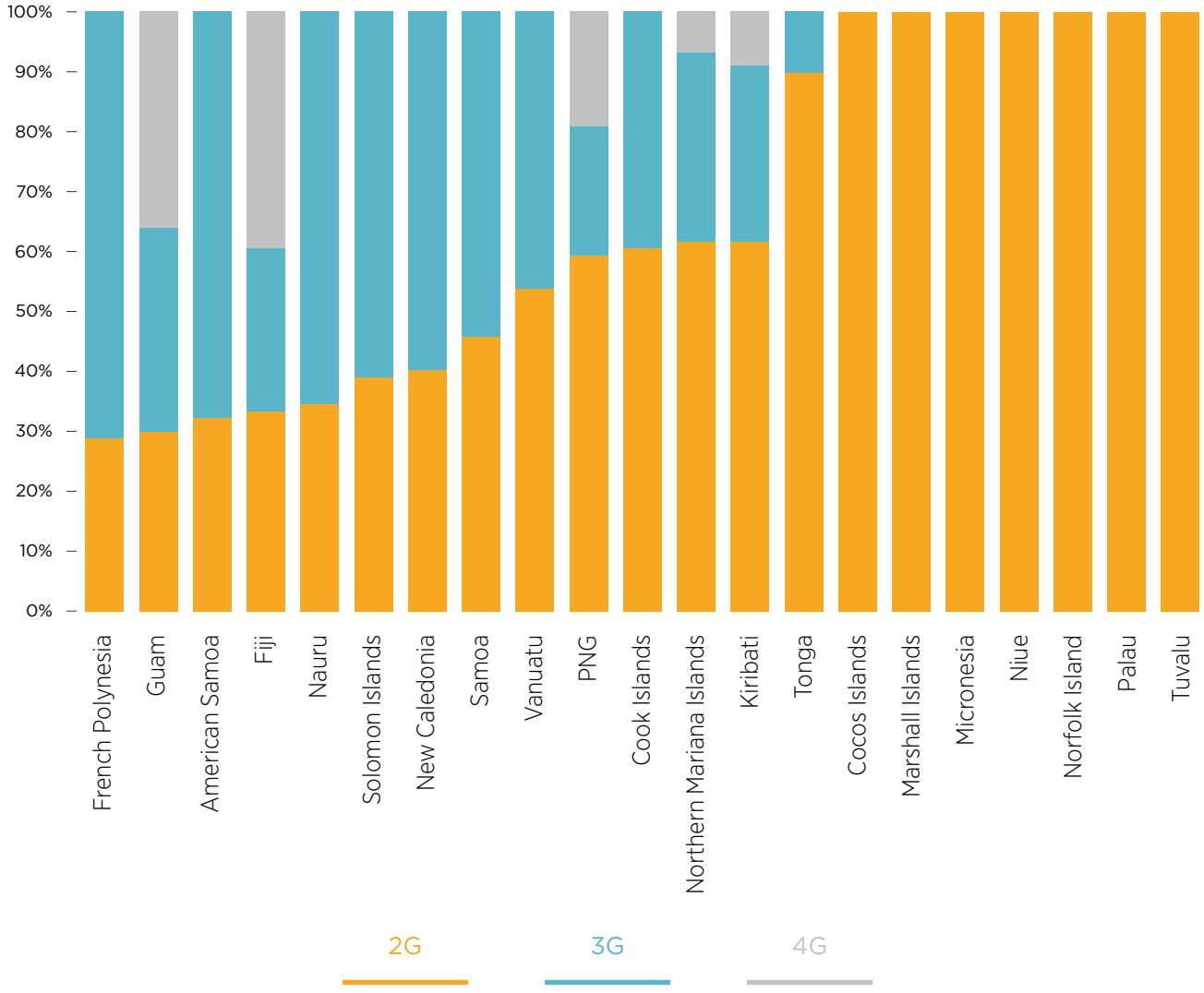
2020

As with subscriber penetration, 4G growth will be dominated by just two markets. Despite subscriber penetration remaining at one of the lowest levels in the world by 2020 at only 34%, the relative size of the country means PNG will account for 57% of the region's 4G connections, or just under 1 million. Almost a fifth of total connections in PNG will be 4G by 2020, up from only 1% in 2014. Fiji, where 4G will actually overtake 3G in terms of connections by 2020, will account for 38% of the region's 4G connections.

Source: GSMA Intelligence

Technology mix by country

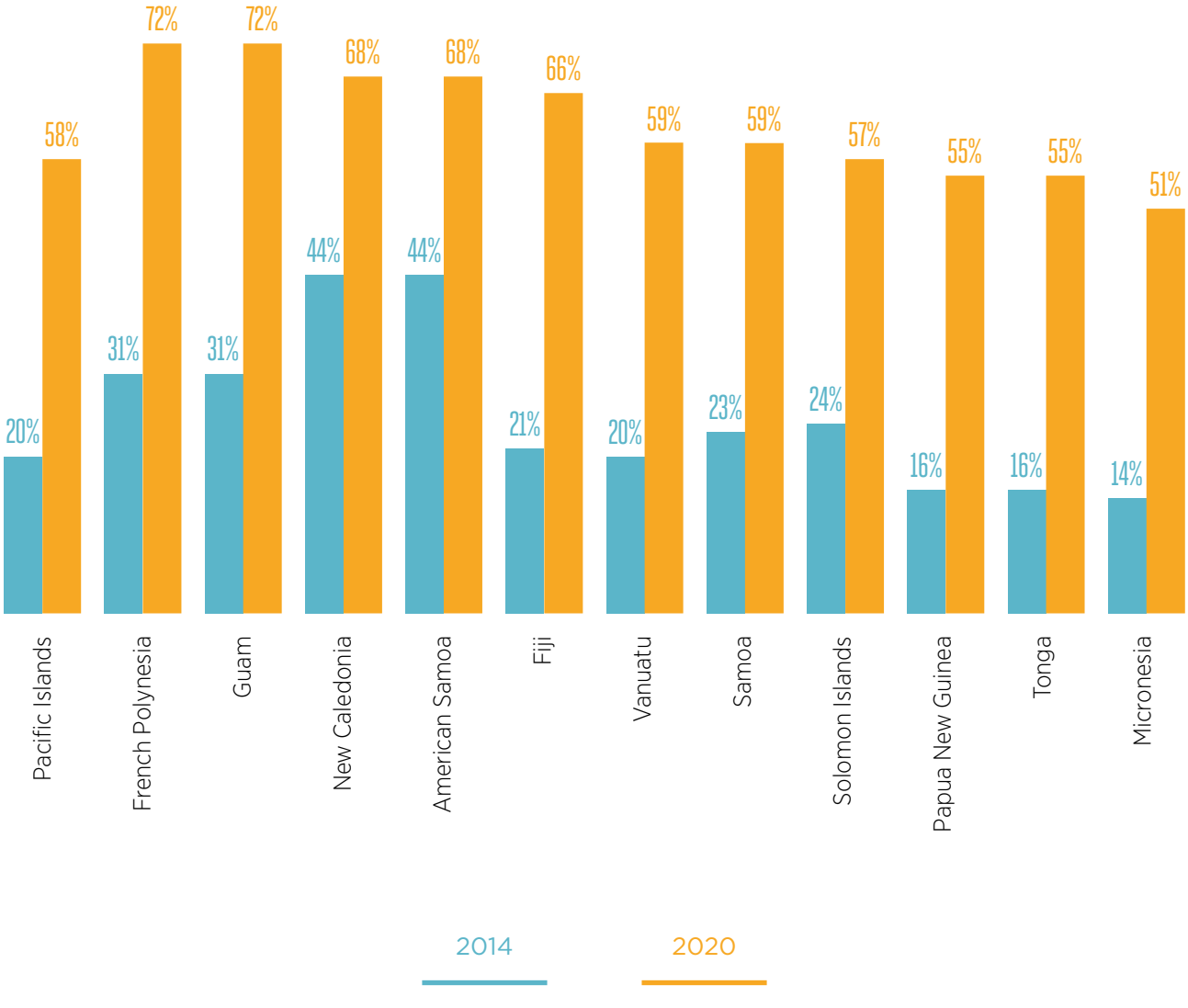
2020



Smartphone adoption closely mirrors the update of mobile broadband. Feature phones (typically running on 2G networks) will retain dominance in some markets, particularly those lacking mobile broadband networks, and a significant presence even in the most developed markets. Having grown slowly in comparison to other regions of the developed and developing world, from just over 2% adoption at the start of the decade to 20% at the end of 2014, smartphone adoption will nearly triple to 58% by the end of 2020.

Source: GSMA Intelligence

Smartphone adoption in the Pacific Islands - selected markets



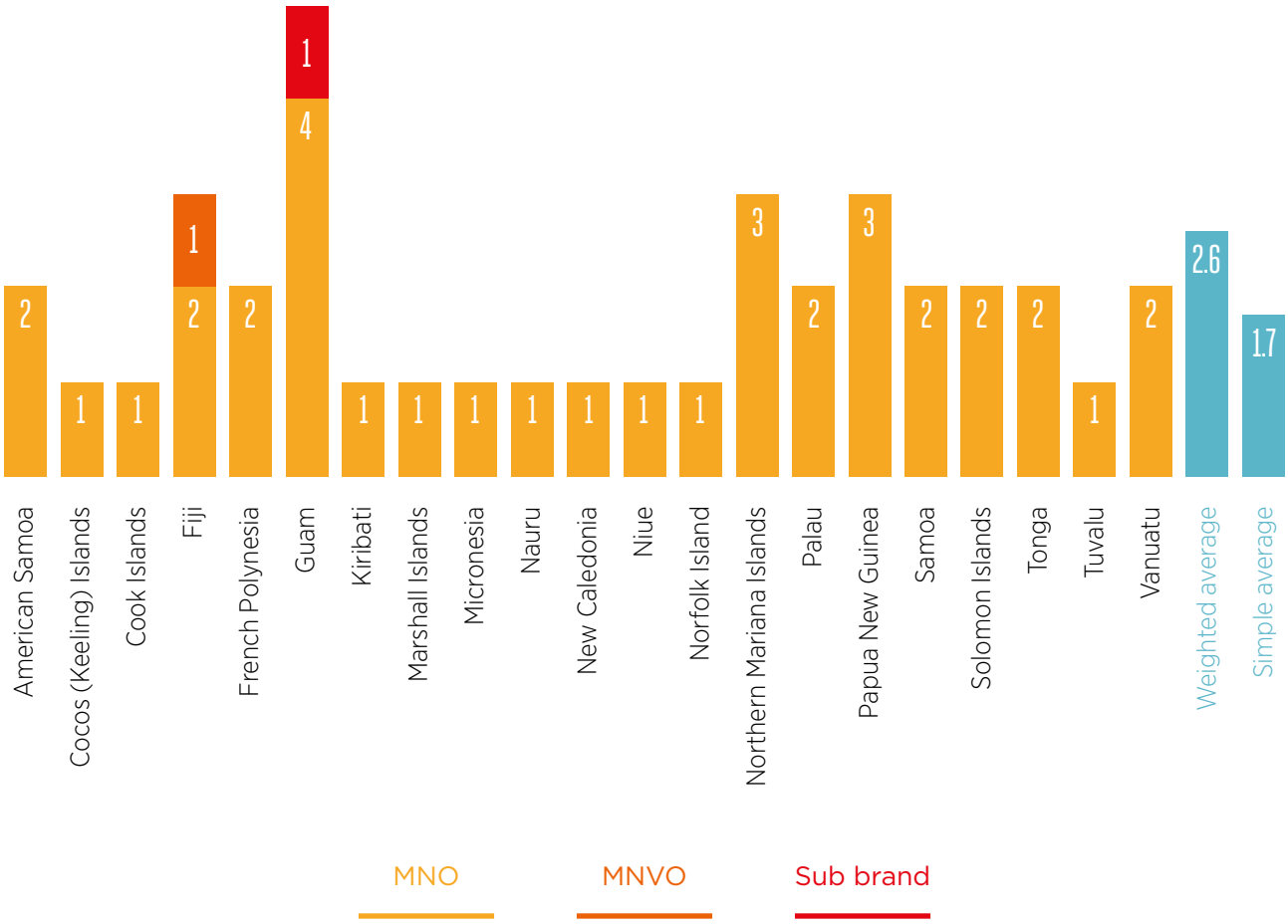
1.5 Market structure a challenge in many markets across the region

At least in part, the region's underdevelopment can be traced to the competitive environment, and the challenges of sustaining more than one operator in some of the smaller markets in the region. Of the region's twenty one countries and territories, ten are currently served by only one mobile operator, while only three countries have three or more operators.

On average, each market has 1.7 operators, or 2.6 on a population-weighted basis. Furthermore, in contrast to many other regions as well as most other countries in the broader Asia-Pacific region, there is only one mobile MVNO in the Pacific Islands (Inkk Mobile in Fiji) plus a further operator sub-brand MVNO (Smart Pinoy, of NTT DoCoMo in Guam).

Source: GSMA Intelligence

Number of mobile operators



The Pacific Islands' geography and demographics certainly present challenges to increasing competition and broadening coverage, particularly the smaller nations and territories. For example, negotiations between the government of Kiribati and a potential new entrant failed after a year of discussions in 2009, due to "concerns about the feasibility of having two mobile operators serving a country with a population of only tens of thousands of inhabitants."[1] Many of the states in the region consist of an archipelago of many islands with a capital island of some size but several other sparsely populated islands, which may be dispersed over hundreds of kilometres, with deficiencies in other infrastructure, such as electricity, that are essential to telecommunications.

