Final report for the
Pacific Islands Forum Secretariat

Review of Pacific Regional Digital Strategy

Part A: Technological Capacity

Network Strategies Report Number 29029. 11 June 2010

NETWORK STRATEGIES
• Telecommunications Strategy •

0 Executive summary

The Pacific Regional Digital Strategy is an initiative under the Pacific Plan to promote economic growth, sustainable development, good governance and security in Forum Countries. The Strategy establishes the following priorities:

- improving access to communications technology
- reducing costs
- establishing higher bandwidth to the global ICT 'backbone'
- removing inappropriate regulatory environments in order to foster higher levels of investment
- strengthening ICT skills.

With the liberalisation that has occurred in a number of Pacific telecoms sectors over the last four years the reach, availability and affordability of mobile services in the region has improved considerably. Nevertheless telecoms penetration and availability in many of the Pacific Island Countries (PICs) are generally low when compared to developed countries, for basic voice as well as more advanced services such as Internet access, broadband and mobiles. ICT and Universal Access policies are still under development in many PICs. In some of the smaller PICs telecoms market structures and services have changed little and it appears that it is a difficult process for these governments to develop updated ICT policies and legislation, mainly due to capacity and resource constraints. For these countries sub-regional solutions may be most appropriate with a focus on introducing measures to improve access to and availability of services from the existing providers.

A number of key advances have occurred with ICT regional harmonisation and assistance. Of particular note is the proposed Pacific ICT regulatory resource centre which will

provide regulatory advice, training and data to PICs, and the Japan-Pacific ICT Centre at USP.

The expense of international capacity continues to be a major issue. There remains heavy reliance on satellite services for the very sparsely distributed, relatively small, regional populations. PICs in general find satellite costs high and are still seeking ways to reduce these costs. Submarine connectivity is a high priority for many PICs but once again cost is a major challenge. Due to the high cost associated with its deployment, international connectivity via submarine cable remains relatively scarce among PICs. However, there have been a number of recent successful projects with additional ventures either forthcoming or under discussion.

ICTs offer huge potential for social and economic development in the Pacific. To this end regional organisations are clearly working to promote the benefits of ICTs at both the national and regional levels, and also in the private sector. However, at present converged applications (such as e-government, e-commerce, e-health and e-education) are either non-existent or in their infancy. Recent information on progress in these areas is difficult to obtain readily, but we found that the accessibility and cost of communications technology still represent significant barriers. In many cases governments and households with scarce resources still struggle to meet very basic needs with the result that ICT cannot be a priority. While in some PICs the increase in availability and accessibility of mobile phones is certainly providing new social and economic opportunities, developmental potential offered by the Internet is still unattainable for most.

Further development of infrastructure in the region is still required, yet only a minority of partners engage in infrastructure-related pilots or projects, and/or provide funding assistance. One example of a successful infrastructure project is PACRICS. Developed under the Pacific Plan to provide affordable and reliable Internet connectivity to any rural and remote area in the Pacific region, PACRICS has deployed many sites throughout the Pacific.

Partners, donors and other agencies and organisations have made substantial and important contributions to capacity building and the promotion of ICT in the Pacific since the Digital Strategy. This has resulted in considerable progress in achieving the objectives of the Strategy although there is still much work-in-progress on key aspects such as national ICT

policies and planning, accessibility of ICTs to rural populations, and regional ICT coordination and harmonisation. With respect to the latter there is certainly a need for improved regional coordination as current channels appear to be ineffective, resulting in gaps in information and knowledge about current and planned activities amongst partners and potential inefficiencies. Opportunities for stakeholder consultation and engagement appear to be very ad hoc, leading to considerable potential for overlap. This situation is exacerbated by the paucity of information and statistics available on ICT progress at the national level and the lack of published information on objectives, developments and outcomes of regional initiatives.

In the four years since the formulation of the Digital Strategy it is clear that progress has been made towards its priorities. At the same time our review indicates that with respect to every single priority there remains considerable work to be completed, and emerging gaps and needs to be addressed. In summary, some very fundamental challenges remain:

- the provision of adequate, accessible and affordable infrastructure for all PICs
- the need to increase usage of such infrastructure through education, training and capacity building,

The Digital Strategy II will aim to address these challenges, building on the progress and knowledge that has been gained since the launch of the first Digital Strategy.