Additionally, the region suffers from occasional but often devastating natural disasters that can damage the infrastructure already in place, as well as the underlying economic growth. For example, Samoa had been expected to graduate from the UN's list of least developed countries (LDCs) in 2010 after recovering from two cyclones in the early 1990s, but was struck by an earthquake and tsunami in September 2009 which resulted in approximately 200 deaths and an estimated US$380 million of damage[2], including to transport and power infrastructure, delaying its graduation from LDC status until 2014.

However, these challenges are not always insurmountable. Samoa liberalised its mobile market in 2006, paving the way for a new operator to enter the market in early 2007. This led to a doubling of the subscriber penetration rate in just over 12 months[3] and network coverage to expand to 95% of the territory.[4] The ITU stated, regarding the liberalisation, that "the introduction of competition into the mobile service market was a direct result of government institutional reform that unwound the monopoly, employing careful planning, consultations and a consensual approach as part of the reform".[5]

The ITU also highlights Vanuatu and the Solomon Islands as states which have also successfully introduced new competitors to their markets, in 2008 and 2010 respectively, despite similar challenges.

Recent press reports suggest that Marshall Islands is set to pass legislation that would open the country's telecom market to competition and see a new mobile entrant, a move that is supported by the World Bank and could see the government receive additional funding from the financial institution.[6]

In the case of Vanuatu, the government subsidised the extension of networks to "areas where the two current mobile providers would not intend to provide service on a commercial basis." Despite the cost to the government, the policy has been a success, with a significant increase in connectivity in Vanuatu's outer islands. The ITU summarises the broader societal benefits well: "increased connectivity facilitates business transactions throughout the country as well as social links among the population. Opening the mobile sector to competition has driven down the cost of telephone calls, improving service affordability".[7]

Regarding regulation, the ITU suggests that smaller, less developed markets need a more supportive regulatory framework with possible government support to ensure sufficient investment. "Where high investment is necessary but demand is insufficient to justify commercial investment, unregulated market forces may lead to unacceptable outcomes. There needs to be the political will in place to ensure that excesses of the market are tempered by a real concern to ensure that everyone can benefit from the richness of opportunities that the Internet and mobile technologies can offer".[8]

It also recommends that planning and financing of development be broadened beyond government and corporates: "in recognition of the need to engage broader coalitions of partners if the benefits of ICTs are truly to serve the most marginalised, we need to focus much more explicitly on Multi-Stakeholder Partnerships (MSPs) that bring together stakeholders other than just governments and private sector corporations".[9]

1. The Role of ICT in Advancing Growth in Least Developed Countries, ITU, 2011
2. The Role of ICT in Advancing Growth in Least Developed Countries, ITU, 2011
3. GSMA Intelligence data: Q4 2006, unique subscriber penetration rate 14.9%; Q1 2007, 30.4%.
4. The Role of ICT in Advancing Growth in Least Developed Countries, ITU, 2011
5. The Role of ICT in Advancing Growth in Least Developed Countries, ITU, 2011
6. https://www.telegeography.com/products/commsupdate/articles/2015/02/23/marshall-islands-poised-to-open-telecoms-market-digicel-waits-in-the-wings/
7. The Role of ICT in Advancing Growth in Least Developed Countries, ITU, 2011
8. The Role of ICT in Advancing Growth in Least Developed Countries, ITU, 2011
9. The Role of ICT in Advancing Growth in Least Developed Countries, ITU, 2011

1.6 The role of satellite in the Pacific Islands

Satellites play an important role in the telecommunications infrastructure of the Pacific Islands, reflecting the challenging geography of the region and the particular problems around bringing connectivity to a large number of small and often remote islands. Commercial satellites in Asia Pacific operate primarily on two bands, the C-band and Ku-band. The C-band has wider coverage but requires larger antenna, and technological developments mean issue of rain fade that has traditionally impacted the Ku-band may become less of an issue.[10] There are signs of an increasing migration away from the C-Band, for example O3b has had some success in the region offering broadband services in Ka-band. Similarly, Kacific aims to launch a Ka-band satellite in 2017 to provide satellite broadband services, and has already begun to sign-up customers in the region.[11]

There are a number of commercial satellite companies providing satellite services in the region, with the region benefitting from ubiquitous satellite coverage. Satellites can play a role in providing both international and domestic connectivity, both of which are severely limited in many countries in the region. Whilst several new submarine cables have improved internet connectivity in the region over recent years, for some of the small islands and territories the lack of international connectivity remains a significant issue, with satellite in many cases the only realistic option.

The completion of new undersea cables can also stimulate further demand for satellite services to provide connectivity to remote areas or scattered islands that are some distance from the main island in the archipelago. Satellite services can play a particular role in disaster relief and emergency communications, when terrestrial-based services may be struggling to cope.

Fixed satellite services have a range of applications, including acting as complements to mobile network deployments, for example in providing backhaul for mobile services in remote areas. The role of satellite systems was recognised by ITU Member States at WTDC-2014, with three Resolutions acknowledging the benefits that satellites provide to remote areas, and in helping bridge the digital divide for remote and rural regions with limited fixed line infrastructure. In the Cook Islands, broadband internet access, voice and video services, as well as backhaul for mobile services, are delivered by O3b's satellite network.[12]

There are a growing number of VSAT (very small aperture terminals) deployments in the Pacific Islands, with a range of potential uses. As well as backhaul services, VSAT can be used by corporates to provide reliable communication services, or by schools and communities in remote locations to provide connectivity. Satellite services are also the main means of distributing television content across the region, with a number of satellite based direct-to-home (DTH) TV services in operation, although most countries in the region also have terrestrial broadcast TV services.

10. JTG4567/550-E: A study of rain fade depth on FSS frequency bands
11. https://www.telegeography.com/products/commsupdate/articles/2014/12/08/teletok-selects-kacific-for-satellite-broadband-solution/
12. http://www.broadbandcommission.org/documents/reports/bb-annualreport2014.pdf

Satellites play an important role in the telecommunications infrastructure of the Pacific Islands, reflecting the challenging geography of the region and the particular problems around bringing connectivity to a large number of small and often remote islands.

2 Contribution to economic and social development in the Pacific Islands

Mobile has had a profound impact on national economies worldwide, particularly in the areas of job creation and economic growth. Increasingly ubiquitous and higher speed mobile networks contribute to many aspects of economic, political and social life in both developed and developing regions.

Mobile is the predominant infrastructure in many emerging markets (including the Pacific Islands) and is often available to a larger proportion of the population than many other basic services, such as electricity, sanitation and financial. As a result, mobile is already helping to address a number of pressing social, economic and environmental challenges. These challenges are often particularly acute in developing regions, given factors such as high levels of poverty, rapid population growth, and in some areas, the vulnerability to natural disasters.

2.1 Mobile contribution to economic development

Mobile network operators, infrastructure service providers, distributors and retailers of mobile technology, and content and service providers constitute an ecosystem of interlinked industries with a strong and growing presence in the 21 countries of the Pacific Islands covered in this report.

In 2014, mobile technology made a huge and central contribution to the economy of the region. The total was US$1.8 billion in value added terms, a contribution of approximately 4.7% of the region's GDP. There were four elements to this impact:

1. The direct contribution of mobile operators
2. The direct contribution of the rest of the mobile ecosystem
3. The indirect impact on the broader economy
4. The increase in productivity brought about by the use of mobile technologies.

There are further positive social and economic impacts from mobile technologies which have not been quantified, for example the improved access to education, health and emergency services brought about by the use of mobile technologies in the region. The overall estimate should be seen as a conservative estimate of the overall impact from mobile technology.

The direct contribution from mobile network operators in 2014 was over US$500 million in value added terms (1.3% of the region's GDP). The mobile ecosystem of interlinked mobile services and industries generated an additional value of approximately US$155 million in the region, contributing 0.4% to the region's total GDP.

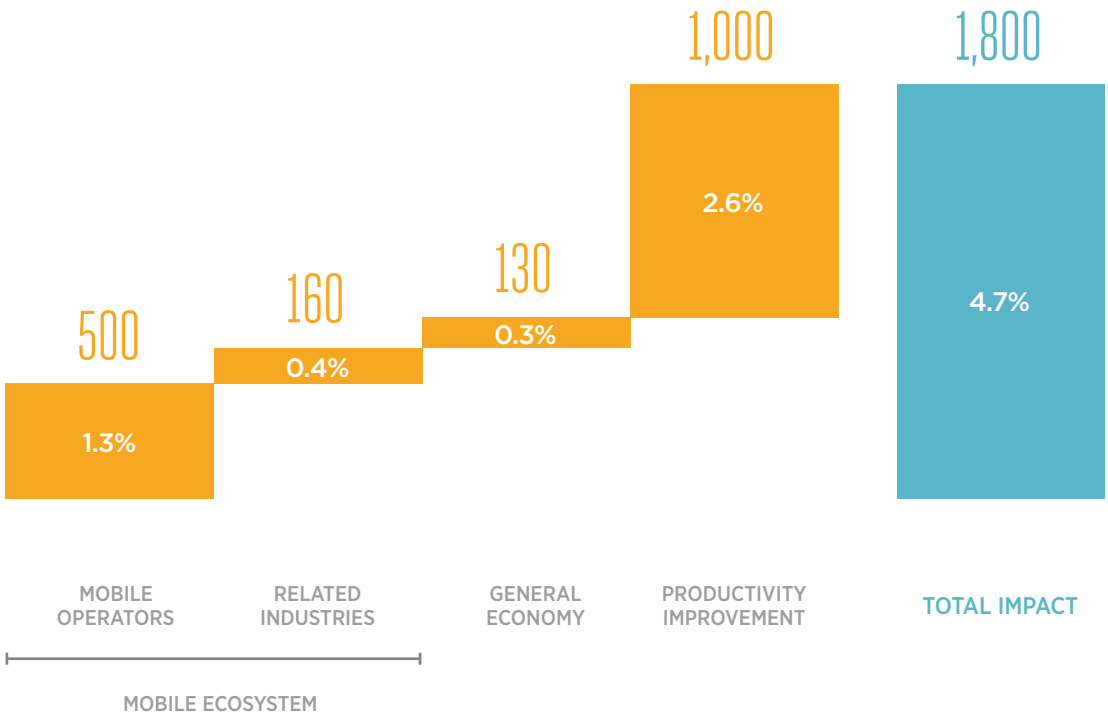
The economic activity directly generated by both mobile operators and the ecosystem has a broader knock-on effect on other sectors of the region's economies, inducing further economic activity in the supply chain. It is estimated that this effect generated another US$130 million, or approximately 0.3% of GDP.

As access to mobile phones and the mobile internet in the region continues to climb, more and more individuals and businesses can work more efficiently and at a lower cost. Mobile technologies continue to pave the way for the development of new business models and services which in turn also have a positive economic impact. The total productivity impact of mobile technology generated approximately an additional US$1 billion in value added in 2014, accounting for 2.6% of the Pacific Islands' overall GDP.

Source: GSMA Intelligence

Total (direct and indirect) contribution to GDP

(2014, US$ M)



Note: Total does not add up due to rounding.

THE DIRECT ECONOMIC CONTRIBUTION OF THE MOBILE ECOSYSTEM IN 2014

The direct economic contribution to GDP of the mobile ecosystem is measured by analysing the value added generated by companies operating in the sector across the 21 countries of the region[13]. Value added is estimated here as the total income generated by the industry to its employees (through the payment of wages and other compensation), to government (through tax contributions) and to shareholders (in the form of profits)[14].

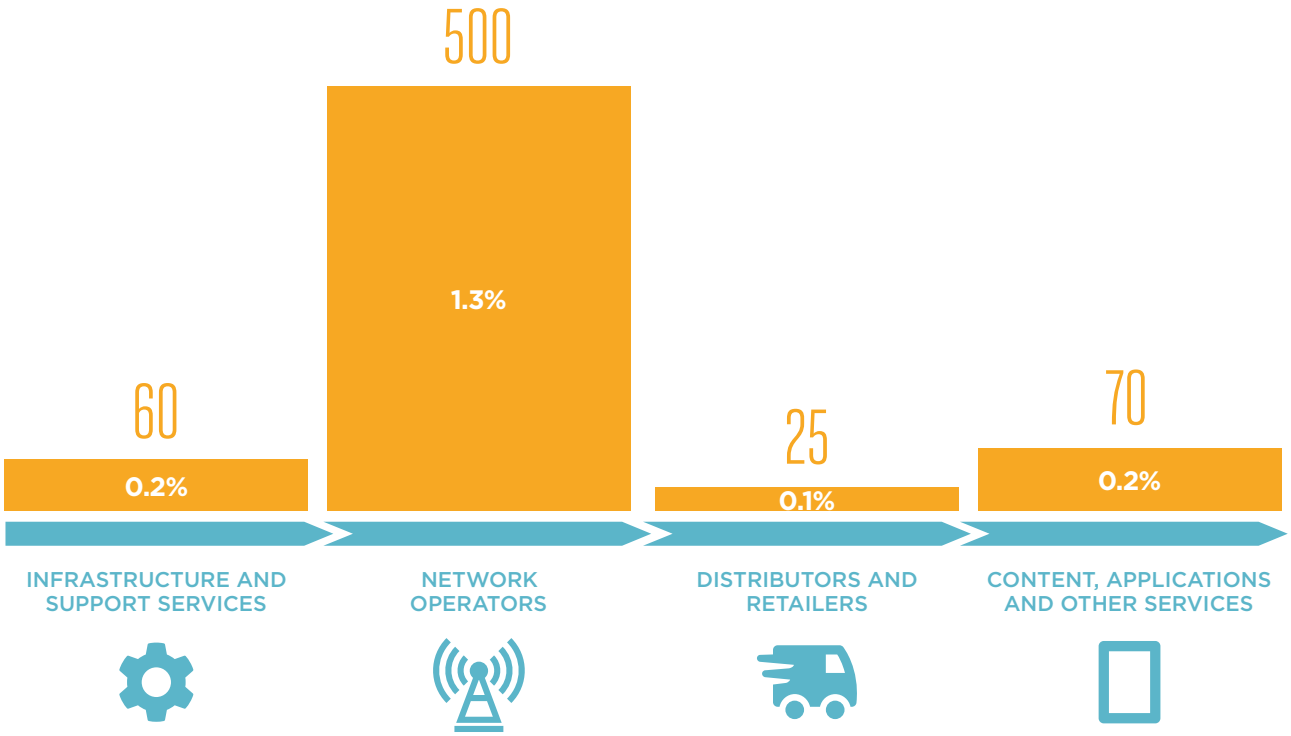
In 2014 the mobile ecosystem contributed a total of around US$655 million in value added (1.7% of GDP). Mobile operators are the largest contributors within the ecosystem with a contribution of just over US$500M, representing more than three quarters of the total economic contribution of the ecosystem. One of the distinct features of the mobile economy of the Pacific Islands is that almost all mobile handsets are imported from outside the region. Mobile devices have in any case a positive impact on the economy of the islands through the distribution and retail of imported handsets which generate revenues and jobs for local businesses and people.

13. Company information was obtained from GSMA Intelligence (https://gsmaintelligence.com/) and complemented where possible with further data provided by mobile operators in the region.
14. Value added by the sector can also be approximated as the difference between the value of sales made by the sector and the direct cost of making those sales.

Source: GSMA Intelligence

Direct GDP contribution of the mobile ecosystem

(US$ M, % 2014 GDP)



BROADER ECONOMIC IMPACTS OF MOBILE TECHNOLOGY IN 2014

The economic activity generated by the mobile ecosystem results in a positive economic impact in other sectors of the Pacific Islands' economy. For example, local transport and construction services in the islands draw part of their revenues from supporting the operations of extending and upgrading mobile network infrastructure. The same effect can be observed in many other sectors of the economy, including energy and professional services. It is conservatively estimated that this multiplier effect of the mobile ecosystem on the rest of the economy generated a value added of approximately US$130 million in 2014 (0.3% of GDP).

In addition to the direct and indirect contribution to GDP by mobile network operators and the mobile ecosystem, an estimated 2.6% of the region's 2014 GDP can be attributed to the increased productivity brought about by the use of mobile technology in businesses and the workplace. For example, mobile technology plays a key role in the development of financial services and e-commerce, and supports the growth of new services and business models in tourism, making viable an increasing number of smaller-scale tourist operations. This growth and productivity effect varies significantly by country and sector and has generated in total a US$1 billion contribution to the region's GDP in 2014.

Overall, considering direct, indirect and productivity impacts, in 2014 the mobile industry made a total contribution of US$1.8 billion to the economy of the Pacific Islands in value added terms, equivalent to 4.7% of the region's GDP. This contribution is significantly higher than the contribution from mobile technologies to the global economy, which is estimated at just under 4% in 2014.[15] The larger share of the mobile industry in the Pacific Islands is explained in part by the rapid growth in the use of mobile technologies in the region, which is helping the region's companies to partly catch up with the levels of productivity growth observed in other regions some years ago. Another factor is that relatively lower levels of economic activity in the region mean that the share of the mobile technology as a percentage of the overall economy is also larger.

15. http://www.gsmamobileeconomy.com/

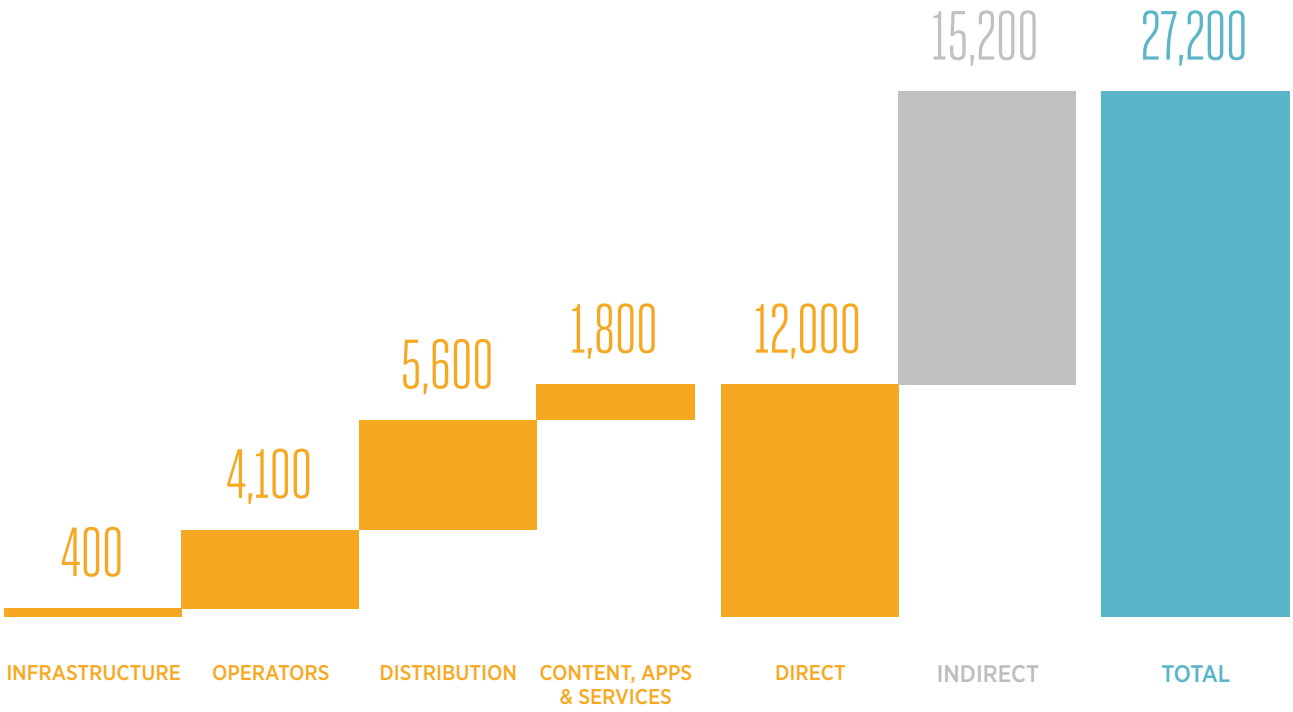
EMPLOYMENT AND PUBLIC FUNDING CONTRIBUTION IN 2014

In 2014 mobile operators and the ecosystem provided direct employment to approximately 12,000 people in the region. Most of this employment was generated by mobile network operators (4,000 jobs) and by companies involved in the distribution and retail of mobile handsets (5,500 jobs). An additional 2,500 jobs were generated through the provision of mobile infrastructure services and the provision of media and content, some of which is by local entrepreneurs.

Additional jobs were also indirectly supported as the industry's economic activity generated demand and jobs in other sectors, in particular in the direct supply chain of the mobile ecosystem. In 2014 approximately 15,000 jobs were indirectly supported, bringing the total impact (both direct and indirect) of the mobile industry in the region to approximately 27,000 in 2014.

Source: GSMA Intelligence analysis

Employment impacts in 2014



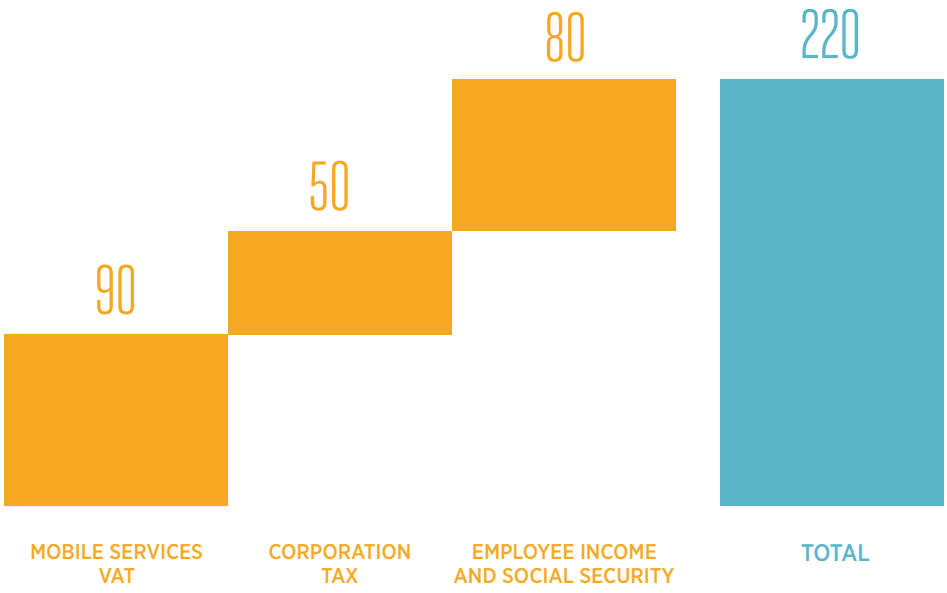
Note: Total does not add up due to rounding.

The mobile ecosystem also makes a very significant contribution to the funding of governments in the region. This includes value added tax on mobile subscriptions, corporation tax, and income and social security contributions made by the 12,000 people in the region which are directly employed in the mobile ecosystem. GSMA Intelligence estimates that the mobile ecosystem made a contribution to the public finances of governments of US$220 million in 2014.

Source: GSMA Intelligence analysis

Tax contribution by the mobile industry

(2014 million US$ M)



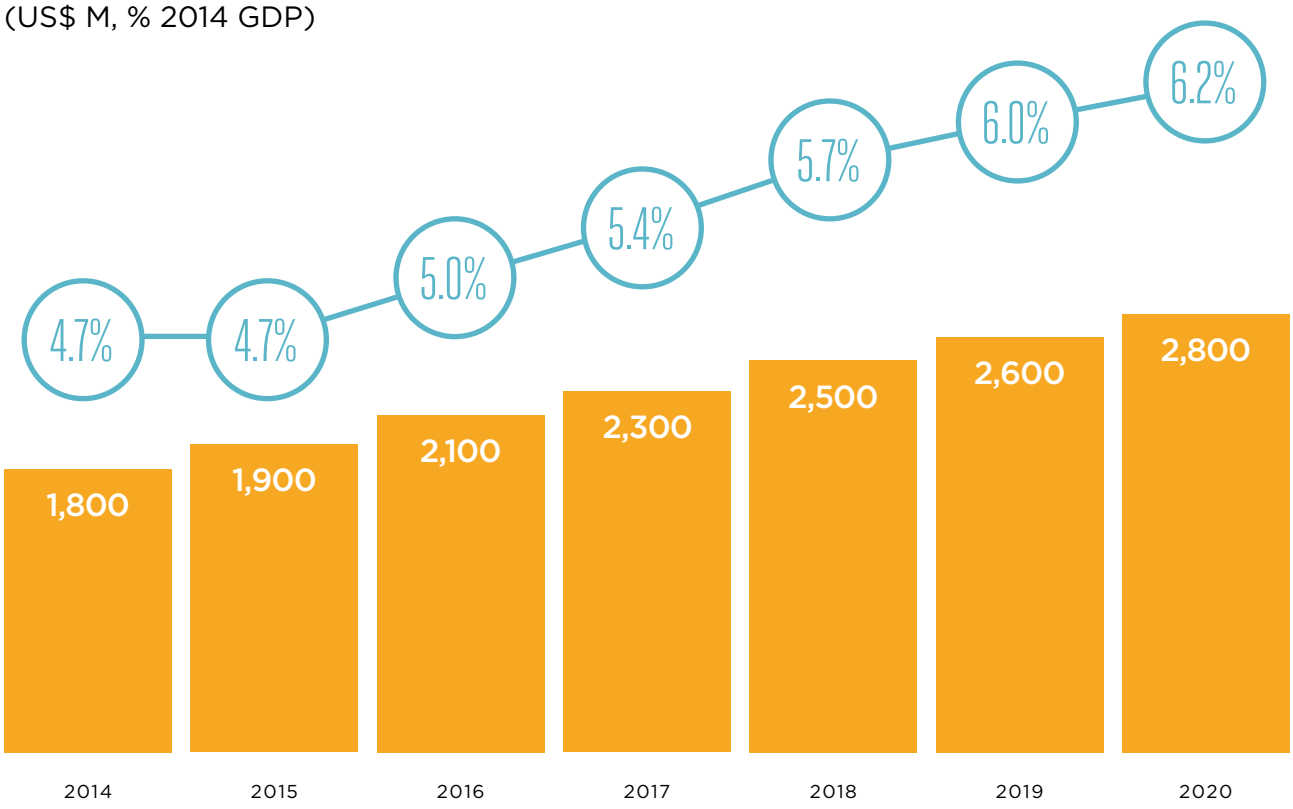
OUTLOOK AND TRENDS IN THE PERIOD 2015-2020

In the period to 2020 the value added generated by the mobile ecosystem and enabled by the use of mobile services will continue to grow. This growth will be experienced across all the key economic measures that have been considered in this report: value added, employment and the contribution to the funding of the public sector. By 2020, the total economic value added across the region will increase by around US$1 billion, reaching US$2.8 billion in 2020.

Source: GSMA Intelligence analysis

Mobile industry contribution to 2020

(US$ M, % 2014 GDP)



Footnote – In 2015, all major international organisations, including the International Monetary Fund, expect the GDP of the region to experience a one-off positive jump due to the start of large scale exports of natural gas from Papua New Guinea. As a result, and despite expected strong growth in the value added generated by mobile technologies of around 8% in 2015, the also very strong growth in the energy sector means that as a percentage of GDP mobile's contribution will remain stable at 4.7%. Once the one-off effect goes away from 2016 onwards the share of mobile as a proportion of GDP is expected to continue to grow until 2020.