Review of Pacific Regional Digital Strategy

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1 Introduction

1.1 Study overview

In this study we review the impact of the Digital Strategy on ICT in the Pacific region, to assist in the development of a revised Digital Strategy (DSII) that addresses any identified gaps and emerging needs. The study is in two parts:

- **Part A** reviews technological capacity, including:
  - a top level assessment of the current state of ICT capacity and usage in the Pacific Island Countries (PICs)
  - a review of the potential of ICTs to meet current and future socio-economic needs in the PICs
  - a review of the current structure of partners and players in ICT to determine competitive advantage, leverage, access to resources and potential modalities of delivery of support.

- **Part B** recommendations that will form the basis of a revised Digital Strategy.

This report contains our findings from Part A of the research.

1.2 Study methodology

The information and findings of this report were based on a combination of desk research and stakeholder consultation. Significant primary research was necessary, due to a lack of published information on issues and initiatives relevant to the Digital Strategy. The primary

research involved country visits and interviews with stakeholders by telephone. A list of the individuals interviewed for the study is provided in Annex F.

In our interview programme we adopted a structured approach in which a series of issues were discussed relating to ICT developments, the impact of the Digital Strategy and ongoing and emerging gaps and concerns. In particular, for each country the following topics were discussed:

- existence of a National ICT plan and/or policy
  - whether the plan is reflected in different sector (e.g. energy, infrastructure, health, education) and Ministry plans
- existence of a National ICT Steering Committee and composition
- main contributions of donor agencies / partners / Pacific ICT-related agencies
- statistical measures utilised to set development targets
- any improvements to rural and remote access to ICT since 2006, and how they were achieved
- usage of converged services for government, commerce and social purposes
- the main perceived potential of ICT to meet future socio-economic needs, and challenges in realising that potential
- current or emerging gaps and needs that are not addressed by the current Digital Strategy.

Our main statistical sources are the ITU, World Bank and national statistical offices of the relevant countries.

1.3 Structure of report

Following the current Introduction the report is structured as follows:

- developments in ICT since the Digital Strategy (Section 2)
- an assessment of ICT in the Pacific (Section 3)
- an overview of ICT utilisation in the Pacific (Section 4)
- a review of partners and players in ICT in the Pacific (Section 5)
- conclusions (Section 6).

There are also a number of Annexes to this report, including:

- an overview of ICT in each Pacific Island country (Annex A)
- the status of PIC government websites (Annex B)
- a summary of submarine cable connectivity in the Pacific (Annex C)
- a summary of regional ICT initiatives in the Pacific (Annex D)
- a list of regional partners and players in ICT in the Pacific (Annex E)
- a list of stakeholders who were consulted during the project (Annex F)
- the Terms of Reference for the project (Annex G).

1.4 The Digital Strategy

Based on the Communications Action Plan (CAP) and the Pacific Island ICT Policy and Strategic Plan (PIIPP), the Pacific Regional Digital Strategy[1] is an initiative under the Pacific Plan[2] to promote economic growth, sustainable development, good governance and security in Forum Countries. The Forum recognised that ICT will play a critical role in countries meeting their Millennium Development Goals, and for those countries' continued development it is critical that vibrant and market-driven ICT sectors are established.

The Digital Strategy highlights the following priorities:

- improving access to communications technology
- reducing costs
- establishing higher bandwidth to the global ICT 'backbone'
- removing inappropriate regulatory environments in order to foster higher levels of investment
- strengthening ICT skills.

1 PIFS (2005), Pacific Regional Digital Strategy, October 2005.

2 PIFS (2005), The Pacific Plan: for strengthening regional cooperation and integration. October 2005.

While the enormous potential of ICTs is recognised, the Strategy focuses firmly on the need to provide basic infrastructure, connectivity and access, as opposed to downstream applications.

> E-government, e-commerce, or e-training will fail if the rural populations cannot access the Internet or do not have the computer literacy to exploit the potential.[3]

To this end many objectives are specified in the Strategy, which can be broadly categorised as follows:

Structural change in the ICT sector	• encouraging policies to facilitate sector development • promoting competition • supporting a commercially-driven sector with privatisation / corporatisation of telecoms/ICT services where possible • harmonise laws and ensure protection of privacy, data security and IP rights.
Infrastructure development	• construction of domestic telecoms and information infrastructure • narrow the gap in information infrastructure between urban / rural and developed / developing countries.
Accessibility	• ensure universal access • ensure easy access to information through ICTs • ensure open and non-discriminatory access to public networks.
Capacity building	• flexible and appropriate ICT education and training to inform and connect people • promote participation of women and disadvantaged groups • promote local content.

To achieve the objectives a three-tier approach is adopted which identifies key programs at each level (Exhibit 1.1).

3 PIFS (2005), Pacific Regional Digital Strategy, October 2005, page 6.

Pillar 1: Country level	*Pillar 2: Regional level*	*Pillar 3: Global level*
ICT steering groups	ICT leadership	Representation in Asia-Pacific and global fora
ICT policies & plans	ICT coordination & harmonisation	ICT trend analysis and monitoring
Development of measures	Promote ICT within CROP	
Universal service plans	Regional approach to ICT education	
Government delivery of health & education	Re-examination of state of broadcasting	
Capacity building via schools, distance education centres etc		

***Exhibit 1.1**: Pillars and key programs [Source: PIFS, Network Strategies]*

The Strategy concludes with an initial 'contract' for a commitment by leaders, CROP agencies and the Forum Secretariat to work together to achieve the objectives. It also proposes the establishment of a Pacific Islands ICT Council (PIIC) to drive ICT development and coordination, and indicates that a number of initial regional studies should be undertaken relating to:

- regional solutions for policy and regulation of telecoms and ICTs
- regional network solutions
- needs and mechanisms for addressing the gap in human resources to support ICTs
- the status of ICTs in every country
- the state of broadcasting.

The PIIC was never established, and this may in part explain the lack of progress with initiating the above regional studies. Further discussion of the contract is provided in Section 5.2.

Wellington Declaration

Following endorsement of the Pacific Plan in 2005, at a Forum meeting for ICT ministers held in Wellington in March 2006, the participating countries further supported the Digital Strategy, recognising that:

- they were committed to developing their countries consistent with Forum goals, namely, economic growth, sustainable development, good governance and security
- ICTs is an important contributor to economic development, but also encourages social cohesion, cultural enrichment and environment conservation, and
- the region will benefit considerably from the effective use of ICTs.[4]

Further, the ICT Ministers established a number of steps that should be implemented by a taskforce within the Strategy's first year. They included:

- establishing qualitative and quantitative indicators to chart the progress of countries towards agreed goals
- encouraging countries to participate in a stock-take of their e-readiness, to develop or refine their national ICT policies, and to implement basic e-government initiatives
- requiring PIFS to secure technical assistance for regulatory and policy capacity development
- investigating options and making recommendations for a regional approach to securing a bulk or wholesale arrangement for satellite capacity
- developing complementary anti-spam policies and legislation, and cooperating at the regional level to address this issue.[5]

ICT Ministerial Forum 2009

In February 2009, the ITU organised the Pacific ICT Ministerial Forum (*Connecting the Unconnected World*) in Tonga. A key objective of the meeting was

> … to provide Forum Island Countries, and other stakeholders and partners with a platform for improving access and adoption of ICT in the Pacific region, through various projects, initiatives and commitments. In particular, an objective was to advance specific initiatives in the Pacific region, including the *Digital Strategy* and the *Wellington Declaration*, to

4 Source: Forum Information and Communications Technologies Ministerial Meeting, 30 March 2006, Wellington, New Zealand. Available at http://www.sopac.org/Wellington+Declaration.

5 *Ibid.*

meet the 2015 Millennium Development Goals of making available the benefits of new technologies, especially information and communication technologies to all.[6]

Forum discussions were conducted along five broad themes:

- affordable access – domestic and international connectivity in the Pacific
- enabling environment – policy, regulatory and financial frameworks
- cyber-security and ICT applications
- emergency communications and disaster relief/climate change
- human capacity building.[7]

From the above it is clear that the same broad objectives identifiable in the Digital Strategy – sector structure, infrastructure, access and capacity building – remained of paramount concern to policy-makers in 2009. At the same time it is notable that cyber-security was identified at this Forum as a key emerging issue, together with emergency communications and disaster relief.

6 ITU (2009), Communiqué: *Pacific ICT Ministerial Forum: Connecting the Unconnected World*, Nuku'alofa, Kingdom of Tonga, 19-20 February 2009.

7 *Ibid*.

2 Developments in ICT since the Digital Strategy

In this Section we provide an overview of progress that has been and is currently being made toward achieving the main objectives of the Digital Strategy:

- liberalisation
- ICT policies and legislation
- international connectivity
- reducing the digital divide
- ICT capacity building
- regional harmonisation and assistance.

2.1 Liberalisation

A priority of the Digital Strategy is the removal of inappropriate regulatory structures to foster an open and competitive ICT environment. Experience from around the world demonstrates that swift progress may occur with ICT accessibility and affordability once national ICT policies change from supporting a State-owned monopoly as the sole ICT provider to a liberalised regime with competitive market entry.[8] Within a relatively short time-period the competitive model typically brings new and innovative services to the market, and encourages efficiencies in existing service provision, with the net effect of cheaper and more widely available services for consumers, households, government and businesses.