As a percentage of GDP, the contribution of the mobile industry will also increase, from 4.7% in 2014 to 6.2% in 2020. This strong growth is higher than the growth that is forecast at the global level, which puts the Pacific Islands among the regions in the world where the impacts from mobile technologies will be most transformative from a socio-economic perspective during this period.

Source: GSMA Intelligence analysis

Economic value added: Pacific Islands compared to rest of the world

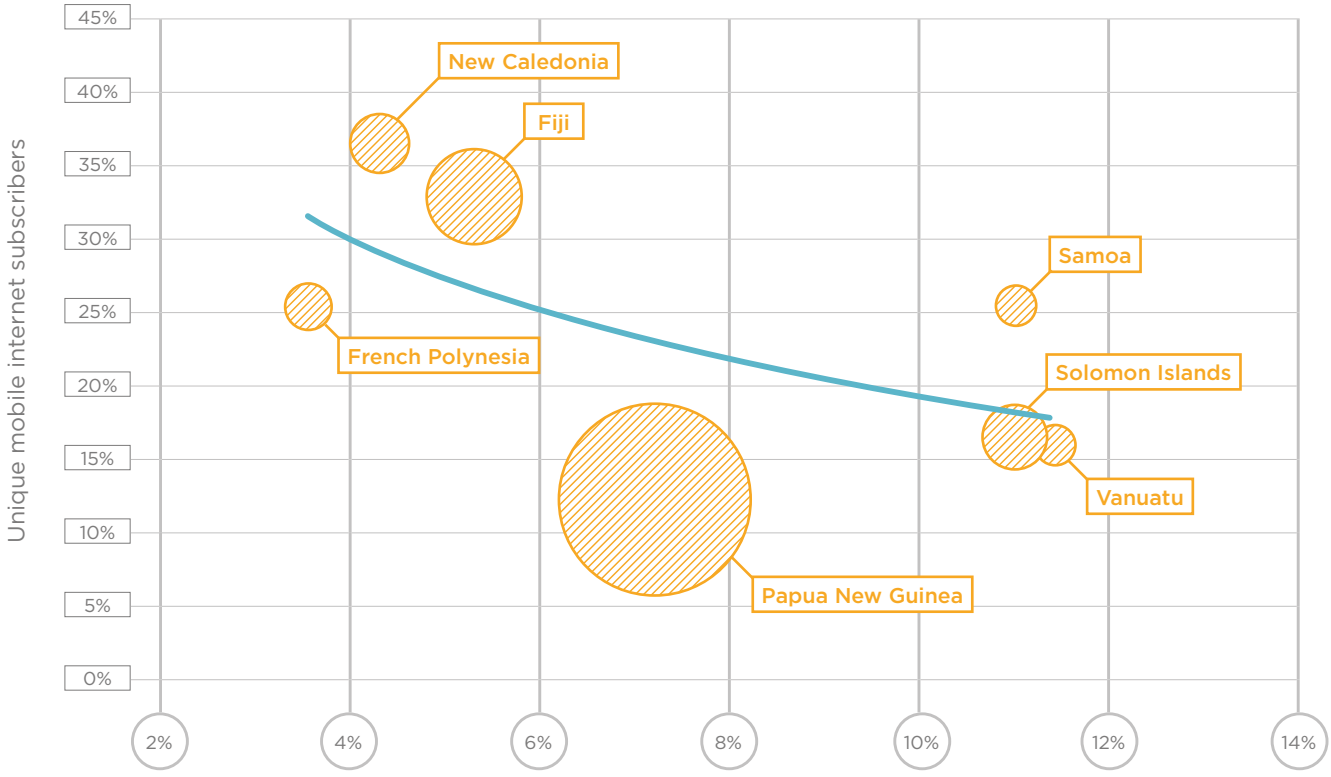
Approximately a quarter of the growth in economic value added during the period will originate from the growth in the mobile ecosystem itself. The growth in the number of mobile internet subscribers during this period will drive revenues and value added across the ecosystem. However, most of the growth in value added discussed above will be generated in the form of productivity gains to the economy and business creation enabled by the use of mobile services.

Growth in the period to 2020 is expected to be particularly strong in those countries with lower income levels and relatively low levels of mobile internet penetration such as PNG, Vanuatu and the Solomon Islands. There is less growth potential through productivity improvements where market penetration is already high, such as in New Caledonia and the French Polynesia, which are also amongst the countries with highest income per capita in the region. It is important to note that there is some upside to our projections in these higher income countries if the development of the internet of things and the roll-out of mobile broadband networks can start delivering efficiencies and lower costs for businesses already during this period.

Source: GSMA Intelligence analysis

Forecast of total value added generated by mobile technologies

2014, bubble size proportionate to size of market

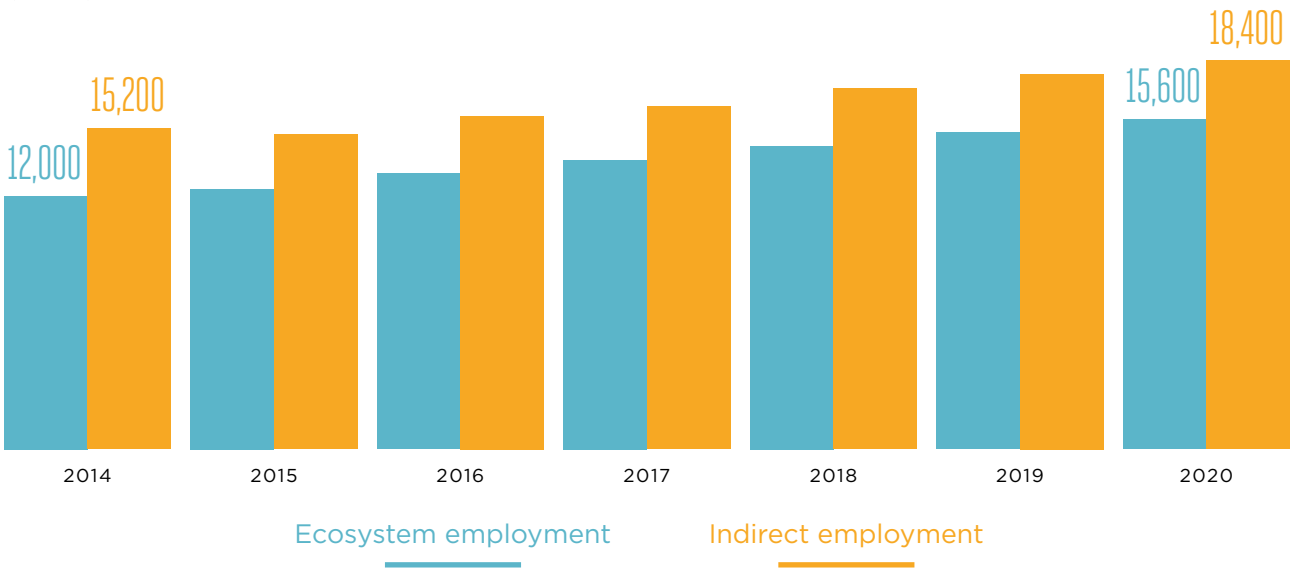


The total number of jobs both directly and indirectly generated by the ecosystem will also grow significantly in the period to 2020. The number of jobs created by the mobile ecosystem will grow from 12,000 in 2014 to nearly 16,000 in 2020. The growth in the economic activity generated by the industry will also result in more jobs in the broader economy throughout the period, reaching over 18,000 jobs in 2020 from around 16,000 in 2014. Similarly, the public funding contribution of the mobile ecosystem (excluding spectrum and other regulatory fees) will also grow over the period reaching approximately US$280 million by 2020 if tax rates remain at current levels, up from US$220 million in 2014.

Source: GSMA Intelligence projections

Employment projections in the period to 2020

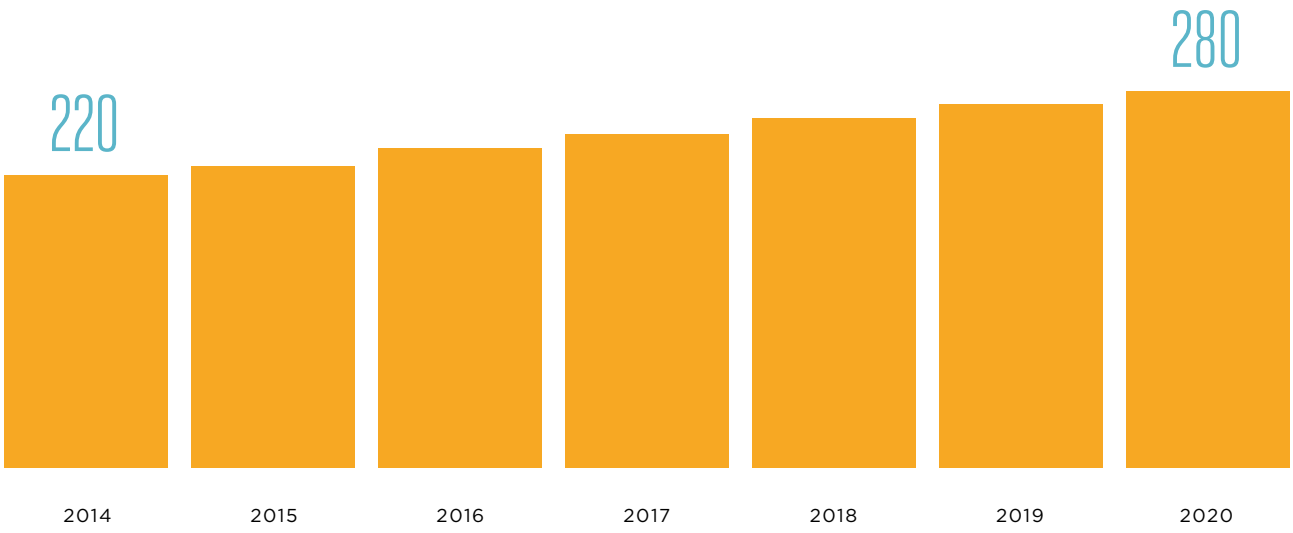
(Jobs)



Source: GSMA Intelligence projections

Public funding contribution

(US$ M)

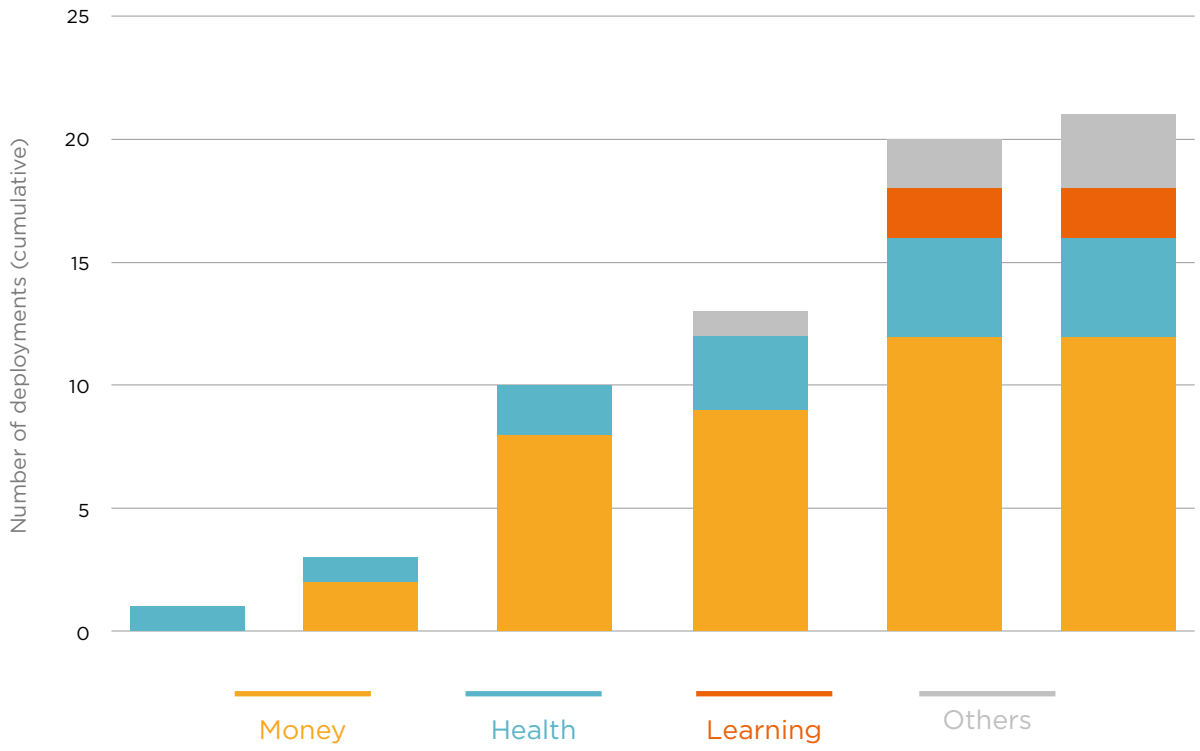


2.2 Mobile contribution to social development

In many developing regions, mobile phones are increasingly seen not just as an economic driver, but also as a driver of social development. Mobile connectivity through feature phones can provide communications and access to basic services to currently disadvantaged populations. Indeed, as mobile networks become more ubiquitous, mobile penetration rates are often higher than those for other basic services. As a result, mobile can act as an enabler when other more traditional delivery mechanisms fall short, and this is already being used to provide underserved populations with access to information and services.

Source: Mobile for Development Impact product and service tracker

Mobile-enabled product and service evolution, Pacific Islands



Note: Others includes mobile agriculture and NFC

Studies have shown that mobile services and access to the internet can also accelerate economic growth, especially in developing countries. For this reason, developing an ICT framework has become a priority for governments in the Pacific Islands. The vision set out in the Framework for Action on ICT for Development in the Pacific (FAIDP) is “Improved livelihood of the Pacific communities through effective utilisation of ICT”. The main goals of the FAIDP are access to affordable ICT, efficient and effective utilisation of ICT for sustainable development and adoption of ICT as a national priority in the Pacific Islands.