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8 A number of studies support this, for example World Bank (2009), *Information and communications for development: extending reach and increasing impact...*

So is this experience evident in the Pacific? Let us consider the case of Samoa which licensed a second mobile operator in 2007. The number of mobiles in Samoa has increased from 30 000 in 2006 to more than 100 000 in 2009. Furthermore, mobile coverage is now 95-96% of Samoa compared to the previous concentration on the more populated centres alone. Similar rapid increases in penetration and coverage have occurred in other Pacific liberalised markets, for example Vanuatu and Tonga.

However across the Pacific there are still a wide range of structural arrangements from monopoly and exclusivity (such as in Micronesia and Niue) to fully liberalised environments with independent regulators (Samoa and Vanuatu). Other countries are currently experiencing varying degrees of competition. Exhibit 2.1 highlights important liberalisation milestones that have occurred in the region between 2003 and 2010.

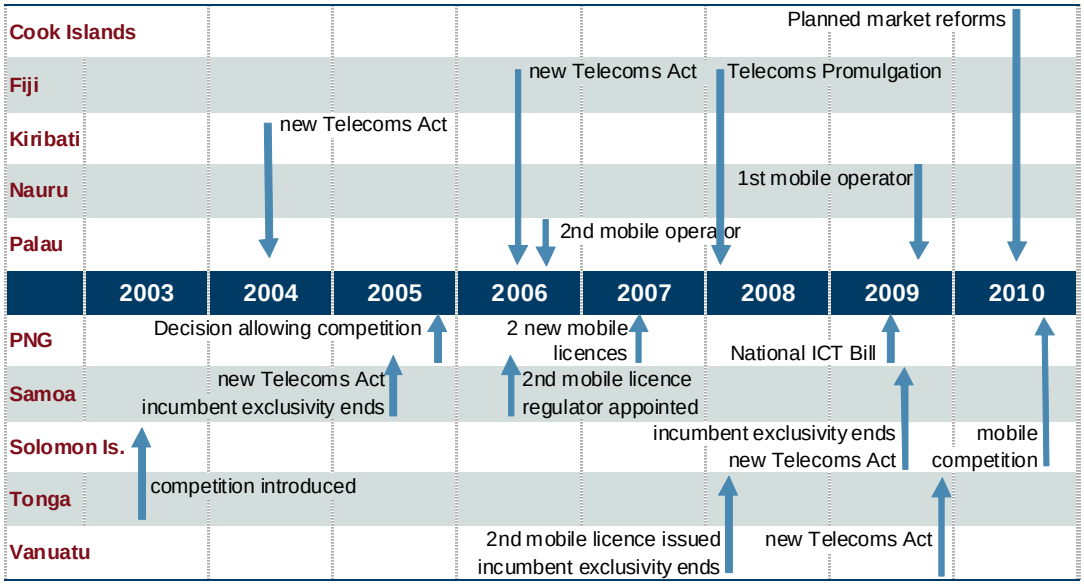

Exhibit 2.1: *Liberalisation timeline among selected Pacific Island countries [Source: Network Strategies]*

One of the Digital Strategy's objectives is to support a commercially-driven sector with privatisation / corporatisation of telecoms/ICT services where possible. While we have definitely seen liberalisation in the larger PICs and market entry by commercial companies, there have been few privatisation initiatives and consequently government involvement in the operation of telecoms services remains strong (Exhibit 2.2). Independent regulators

have been established in liberalised markets with the exception of Tonga. Those PICs that do not have competition tend to be relatively small in terms of population (Cook Islands, Marshall Islands, Nauru, Niue, and Tuvalu) with the exception of the Federal States of Micronesia and Kiribati which have about 100 000 inhabitants. We understand that in some cases liberalisation has not yet occurred as there is concern that the small market may not sustain more than one operator. However the successful liberalisation of the Tongan market, a country of just over 100 000 people, indicates that competition may be feasible in some of the smaller PICs, such as the Federal States of Micronesia and Kiribati.

Country	*Mobile provider or ISP competition*	*Government ownership*	*Independent regulator*	*Population**
Cook Islands				23 500
Federated States of Micronesia		✓		111 306
Fiji	✓	✓	✓	838 724
Kiribati		✓	✓	96 557
Marshall Islands		✓		59 667
Nauru				10 000
Niue		✓		1 761
Palau		✓		20 279
Papua New Guinea	✓	✓	✓	6 448 918
Samoa	✓	✓	✓	181 528
Solomon Islands	✓		✓	506 967
Tonga	✓	✓		103 566
Tuvalu		✓		9 561
Vanuatu	✓		✓	231 142

* Population data are for 2008, sourced from the World Bank

Exhibit 2.2: *ICT sector structure [Source: Network Strategies]*

In some of the countries that have not yet fully liberalised their telecoms/ICT sectors, plans are underway (Exhibit 2.3) to establish the requisite framework and to foster the political will to enable competition in the near future. For very small countries that are not actively working towards liberalising their markets, a competitive solution may not be an option at all, and a sub-regional solution may be more appropriate. In such circumstances the focus

would be on introducing measures to improve access to, and availability of services from, the monopoly incumbent.

Country	*Status of liberalisation efforts*
Cook Islands	Telecoms services are still being provided by a privately-owned monopoly, in which the government has minority shareholding. In 2009, the government announced its intention to introduce competition.
Federated States of Micronesia	Telecoms services are being provided by a statutory corporation. A Telecoms Reform Bill has been recently submitted to the FSM Congress, but no decision has yet been made. As a result, there may not be any immediate plans by the government for competition to be introduced into FSM.
Kiribati	Telecoms services are still being provided by a government-owned monopoly. The legal framework facilitates competition, and in recent years the government has actively engaged in discussions with other commercial entities to provide mobile services in Kiribati. However, it is also seeking to support the incumbent and is considering potential joint ventures and other initiatives that could improve its company and increase coverage and accessibility to telecoms services.
Nauru	In recent years telecoms services in Nauru have been virtually non-existent due to poor infrastructure and costly backhaul. In 2007 a WiFi/WiMAX network powered by wind and solar power was installed in Nauru with funding assistance from the Australian government. This project was unsuccessful, however, due to a number of reasons, including funding limitations, a lack of maintenance and equipment failures, although parts of the infrastructure remain and are being utilised by the government.[9] However, in mid-2009 a mobile licence was issued restoring some service to the country and its citizens.
Niue	Telecoms services are still being provided by a statutory corporation. While fixed-line teledensity is relatively high, the mobile service is virtually non-existent due to the damage from cyclone Heta in January 2004, which devastated the country.
Republic of the Marshall Islands	Telecoms services are still being provided by a privately -owned monopoly with the government holding a significant stake in the company. There do not appear to be any immediate plans to liberalise the sector.
Tuvalu	Telecoms services are still being provided by a statutory corporation. The incumbent has outsourced the provision of mobile services to a separate entity, but further liberalisation of the sector seems unlikely.

Exhibit 2.3: *Status of Forum countries that have not liberalised [Source: Network Strategies]*

9 Republic of Nauru (2009), *National sustainability development strategy – 2009 review, c: review of sector goals, strategies, and milestones, infrastructure sectors*.

2.2 ICT policies and legislation

The development of national policies and legislation to facilitate ICT sector development was a cornerstone of the Digital Strategy. Relevant national policies include both telecoms (or communications) policies, and ICT policies. Telecoms policies set out Government's intentions with regard to telecoms, and thus form the basis of telecoms legislation. ICT policies typically address wider issues such as e-Government, e-Communities, and cybersecurity.

While most PICs have enacted (or are about to enact) telecoms legislation relatively recently, five countries (Cook Islands, FSM, Marshall Islands, Niue and Tuvalu) have legislation that dates back to the 1980s or 1990s. Five PICs have existing policies although only two of those policies have been recently published (namely PNG in 2008 and Tonga in 2009). The majority of PICs are at various stages of developing national ICT policies (Exhibit 2.4). Our research indicates that policy development is a difficult process for PICs, and most are reliant on outside assistance due to capacity and resource constraints. Recently SOPAC and SPC have been actively assisting a number of countries in this regard.

Country	*Existing national ICT Policy*	*Developing national ICT policy*	*Telecoms Law enacted after 2000*	*Telecoms Law enacted before 2000*
Cook Islands	✓			✓
Federated States of Micronesia		✓		✓
Fiji	✓		✓	
Kiribati		✓	✓	
Marshall Islands		✓		✓
Nauru			✓	
Niue		✓		✓
Palau	✓			
Papua New Guinea	✓		✓ (bill)	
Samoa	✓		✓	
Solomon Islands		✓	✓	
Tonga	✓		✓	
Tuvalu		✓		✓
Vanuatu		✓	✓	

Exhibit 2.4: *ICT policies and legislation in PICs [Source: Network Strategies]*

Further information, largely gathered in our stakeholder consultation process, about national telecoms and ICT policies is provided in Annex A.