2.3 Digital Inclusion in the Pacific Islands

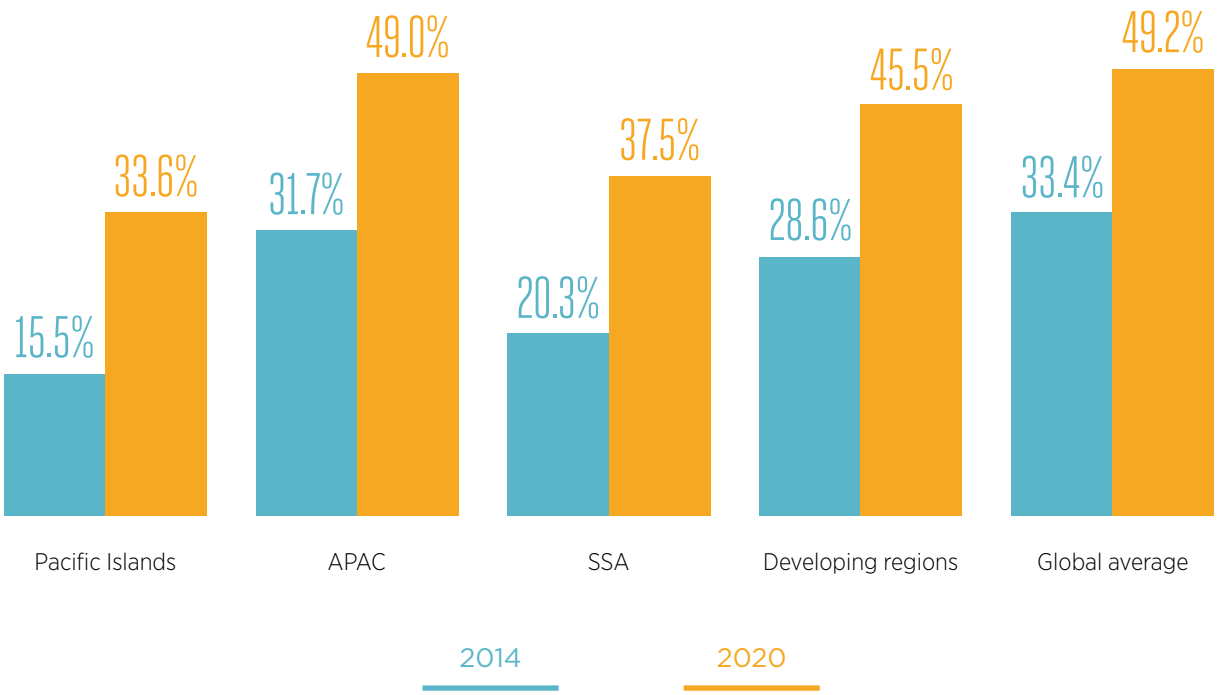
Mobile phones are bringing internet access to previously unconnected populations across the world, particularly in developing regions where there is a lack of alternative access technologies. Fixed broadband penetration on average across the Pacific Islands stands at less than 1% of the population, and where fixed connections do exist they are often prohibitively expensive.

Mobile internet access can create a virtuous cycle in developing countries. In the first instance, mobile connectivity using simpler feature phones can provide communications and basic services to currently disadvantaged populations. Mobile can act as an enabler when other more traditional delivery mechanisms fall short, and is already being used to provide underserved populations with access to information and services. Mobile and mobile internet access, particularly when provided over higher speed mobile broadband networks, can then act as a platform for the delivery of a range of more advanced applications and services, and act as a key platform for the delivery of broader ICT strategies and to promote both growth and sustainable development.

At the end of 2014, around 15% of the population across the Pacific Islands were using mobile devices to access the internet, equivalent to around 1.7 million individuals, a figure that has tripled in the last three years alone. Going forward, mobile internet penetration will reach around a third of the population by 2020, by which time an additional 2.4 million people across the Pacific Islands will gain mobile internet access. Over three quarters of subscribers will be accessing the mobile internet by this date on mobile broadband networks, up from just over half at the end of 2014.

Source: GSMA Intelligence

Mobile internet subscriber penetration



However, this will still leave mobile internet penetration rates in the Pacific Islands trailing both the averages for the broader Asia Pacific region and for the developing world as a whole. This lack of internet access compared to other regions in the world has the potential to hinder development opportunities and prevent the region from truly engaging in the information age.

Today the largest online network in the Pacific Islands is Facebook. As of November 2012, there were approximately 700,000 Facebook users in the Pacific Islands. The countries that are driving this growth are PNG, where the total number of Facebook users has tripled since mid-2011, and then Fiji and Samoa.

The GSMA launched its Digital Inclusion programme in April 2014 to expand global connectivity and increase mobile internet adoption. The programme will collaborate with mobile operators, governments, internet players and non-government organisations to address four key barriers to mobile internet access.

- **Network infrastructure and policy:** increasing network coverage to currently unserved areas.
- **Affordability and taxation:** the combination of low incomes, the cost of the device, charging fees, and data plan payments creates an affordability barrier to accessing the mobile internet. This issue is compounded by government taxes and fees, such as airtime taxes and handset taxes.
- **Consumer barriers:** Illiteracy, digital illiteracy and lack of internet awareness are consumer barriers to mobile internet adoption.
- **Local content:** the availability of content that is both local language and locally relevant can play a vital role in the adoption of mobile internet.

2.3.1 Network infrastructure and policy: extending coverage to currently underserved areas

Network coverage is critical for access to the mobile internet, particularly higher speed networks that allow consumers to utilise a range of new services and applications. At the end of 2014, mobile operators reached a little over 40% of the population in the Pacific Islands with higher speed mobile broadband (3G) networks, slightly below the coverage seen in SSA and well below the developing market average, which stands at approximately 70%.

A large proportion of the still unconnected population lives in rural and in some cases geographically remote areas. Many states are fragmented into a large number of small islands, and the region as a whole often referred to as being 'sea-locked'. The lack of electricity infrastructure and a low road density can provide extra obstacles to extending network coverage, which negatively impacts the economic case for mobile operators to expand networks in these areas.

There are a number of measures that can be taken both by industry players and by governments and regulators to help address these issues. Infrastructure sharing is a solution that can help reduce the cost of extending network coverage, particularly into remote areas. It has the potential to strengthen competition and reduce the carbon footprint of mobile networks, while reducing costs.

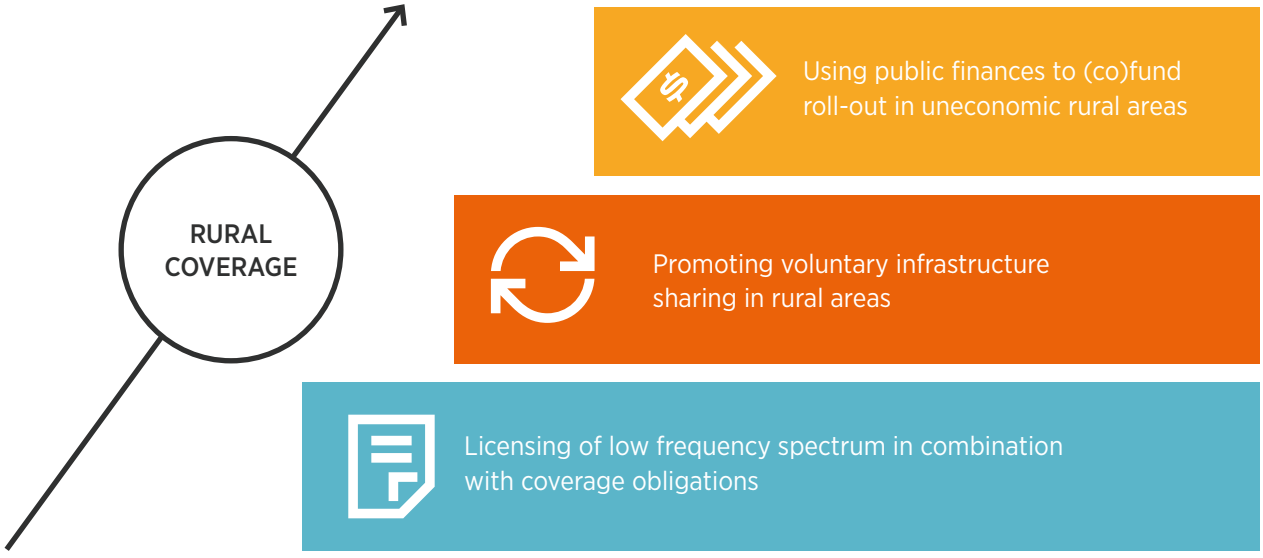
Mobile operators in many developing regions are employing a wide array of solutions to tackle the challenge of off-grid connectivity, including the growing use of 'green' options such as solar, wind, water, biomass and fuel cells. Such alternatively powered cell sites can significantly decrease diesel costs (which are often the primary power source in areas off the main electricity grid) and therefore reduce operating costs and maintenance burdens of rural cell towers. There are a number of examples of these green deployments across the Pacific Islands. Digicel in Vanuatu has deployed hybrid wind/ solar powered base stations, with a total of 25 of these deployed in the country, while Vodafone in Fiji and Digicel in PNG have also deployed a number of hybrid powered base stations.

The particular geographical challenges of the region mean that complementary alternative access technologies are likely to continue to play a role in the region. The role of satellite communications has already been highlighted in the report, and particularly for some of the more sparsely distributed and relatively small populations this role is likely to continue.

Recent research by Frontier Economics examined the role of network competition in promoting rural mobile coverage. Evidence from more than 200 countries over a 15 year period shows that network competition has driven mobile coverage further and faster than has been achieved by single networks. There are also complementary measures that governments can take to promote mobile coverage in rural areas. For example, there may be some rural areas where the economics are too challenging for network competition to deliver coverage, which may require some form of government intervention.

Source: Frontier Economics

Complementary government policies to promote rural coverage



2.3.2 Affordability and taxation

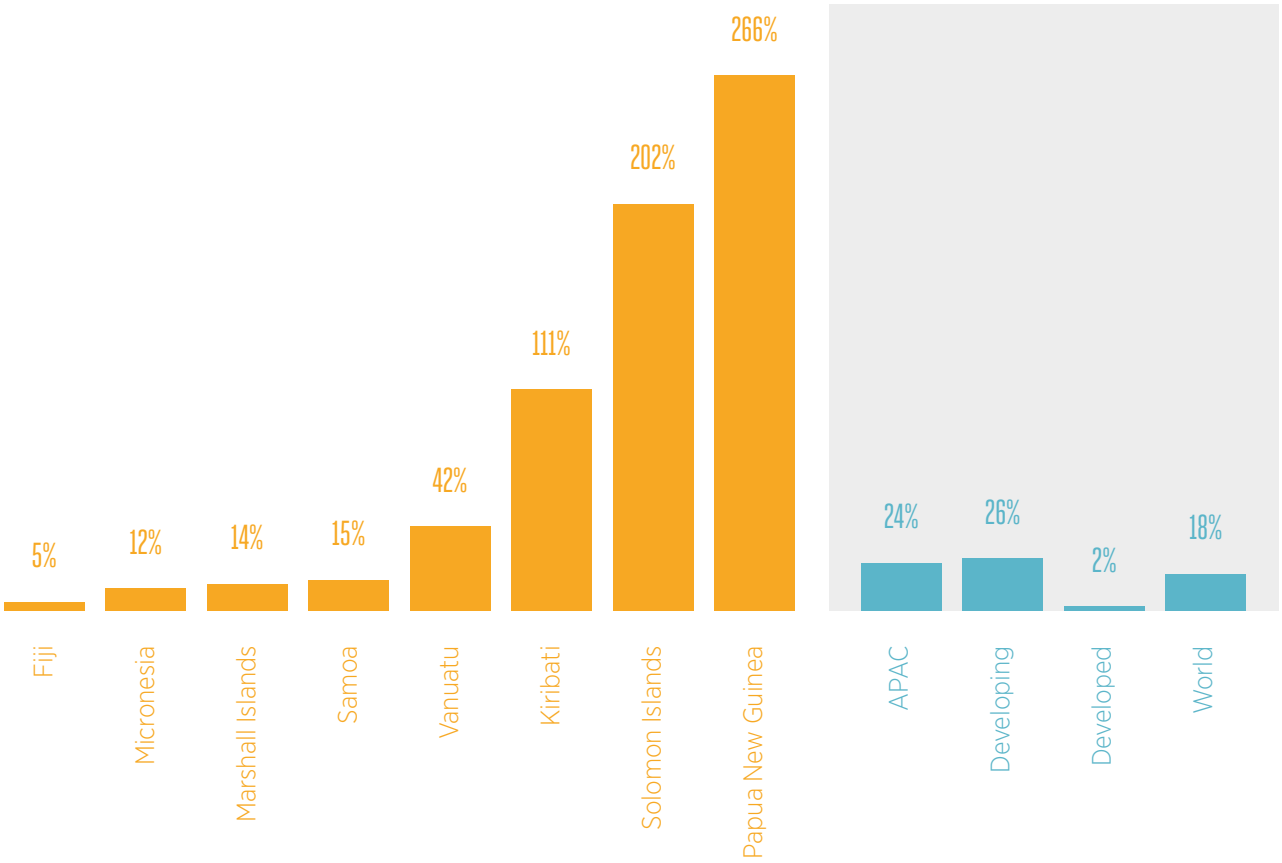
Unconnected populations in many developing regions suffer from high levels of poverty, and this is a particular challenge across many Pacific Islands. Poverty in the region has been exacerbated by a prolonged period of relatively weak economic growth, population growth and increasing urban migration.[16] As a result, individuals face difficult choices on a daily basis about how to spend their cash resources, which means that mobile connectivity remains beyond the reach of many people.

The ITU has estimated how much ICT services cost relative to the economic value generated by each country. The affordability target set by the Broadband Commission for 2015 is a maximum of 5% of GNI per capita.[17] In the Pacific Islands, the price of mobile services ranges from 4.8% of GNI per capita in Micronesia to 16.1% in PNG.

Broadband, both fixed and mobile, is even less affordable compared to basic mobile services. Fixed broadband prices as a percentage of GNI vary from 5.2% in Fiji to over 100% in Kiribati, Solomon Islands and PNG. Prices for mobile broadband are more affordable – under 35% of GNI per capita – however they are still far from the target of 5% of GNI per capita.

Source: ITU

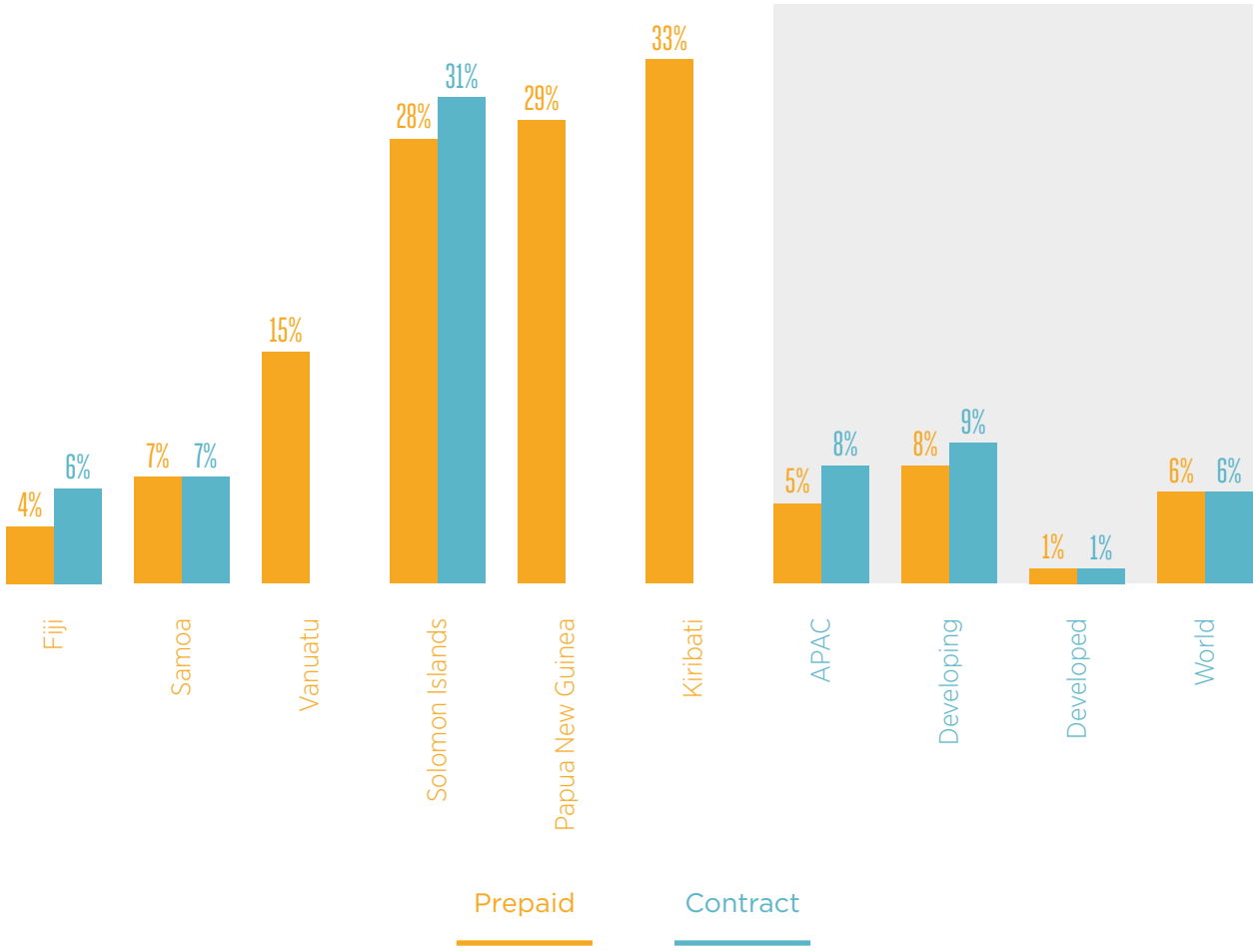
Fixed broadband prices as a percentage of GNI per capita



16. http://www.oxfam.org.nz/what-we-do/where-we-work/poverty-in-the-pacific
17. GNI: gross nation income per capita, which is GPD plus the income received from overseas

Source: ITU

Mobile broadband prices as a percentage of GNI per capita



There have been considerable efforts over recent years, both by mobile operators and other ecosystem players, including device manufacturers, to improve the affordability of mobile services. Operators have played a role in improving the affordability of mobile services, particularly with regard to mobile data and internet access, and the challenge of making these services available to low income consumers on prepaid tariff plans[18]. A range of flexible tariffs are now available from operators focusing on mobile data. For example Vodafone Fiji offers flexible prepaid plans which are priced based on the days of use or the amount of data.

In PNG, bmobile offers data bundles valid for 1, 3, 7, 14 or 30 days. These allow users to access the internet for a period of time or alternatively allow full access to a particular website.

Smartphone adoption will be enabled by ongoing reductions in handset pricing. A number of smartphones in the US$25-50 price range were launched over the last year, such as the Mozilla Firefox smartphone, with new models from several handset manufacturers. These launches only mark the start of a price expansion trend towards low-cost levels that will spread to more developing economies.

18. https://gsmaintelligence.com/files/analysis-subscription/?file=131205-prepaid-data-tariffs.pdf

2.3.3 Consumer barriers and local content

Two main barriers for consumers in accessing the internet are literacy and awareness. Literacy remains a significant barrier to internet access in developing regions. While there has been significant progress in reaching the goal of universal primary education, adult illiteracy remains a challenge in a number of countries across the Pacific Islands. Whilst declared adult literacy rates for many countries are around the 70% level, research has suggested that the true or 'functional' literacy rates are significantly lower[19].

Combined with an overall lack of awareness about the internet and its potential uses and benefits, these factors create a significant barrier for mobile internet adoption, even where coverage and affordability issues have been addressed. Building awareness of the internet and needed skills in the developing world will require help from multiple stakeholders to deliver awareness through campaigns and literacy training programmes.

In Fiji, a key element of the country's national broadband plan has been the establishment of telecentres. Through partnerships with the World Bank and key industry players such as Telecom Fiji and Vodafone, which provides support with infrastructure, several centres are being set up. The first telecentres were launched in 2012 in schools and in local centres to serve the surrounding community. Many of these potential users consist of people who have never used the internet before, therefore assistants are available in the telecentres to help people learn how to use the internet.

The availability of local content can play a vital role in the adoption of mobile internet. In Fiji, Vodafone has been trying to address this problem by launching the first local App-Store, the V-app Store. The purpose of this initiative is to have localized apps for local situations that serve local needs. Apps like shopping, banking, cinema, news, sports, information, lifestyle, travel, education and fashion can all be customized for the Fijian market, which should make them more relevant for the local population.

2.4 Delivering financial inclusion in the Pacific Islands

In many Pacific countries today, fewer than 10% of adults are thought to have access to basic financial services. Challenging geography, poor infrastructure and the high costs associated with delivering services to sparse populations are barriers to financial inclusion in the region.

A range of players are looking to address the issue of financial inclusion in the region, including governments, mobile operators, financial institutions and other stakeholders. The United Nations Development Programme (UNDP) and the UN Capital Development Fund (UNCDF) launched a joint project, the Pacific Financial Inclusion Programme (PFIP)[20], to help provide sustainable financial services to low income households in the Pacific. The programme, now in its second phase, aims to increase financial inclusion across the region by ensuring that Pacific Islands implement national financial inclusion strategies that address the affordability of financial services, increase financial literacy and education, and lower barriers to entry[21].

19. http://devpolicy.org/in-brief/alarming-literacy-gap-in-the-pacific-20131122/
20. http://www.pfip.org/
21. http://www.sids2014.org/index.php?page=view&type=1006&nr=2451&menu=1507

Mobile has played a key role in accelerating the adoption of these services. Today there are a total of 11 live mobile money services available to the unbanked in six different countries across the Pacific region: two in Fiji, five in PNG, one in Samoa, one in Solomon Islands, one in Vanuatu and one in Tonga. Six of the eleven services are operationally run by mobile operators. At the end of 2014, there were a total of 595,000 registered mobile money accounts in the region, though just a quarter of the accounts were active[22]. At the end of 2014, there were almost 4,000 mobile money agents across the region, over 80% of which were active[23].

Fiji was the first county in the region to have launched a mobile money service in 2010. Services are now offered by both mobile operators: Digicel and Vodafone. Today, 169,000 underserved people have been reached through mobile money services. There has been a generally supportive and enabling regulatory regime in Fiji towards mobile money services, and in 2014, the two providers signed a Trust Deed Instrument with the Reserve Bank of Fiji to further protect customer funds. In 2011, the Department of Social Welfare (DSW) launched government-to-person (G2P) payments, and 23,000 social welfare clients are now paid through electronic savings account. This was the first large scale transfer of G2P welfare payments of its kind in the Pacific[24].

In 2012, Digicel Tonga launched a commercial NFC service, 'Beep and Go'. The service won Best NFC Category at the Connected World Forum Awards in 2012, and in 2013 it won the Best Consumer Innovation Award at the Global Telecoms Business Innovation Awards. 'Beep and Go' is the world's first integrated NFC capable wallet. It works by linking an NFC POS (point of sale) terminal to a mobile money wallet, without the need of a credit card or smartphone. It offers customers a range of promotions and an expanded network to make payments easier and more convenient. Digicel has seen over 50% of mobile money users register their accounts to an NFC tag, and a 30% increase in unique users of mobile money services[25].

Providers in the region have also shown some success in increasing the penetration of financial inclusion amongst women. MiCash was launched by Nationwide Microbank in PNG in 2012, in a market where only 15-20% of the population were estimated to have access to financial services. The uptake of the service was particularly strong amongst women, with women accounting for around 38% of the customer base and using the service primarily for savings. The company also undertook a number of local marketing campaigns, for example visiting villages and plantations, in order to educate women on financial services and the benefits of using mobile money[26].

While a growing proportion of the population in the Pacific Islands have the technology that allows them to access financial services, more needs to be done to educate potential users. A survey conducted by the PFIF in Fiji in 2012 suggests that most people are aware that mobile money services exist, but do not have a good understanding of how the service could be relevant to them and their financial needs. Frequent mobile money users surveyed cited both convenience and time saving as the biggest advantages of using mobile money. From the survey results, the price of transactions did not appear to be a limiting factor, even among lower-income users[27]. In order to increase awareness and on-board new potential customers, mobile operators are increasingly partnering with other trusted local brands including post offices, banks, microfinance institutions and insurance companies.

22. Based on a 90-day cycle
23. Based on a 30-day cycle
24. Source: Pacific Financial Inclusion Programme
25. Source: Digicel Tonga's "beep & go" wins best NFC category at connected world forum awards, Digicel, November 2012
26. http://www.gsma.com/mobilefordevelopment/reaching-half-of-the-market-women-and-mobile-money-the-example-of-nationwide-microbank-in-png
27. Source: Mobile money attitudes and perception omnibus survey, PFIP, February 2012

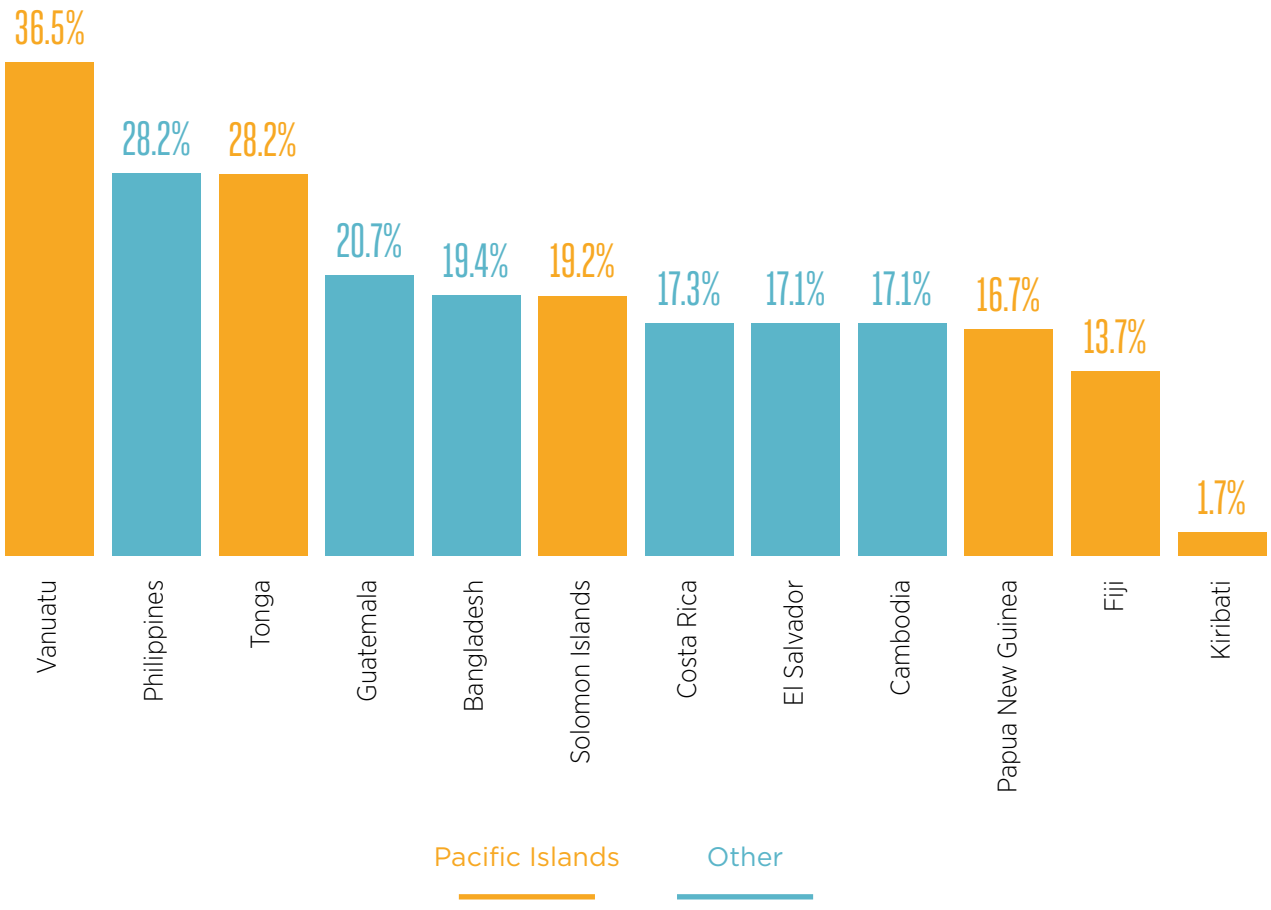
2.5 Disaster Response

The Pacific Islands is one of the world's most vulnerable regions to natural disasters. According to the UN World Risk Index (WRI)[28], Vanuatu is the country with the highest probability in the world that an individual is affected by a natural disaster. This ranking has been underlined by the devastating impact of the cyclone which recently struck the country.