In some instances it was apparent that there was a lack of knowledge of the Digital Strategy amongst those directly involved in ICT at the national level. In cases where sectoral change has occurred without a national policy update, it may have been the case that the strategic direction of the Digital Strategy has been followed. In other cases it is apparent that change has occurred as the result of other factors. For example, in Vanuatu ICT sector change was considered in the 1990s, with the Ministry of Finance playing a key role in supporting this reform. Subsequently Vanuatu used a draft Telecoms Policy prepared by the World Bank and donor assistance from AusAID to make progress with respect to the stated priorities of the regional Digital Strategy, such as:

- improving access to communications technology – through liberalising its telecoms market and licensing new entrants, in particular a mobile operator that could compete directly with the incumbent

- the establishment of an independent regulator.

The assistance of the Governance for Growth programme (sponsored by AusAID) was critical for the reforms in Vanuatu – providing funding, technical and legal assistance to assist in dismantling the ICT monopoly, which was key to the entire reform process.

Cyberlegislation

A significant level of cyber crime activity is already occurring in the PICs, which would be expected to increase over time, in line with worldwide trends. Cyber crimes may be targeted at the individual or corporate/Government computer systems, and in extreme cases may create major disruptions of nationwide telecoms systems. An example of the latter was experienced in the Marshall Islands, where there was a two-day loss of all external email due to a denial of service attack.

Common types of cyber threats affecting PICs include:

- phishing
- SSH (secure shell) brute force attacks
- malware
- Nigerian scams
- denial of service attacks
- telephone number hijacking
- spam, which wastes resources and is a common carrier for scams, malware and phishing attacks.

The PICs may be considered to be particularly vulnerable to cyber threats for a number of reasons, such as:

- there is a high reliance on ICT even for basic communications, for example using VoIP services due to limited reliability or availability of traditional fixed and mobile telephony
- a reliance on Internet technologies for emergency management and disaster recovery
- limited or no redundancy in ICT infrastructure

- there may be a lack of knowledge and ability to deal with attacks when they occur
- there is a lack of cybercrime legislation in PICs creating difficulties in dealing with offenders.[10]

The legislation that does exist in PICs for dealing with cyber crimes differs widely in form. Cyber crime is dealt with variously in ICT, Spam, Computer Crimes, Electronic transactions/business and Telecommunications Acts, and a Crimes Decree, as discussed below for specific countries.

Cook Islands	The Spam Act 2007 defines spam and sets out rules regarding sending commercial electronic messages and the use of address-harvesting software and harvested-address lists, as well as outlining penalties for contravening those rules.
Fiji	The Crimes Decree 2009 defines a number of computer offences including unauthorised access or modification of electronic data, and includes the use of computers to perpetrate other offences such as fraud. Relevant maximum penalties are also outlined.
Kiribati	The Telecommunications Act 2004 includes a section on computer misuse outlining forms of offence with regards to unauthorised access of computer programs or data and the associated maximum penalties.
Papua New Guinea	The National ICT Act 2009 outlines offences regarding improper use of ICT services, including the sending of obscene or offensive communications and the unauthorised access or modification of data or communications. Relevant maximum penalties for offences are also stated.

10 AusCERT (2008), *Study to ascertain the readiness of Pacific Island nations to establish a regional Pacific Island CERT capability*. Available at http://www.docstoc.com/docs/10152875/Draft-Feasibility-Study.

Samoa The Electronic Transactions Act 2008 covers the legal recognition of electronic records, including their use as evidence, as well as the communication and ownership of electronic records.

Tonga The Computer Crimes Act 2003 defines computer-related offences along with maximum penalties, including illegal access of protected computer systems, interfering with data or computer systems and illegal interception of data.

Vanuatu Vanuatu has an Electronic Transactions Act similar to that of Samoa. In addition, an Electronic Business Act deals specifically with companies carrying out electronic business.

2.3 International connectivity

The expense of international capacity has been a significant deterrent for the development of telecoms/ICT in and among Pacific Islands. Due to the considerable geographical area to be covered and the distances involved between islands, cost-effective backhaul and international links are critical to connect islands within a national group, and with the wider world. Satellite services are a key element of any telecommunications strategy for the less developed PICs, and will remain essential for the foreseeable future. No other telecommunications technology is able to span the vast distances of the Pacific region and cost effectively provide service to the very sparsely distributed, relatively small, regional populations.