Tonga, Solomon Islands and PNG are also among the top ten countries at risk. The index takes into account both external and internal factors, combining the exposure of countries to natural hazards and the social, economic and ecological conditions within these countries. In the Pacific Islands, exposure, vulnerability and lack of coping and adaptive capacities are the main factors that contribute to the high probability of individuals being affected by natural disasters. The two most frequent types of disasters in the region are hydrological (flooding and water movement) and meteorological (storms).

Source: UN World Risk Report 2014

Probability of an individual becoming the victim of a natural disaster



28. The components of the World Risk Index are: exposure (exposure of the population to natural disasters), vulnerability (sum of susceptibility, lack of coping and adaptive capacity), susceptibility (dependent on public infrastructure, nutrition, income and general economic framework), lack of coping capacity (dependent on governance, medical care and material security) and lack of adaptive capacity (related to future natural events and climate change)

In times of disasters, isolated communities become even more isolated, particularly when communications infrastructure is damaged, and this is where operators have an obvious, but critical role. It is crucial that emergency lines or other forms of back-up communication systems are already in place and maintained such that communities at risk are easily reached before, during and post emergency situations.

There are numerous examples of how mobile operators and governments have used mobile phones to coordinate disaster preparedness, response and assessment activities across the region. Digicel has worked with Government Agencies across the Pacific to provide SMS warning alerts to key agencies across the islands in times of emergency. In Vanuatu, the National Disaster Management Office (NDMO) established a short code emergency number allowing people to easily receive disaster warnings and alerts. In addition, NDMO has developed an SMS impact reporting tool, where assessment data can be sent using the short code number. The data received via SMS is disaggregated and synchronised with Ushahidi, a free open source crisis mapping platform, which provides a visual representation of affected areas to inform response efforts.

When Cyclone Pam hit Vanuatu, Digicel responded to the disaster by restoring connectivity in the capital within a few days, deploying public charging stations across the islands so that people could charge their phones and providing a total of US$250,000 free credit to their customers to allow them to continue to communicate with their families despite top-up difficulties. Regular updates on network restoration have been provided via social media to keep subscribers informed of the network status and to alert them of the emergency response activities being undertaken by the operator. Digicel began its activities even before the cyclone struck, pre-positioning fuel for use in back-up generators and moving network engineers to strategic points enabling them to respond rapidly to restore networks in the aftermath of the cyclone.

During natural disasters, networks can go down, especially if back-up systems are not in place. An alternative solution to ensure communication during these black-outs is satellite communication. The Pacific Islands Telecommunications Association (PITA) and the International Telecommunications Unit (ITU) have launched a project to connect rural villages through satellite communication. One of the objectives of the project is to provide emergency telecommunications to help individuals during disasters, and E-centres will serve as the hub for emergency telecommunication when disaster strikes.

2.6 Tackling the gender gap in the Pacific Islands

Recent research by the GSMA's Connected Women programme has found that, on average, women are 14% less likely to own a mobile phone than men. 54% of women in low and middle income countries in East Asia & Pacific do not own a phone, or 531 million women. As well as the ownership gap, there is also a usage gap between men and women. Even when women own a phone, they use it less frequently and intensively then men, especially the mobile internet.[29]

A study carried out in PNG shows that only 16% of women at the bottom of the pyramid (BOP) own a mobile phone, but 55% have access to a mobile phone. The main reason for not owning a mobile phone is affordability, but more than half would be interested in purchasing one. In addition, 35% of BOP women surveyed were not comfortable with making a call, and just over half could not send an SMS.[30]

The main barriers to mobile ownership and usage identified by women are affordability (handset cost, SIM cost, credit cost and battery charging cost), network quality and coverage, security and harassment, operator/agent trust and technical literacy. Cost remains the greatest barrier overall to owning and using a mobile phone, particularly for women in developing regions, who often have less financial independence than men. Improving affordability, especially of handsets, will disproportionately benefit women and help to close the gender gap in mobile phone ownership.[29]

In the Pacific Islands, operators and other key players have worked together to overcome technical and language literacy barriers. Technical literacy and confidence is a particular concern for women in this region, who are typically less educated, less confident with technology, and have more basic handsets than men. In PNG, the Connected Women programme has developed a 'Mobile Skills' toolkit that mobile operators and other stakeholders can use to help their female customers overcome technical literacy issues. The toolkit explains key mobile functions such as SMS, mobile money, and bill payment, mainly through visual and audio resources to account for low literacy levels.

Other examples of services launched in the Pacific Islands targeting women are Tapuaki, a website and smartphone app that allows Pacific Island mothers and other members of the family to find information leading up to, during, and after pregnancy. The app and the website are available in local languages. Another example is an SMS-based interactive counselling and advisory channel launched in Fiji by Fiji's Goodwill Ambassador for Women, Madam Nazhat Shameem. Today, more than 25,000 subscribers receive information and awareness on child abuse, sexual assault, rape and domestic violence, and 11,000 enquiries were received for advice on avenues to seek redress and support. A further example is an SMS advisory service in Fiji on sex education a range of health related topics. It has reached over 50,000 subscribers and continues to raise awareness on diseases with the engagement of a panel of doctors.

Closing the gender gap in mobile ownership and usage in low- and middle-income countries can have substantial benefits to women and the society. For women, access to mobile phones and services offers the benefits of feeling connected, autonomous and safer, the ability to access critical information and services, and the potential to access increased employment and education opportunities. In addition, ensuring the increase in ownership and usage of mobile phones among women could add an additional US$170 billion globally to the mobile industry by 2020. In East Asia & Pacific, this opportunity is around US$17 billion by 2020[31], around 80% of which will come from closing the usage gap[29].

29. Source: Bridging the gender gap: Mobile access and usage in low and middle-income countries, GSMA Connected Women, March 2015
30. Source: Striving and Surviving in Papua New Guinea: Exploring the Lives of Women at the Base of the Pyramid, GSMA Connected Women, November 2014
31. Excluding China

Key stakeholders can work together to address some of the main barriers. Mobile industry key players can design solutions to bring low cost devices to customers (e.g. microloans, monthly instalments and creating partnerships between mobile operators and handset manufacturers), introduce more creative pricing to appeal to women's price sensitivity, develop relevant services for women, and, where men make decisions on the women's access to mobile, create marketing campaigns targeting men to reach women. In addition, to address the technical literacy barriers, mobile operators and other industry players can design services to meet the needs of women who are less literate and ensure that pilots and user testing of services include women. Policy makers and the development community also have a role to play to help women overcome these barriers and drive mobile adoption. These recommendations create an opportunity for stakeholder to accelerate the uptake of mobile technology by women in low and middle income countries.

2.7 Mobile addressing a range of other social challenges in the region

Mobile operators and other players have launched services to address social issues in areas such as agriculture, health, and learning. In 2013, Digicel Fiji launched Makete, a USSD-based[32] platform for farmers that allows buyers and sellers access to live prices for crops. The service reflects a government strategy of import substitution, to increase local production of certain foods and to help supply the tourist industry. In 2014 in Fiji, Vodafone launched mFarmacy in collaboration with the Western Charity Alliance, which is focussed on providing information on farming practices to ensure that healthy produce reaches the market.

Four health services have been launched in the Pacific Islands, three of which are in PNG, and one in Fiji. In PNG, Digicel launched Femili Seif hotline in partnership with Yumi Lukautim Mosbi (YLM) project, a network of organisations looking to create a just, safe and secure society. Femili Seif aims to assist women and children who are victims of violence or abuse, by providing a free 24 hour rapid-reaction communications and transport service. The service is available in Port Moresby, Lae, Rabaul, Madang, Mount Hagen and Goroka.

The second service in PNG is Haus Lain. It was launched in 2012 by Population Services International, a global health organization, with the support of the Australian Agency for International Development (Australian AID) and in partnership with the mobile technology agency MobiMedia. Haus Lain provides tips on a wide range of health issues, from maternal health, preventing child and infant death from diarrhoeal disease and malaria, prevention of the transmission of HIV and sexually transmitted infections, and helping married couples better communicate to maintain strong, healthy relationships. Any Digicel mobile service user in PNG can join the service and receive free, weekly health tips.

Also in PNG, APuHC launched an mHealth project for neuro-cognitive disorders in HIV patients in 2011. This project aims to screen HIV patients for neuro-cognitive disorders through a multi-disciplinary collaboration of neurologists, sociologists, information technologists and HIV experts. In Fiji, Vodafone launched F-One, a service that provides daily health and fitness information through SMS.

Both of the mobile operators in Fiji have launched mobile learning services. The Vodafone ATH Foundation has ongoing projects that aim to improve education and health in schools. Vodafone is working with charity partners to bring their mobile service program to primary and secondary schools. Digicel had launched a tablet learning project to enhance learning in the region by handing out tablet to students to use for free.

32. Unstructured Supplementary Service Data (USSD)

3 Policy: Supportive and collaborative action

3.1 Spectrum – a scare resource requiring careful management

Realising the enormous socio-economic potential of mobile broadband connectivity, both in the Pacific Islands and more generally across the developing world, will depend on the timely release of suitable spectrum. Data traffic is set to grow by a factor of up to ten times over the next five years[33], as more people go on line and businesses go digital. Without sufficient spectrum, mobile calls will not connect, web pages will not load, apps will not update and videos will freeze. In many countries, sparse fixed-line networks mean the majority of the population is solely reliant on mobile connectivity to access the vast repository of information and services available over the internet.

The International Telecommunication Union (ITU) estimates between an additional 1340MHz and 1960MHz of spectrum will be required to meet the anticipated global demand in 2020. 2015 is an important year in this regard, seeing both the ITU's global deadline for the digital switchover (DSO) (June 17th), as well as the World Radiocommunication Conference in (WRC-15) in Geneva.

While management of this scarce resource is primarily the role of national governments, international coordination is crucial. Spectrum allocations need to be harmonised internationally to enable the industry to realise economies of scale and deliver affordable handsets and equipment. Governments should, wherever possible, adopt internationally agreed band plans, thereby reducing the cost of developing and manufacturing a wide range of mobile equipment, from network base stations to handsets and tablets. Although mobile devices can support multiple bands, each additional band increases the device cost, reduces the receiver's sensitivity and drains the battery. Operators require large blocks of contiguous spectrum in order to provide mobile broadband connectivity on a cost-effective basis.

Moreover, spectrum needs to be licensed in a way that does not curb mobile operators' ability to invest in new networks and services. Using spectrum licenses to raise as much cash as possible can be counterproductive in the mid-term. Levying excessive license fees on mobile spectrum will reduce the money available for network deployment, increase consumer prices and limit the potential economic benefits of mobile broadband.

33. http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.html

3.1.1 Digital dividend spectrum

Digital dividend spectrum (in the 700MHz band) is of particular use for cost-effective build-outs of mobile broadband networks, particularly in rural areas, as it requires fewer base stations to provide coverage as compared to higher frequency bands. Freeing this spectrum for mobile use, through accelerating the switchover from analogue to digital television, and then licensing this spectrum for mobile use, will be of great importance for the Pacific Islands if the region is to reap the full potential of mobile broadband connectivity for its local populations.

There is growing momentum behind the adoption of the APT700 (Asia Pacific Telecommunity 700MHz) band plan across the broader Asia Pacific and Latin American region, particularly the policy commitment to work towards implementation of the APT700MHz band plan from the 6th APT Policy and Regulation Forum for the Pacific.[34] PNG was also one of the very first countries to commercially release the 700MHz spectrum. Spectrum harmonisation also helps to ensure global economies of scale and will reduce interference issues along borders and promote international roaming.[35]

When considering the DSO, the Pacific Islands should assess how much spectrum the broadcasting industry will need in the future, with digital compression allowing more efficient use of bandwidth. To avoid further TV channel replanning in the future, the GSMA recommends that administrations assess likely future requirements for digital channels in the VHF and lower part of UHF during the DSO.

34. http://www.aptsec.org/sites/default/files/2013/08/PRFP-6-OUT-02-PolicyStatementr3.docx
35. https://gsmaintelligence.com/research/2013/5/asias-apt700-band-plan-leads-the-way-to-large-scale-4g-lte-growth/387/

3.1.2 The case for future spectrum identification at WRC-15

The outcome of the WRC-15 will be the single most important factor determining the future availability of affordable, ubiquitous, high-speed mobile broadband services. The event will see administrations from around the world agree on changes to international spectrum allocations, and associated regulatory provisions, with a major focus on making additional bands available for potential mobile broadband use.

In the absence of new spectrum allocations at WRC-15, governments will find it difficult to release enough spectrum to accommodate the ongoing rise in mobile traffic, resulting in a poorer experience for end-users and potentially more expensive mobile services. It takes about eight to 10 years to re-allocate, re-assign and re-license spectrum, so WRC-15 will play a pivotal role in avoiding a capacity crunch in the next decade.

The GSMA has identified four frequency ranges within which the spectrum requirement for future mobile broadband could be best satisfied and where existing services could continue to use parts of the bands through coordination and spectrum planning. These bands, which include a portion of the C-Band (3.4-4.2GHz), should be identified for International Mobile Telecommunications[36] (IMT) at WRC-15. The C-band is one of the few bands where a harmonised portion could be made available for potential future mobile broadband use worldwide and which is large enough to support very high levels of data traffic and the fastest data rates.

Governments in the Pacific Islands may be reticent to support an identification because local mobile data demands are less intense and the C-Band is heavily relied upon for fixed satellite services. However, it is important to recognise that an IMT identification at the international level will not impact C-band satellite services in the Pacific Islands for as long as they are deemed necessary.

An IMT identification in a portion of the C-Band will give regulators the tools to manage this challenge when it emerges – without it they will struggle to prevent a network slowdown. However, this is not a zero-sum contest between mobile and satellite services, as these technologies and markets evolve regulators can protect the interests of both to create a win-win scenario for citizens.

The Pacific Islands may also need an alternative to the C-band to provide capacity in the future to cater for demand from both domestic usage and tourism. The 2.7-2.9GHz band is a realistic and attractive option, with several countries from Europe, APAC and Africa supporting its identification for IMT. The GSMA recommends that the 2.7-2.9GHz band is also identified for IMT at the WRC-15, so that the ecosystem can be further developed. The Pacific Islands should also consider supporting the proposal for a sub-700MHz UHF IMT identification, as proposed in the USA and Canada. This band represents the most cost efficient way to cover the whole islands with mobile broadband connectivity. Other regions can then benefit from lower price equipment when capacity becomes a problem and these alternative spectrum bands are required.

Identifying a further 600-800MHz for potential future mobile broadband use at WRC-15 will ultimately benefit the Pacific Islands, despite its low level of mobile data usage compared with some other markets. As highlighted earlier in this report, the Pacific Islands are still in the early stages of LTE deployments, although the rate of adoption is already accelerating. The resultant growth in data traffic means that new mobile spectrum will ultimately be necessary in the future in the region. The developed markets which license these bands in the near-term will create the economies of scale that will allow Pacific Islanders to benefit from a wide range of low cost devices when the spectrum is used for mobile services at a later date.

36. An IMT identification refers to a specific frequency range in a band that is designated for potential use by compatible mobile broadband technologies, including all 3G and 4G networks.

3.2 The importance of national broadband plans

By mid-2014, there were 140 national broadband plans in force in countries around the world, according to a report by the Broadband Commission entitled the *State of Broadband 2014*.[37] These plans take different forms – some are enshrined in legislation, others are essentially a policy framework/strategy and others are realised through a series of regulations. They also vary in scope – some plans are focused solely on broadband, while others encompass IT, as well as connectivity, and constitute a comprehensive roadmap towards an 'Information Society'.

Although many national broadband plans are in their formative stages, there are signs that they are producing results. The Broadband Commission has found that the introduction or adoption of a broadband plan can lead to 2.5% higher fixed broadband penetration, and 7.4% higher mobile broadband penetration, on average. The difference in those figures reflects the key role wireless technologies, which can be deployed quickly and at relatively low cost, typically play in enabling countries to achieve their national broadband goals.

The ITU has helped a number of countries in the region to develop national broadband plans, including Fuji, and in 2014 helped both the Marshall Islands and Vanuatu to further develop their plans.

3.2.1 Engaging industry in a national broadband plan

Realising the full potential of broadband to increase national competitiveness and empower citizens depends on a strong partnership between government, industry and other stakeholders. Ideally, governments will engage in a consultative, participatory approach that involves all key stakeholders in the development of a national broadband plan and the associated policy-making process.

To ensure a national broadband plan is more than a set of aspirations, a government needs to create a structure and process that will enable its provisions to be implemented. Ideally, the plan will be owned and championed by a high-level ministry and will be overseen by a government agency with clear responsibility for its implementation. This coordinating agency needs to be empowered to work with all the relevant branches of national and local government to implement policies, address related legislation and specific obstacles, such as cumbersome planning processes. The government will also need to make appropriate funds available and measure progress at regular intervals.

Policy makers should also consider demand-related factors. For example, they need to ensure that citizens have the skills to make full use of broadband networks and that there is a broad selection of digital content available in local languages.

37. http://www.broadbandcommission.org/publications/Pages/SOB-2014.aspx.

3.2.2 Four guiding principles for a national broadband plan

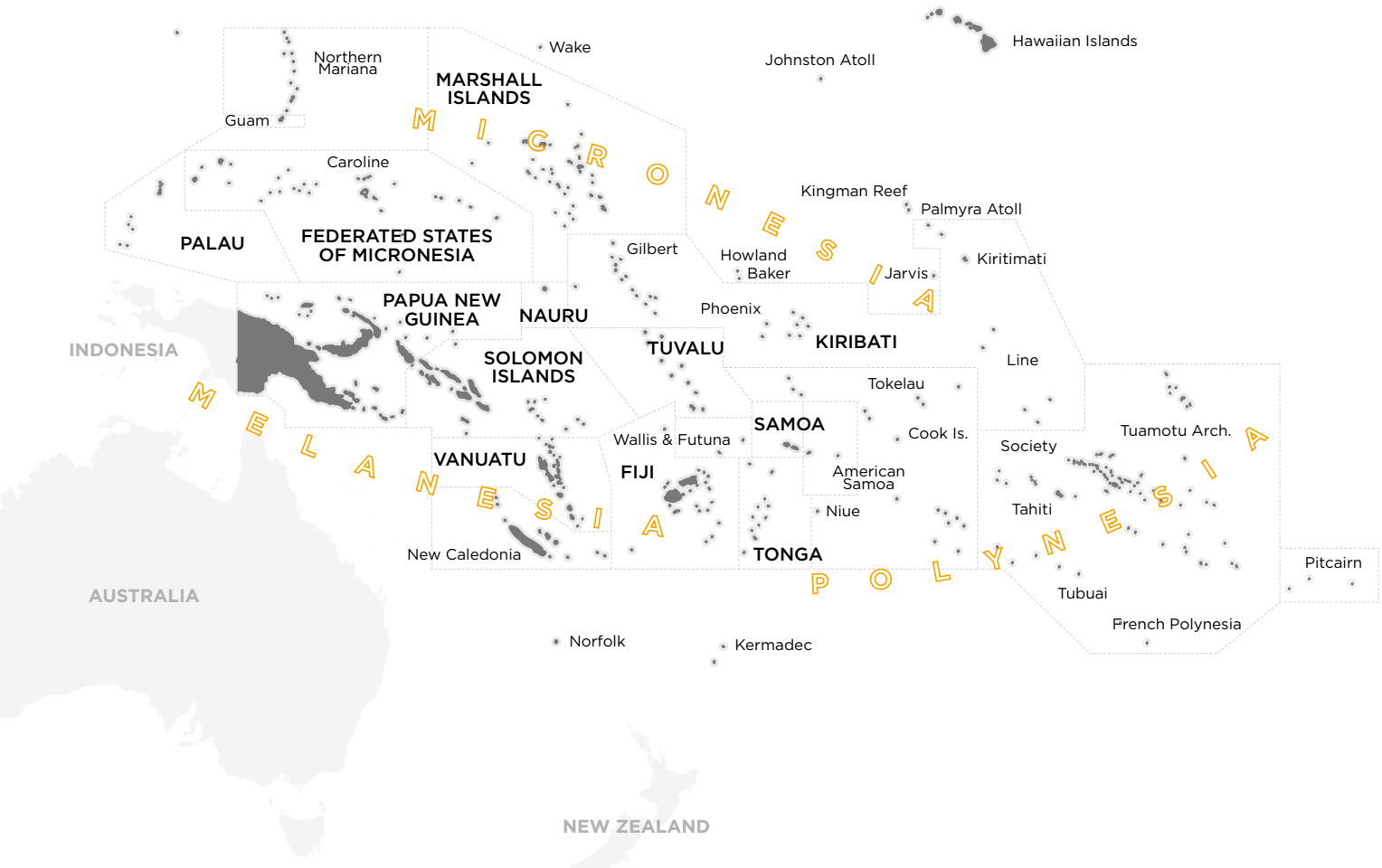
In order to ensure that a country and its citizens can realise full benefits of a national broadband plan, there are four key principles that should guide the plan:

1. **Ensure availability of suitable and harmonised spectrum:** in many countries, mobile has already emerged as the dominant technology for internet access, and it is often too expensive or impractical to provide fixed broadband connectivity. As a result, policy makers should explicitly recognise the central role of mobile broadband technologies in delivering national broadband plans, which in turn depends on the availability of suitable spectrum.

2. **Keep costs down:** As broadband services are crucial to the competitiveness of a country, they should not be subject to sector-specific taxes, levies and other fees that increase operators' costs and deter investment and take-up of the services.

3. **Remove barriers to the deployment of infrastructure:** A national broadband plan needs to consider whether existing legislation or regulations, such as those relating to electromagnetic frequency (EMF) exposure, may prevent it from achieving its goals.

4. **Ensure sufficient competition:** A national broadband plan needs to contain provisions to ensure that the telecoms market is sufficiently competitive to fuel innovation and drive efficiency.



3.2.3 The example of Fiji

Beginning in 2007, the government looked to liberalise the telecoms sector in Fiji, beginning with the removal of all exclusivities in the telecom sector. An agreement was signed in January 2008 that led to a number of changes in the industry:

- Digicel became the second mobile operator in the country when it launched services in October of 2008;
- Fiji International Telecommunications Limited, FINTEL, saw its exclusivity over the international gateway end in July 2009, with a second player entering the market in October 2010;
- Telecom Fiji Limited ended its monopoly on the fixed line network in February 2011, although new entrants have yet to emerge in this market segment.

The changes in the telecom market were enabled by the Telecommunications Promulgation 2008, which set the policy relating to the release of exclusivities and also provided for the creation of an independent regulator for the telecommunication sector, the Telecommunications Authority of Fiji (TAF). The TAF has the authority to deal with licensing, technical regulation, spectrum, and consumer concerns.

The government chose to issue 15 year licences that allowed operators to offer a broad range of services. The use of these open licences and assistance from the Pacific Island Financial Inclusion Programme saw Vodafone become the first operator in the South Pacific to launch mobile money services in June 2010, closely followed by Digicel, with assistance from the GSMA's MMU team.

Tax is an important component of national ICT strategies, and high levels of sector-specific taxation can be a major obstacle to improving the affordability of mobile services and so achieving the broader goals of digital inclusion. A number of fiscal and excise duties have been removed over recent years on for examples computers and computer parts. For the mobile sector in particular, there was a reduction of import duty on smartphones in January of 2011, with the rate falling from 32% to 5%.[38]

Fiji adopted its national broadband policy in 2011, with the plan developed with the assistance of the ITU. In recent years the country has seen significant progress in developing its broadband roll out and the overall level of ICT development in the country, helped by the enabling legislation and the relatively early adoption of a national broadband plan.

As a result of a broad range of actions, Fiji was well prepared for the acceleration in broadband adoption that the country has seen over recent years. However, much remains to be done to bring connectivity, and particularly mobile broadband, to the still unconnected population in the country.

The International Telecommunication Union (ITU) regularly assesses the level of ICT development of its members and ranks countries on a composite index, the ICT Development Index (IDI), which includes measures of access, usage and skills. In the most recent 2014 publication[39], Fiji was highlighted as one of the most dynamic countries in terms of the improvement in its ranking between 2012 and 2013. Fiji saw an improvement of 12 places in its ranking and is currently ranked at 91st, helped by the significant growth in mobile broadband penetration that the country has seen. Fiji also benefited from increased regional internet connectivity with the completion of the Tonga cable, connecting Fiji and Tonga.

38. http://www.itu.int/ITU-D/treg/broadband/MinicasestudyBBFiji.pdf
39. http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf

3.3 Building regulatory capacity in the region: the potential role of the GSMA

The mobile industry is constantly innovating and adapting to a variety of pressures, including huge growth in demand for mobile data, a continuous cycle of technology upgrades and shifting business conditions due to the emergence of over-the-top players, as well as the growing importance of mobile as an enabler for connected living and digital and financial inclusion.

Policymakers and regulators play a key role in shaping the way the industry responds to these issues, so it is vital they keep pace with the latest developments in technology and the business environment, and understand the implications of different policy and regulatory approaches. There can be particular challenges in this for small island developing states, which may in some cases lack the resources and human capital to manage these challenges effectively.

As the global association of mobile network operators, the GSMA closely tracks changes in these areas, and the effects they have worldwide. Using this knowledge, the GSMA has created a range of high-quality short training courses that offer unique insights into the latest industry, policy and regulatory thinking.

To download Pacific Islands Mobile Economy 2015 report please visit the GSMA website at www.gsmamobileeconomy.com

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