In a previous study on international satellite connectivity in the Pacific[11], conducted on behalf of the Australian Government, we gathered data from extensive interviews with key stakeholders – including governments, operators and satellite vendors – throughout the region. This market research identified that the common factors driving demand for international connectivity were:

11 Network Strategies Limited (2007) *Satellite services in the Pacific: perspectives from the region*, report no 27013, 5 June 2007.

- growth in broadband Internet services, the speeds offered and the types of applications being used
- growth in dial-up Internet services
- growth in international incoming and outgoing voice traffic
- market liberalisation.

Broadband and dial-up Internet

Internet penetration – both broadband and dial-up – is still relatively low in many PICs (Exhibit 3.3), and we believe there to be significant pent-up demand for Internet services. As is common in many markets, the number of users greatly exceeds the number of subscriptions, as more than one person may use a single subscription. Anecdotal evidence from our interviewees suggests that many users access the Internet at work rather than at home. In addition, there are public Internet facilities at libraries and other locations. The high price of Internet services is a major barrier for take-up of Internet subscriptions.

Broadband users will be seeking a far richer interactive experience than the relatively low bandwidth applications accessible via dial-up (such as email, Web browsing and instant messaging). With broadband, downloading large amounts of content, such as video and music becomes feasible. Moreover fast broadband enables access to real-time applications such as voice and video telephony, streaming media and online games, for which any delays due to congestion are less acceptable.

A significant proportion of this Internet content will be sourced from servers located overseas. Certainly there are strategies that local ISPs can adopt in order to manage their international bandwidth requirements, nonetheless download volumes will continue to put pressure on international capacity as broadband take-up, and speed, increases.

It should also be noted that another component of Internet traffic will be generated by users from other countries accessing content

located on local servers – local news or streaming audio would be keenly sought by expatriates, and anyone conducting business with the Pacific Islands would be accessing local content.

Voice telephony

The traditional driver for international bandwidth has been voice telephony (incoming and outgoing), however this has become less significant with the explosive growth in Internet traffic.

International voice traffic is typically subject to major fluctuations, in response to factors such as price changes, economic conditions and unusual occurrences, such as sporting events and disasters. In recent times, international traffic has also been affected by the substitution of Internet applications, such as email, instant messaging and online VoIP services such as Skype.

Market liberalisation

In a number of the Pacific Island countries, the telecoms and ISP markets are being opened to competition. Satellite operators and service providers see this as an opportunity to expand their sales within the region, as the new entrants will be seeking international bandwidth. Moreover, liberalisation leads to expansion of the total telecoms market, as competition stimulates demand for services with new offerings and cheaper prices.

Overwhelmingly, broadband Internet was considered to be the key driver for international bandwidth. More and more international capacity will be required, in response to the growth in demand for broadband services. The challenge for operators and ISPs in PICs will be to implement strategies that will deliver the required capacity in the most cost-effective manner, and optimise usage of that capacity. Such strategies may include implementing local 'mirror' sites for popular international content and encouraging users to access local content. Nonetheless even with these types of strategies in place, access to content will still require substantial international connectivity.

Access to submarine cable networks provides some relief from high satellite charges to Fiji and Papua New Guinea, and there are prospects for cables to connect to other countries

(outlined below), but the majority of Pacific Island countries remain absolutely dependent on satellite.

Submarine cable connectivity

Due to the considerable expense associated with its deployment, international connectivity via submarine cable is relatively scarce among Forum Countries. However, there have been a number of successful projects within the region[12,13] as follows:

- Pipe Pacific Cable 1 (PPC-1) between Sydney (Australia) and Guam, with a spur to PNG
- Pipe Pacific Cable 2 (PPC-2) will extend PPC-1 to Auckland (New Zealand) in 2010
- ASH between American Samoa and Hawaii (ASH), with a spur to Samoa
- HANTRU1 Guam-Kwajalein System is being extended to connect the Federated States of Micronesia (Pohnpei) and the Republic of the Marshall Islands (Majuro)
- Honotua cable across French Polynesia
- Gondwana between Noumea (New Caledonia) and Sydney (Australia).

Further details are provided in Annex C.

The South Pacific Island Network (SPIN) initiative brought considerable hope to Pacific Islands seeking submarine cable connectivity during recent years. This was devised as a private venture to provide connectivity from Solomon Islands in the east to Papeete (French Polynesia) in the west, and connecting with the Gondwana-1 cable (between New Caledonia to Australia) and Honotua cable between Papeete and Hawaii. However the initiative failed to secure the necessary funding and is unlikely to proceed.

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12 Source: World Bank (2009), *Regional telecoms backbone network assessment and implementation option study*. Available at http://www.itu.int/ITU-D/asp/CMS/Events/2009/PacMinForum/doc/POLY_WB_GeneralReport_v3%5B1%5D.0.pdf

13 Source: Submarine Telecoms Forum (2009), *Marshall Islands National Telecommunications Authority and Tyco Telecommunications Welcome Cable Ship Tyco Durable; mark significant step toward regional and international connectivity*, 17 December 2009. Available at http://www.subtelforum.com/articles/?p=1879.

The World Bank completed a Pacific regional connectivity study in 2009, and is currently in discussions on potential sub-regional projects to connect Tonga and Fiji, Samoa and Fiji, and New Caledonia to Vanuatu to Solomon Islands/Fiji.

Despite these ventures to provide international connectivity via submarine cable to various locations around the Pacific, there will be several Pacific Island nations for whom such a venture will not be feasible. For these countries – including the Cook Islands, Nauru, Niue and Tuvalu – satellites are expected to be the only option for the foreseeable future.

Furthermore, access to submarine cable does not remove the need for satellite access – Fiji, which uses both submarine cable and satellite services, has retained its satellite access, and there were plans to construct a second satellite earth station on the opposite side of the main island. The satellite provides backup for the cable, and the new earth station will provide additional security for that satellite service. Papua New Guinea also uses both submarine cable and satellite, with the latter being used extensively for domestic telecommunications.

Satellite connectivity

The less-developed PICs are highly dependent on satellite services, but from our discussions with industry representatives satellite prices are perceived to be relatively expensive for low income countries with limited demand, and represent a significant barrier to capacity building efforts. These costs are passed on to consumers, resulting in high prices for international telephony and Internet services.

So how expensive are satellite prices in the Pacific? Network Strategies undertook a study of satellite services in the Pacific on behalf of DBCDE[14] and we found that compared to global benchmark prices the prices paid by several of the operators in PICs are reasonable, and in one case was at the minimum benchmark price. Given that prices over the Pacific were expected to be at the high end of the global benchmarks, and that the benchmarks applied to a volume usage level that the PICs did not reach, this finding was surprising.

14 Network Strategies (2007), *Satellite services in the Pacific*, Network Strategies report no. 27013, 5 June 2007. Available at http://www.dbcde.gov.au/international/report_on_satellite_networks_in_the_asia_pacific_region.

Nonetheless there are some PICs paying satellite service prices well above the global benchmarks. In addition, there are newer earth station technologies that will enable the bandwidth extracted from the satellite services to be increased with no change in satellite fees.

A recent development in the Pacific has been the potential market entry of O3b, a network of medium earth orbit satellites using the Ka band and aiming to provide worldwide Internet connectivity to those not currently connected. As at the time of writing of this report the service had not launched in the Pacific and we understand that PICs are being asked for a financial commitment prior to launch.

It should also be noted that satellites are also being used for domestic telecommunications, in situations where terrestrially-based wired or wireless infrastructure is impractical, too expensive, or cannot provide broadband services. For example, two common terrestrial wireless technologies that can be deployed over large distances are microwave links and radiotelephones. Microwave links are able to provide broadband services over very large distances, but require microwave towers to be placed regularly every 30-80km or so, depending on the technology, the radiofrequencies being used, and the height of the towers. This is not possible or practical for the thousands of kilometres that separate the individual islands of some Pacific Island nations, such as FSM and Kiribati. Radiotelephones are able to span these distances easily and relatively cheaply, but are restricted to voice services or very low rate data.

However, it is not only widely spread island countries that can benefit from domestic satellite telecommunications. Compared to FSM and Kiribati, Papua New Guinea, for example, is a relatively compact country which covers the eastern half of the island of New Guinea plus only a few populated islands. Although it has access to a submarine cable for international connectivity, satellite facilities are extensively used for domestic communications as the rugged interior terrain coupled with sparse population density are difficult and expensive for terrestrially-based alternatives.

Conclusions

Pacific operators anticipate that international bandwidth capacity will need to increase substantially over the next few years, driven mainly by greater Internet use. Our projections indicate that in most Pacific Island countries potential demand for international bandwidth will increase by between 50% and 200% over the next five years[15], which will represent a huge cost burden on operators if there is no change in present supply conditions.

It should be noted that it is possible to make some economies in the use of international bandwidth since the business models utilised by local ISPs can have a marked effect on demand. The obvious approach, which is included in the Digital Strategy, is to develop local content. However there are a number of other business strategies, in most cases already in use around the world, that can be adapted to PICs to minimise the use of international bandwidth and further reduce costs:

- apply download limits with higher charges for higher limits
- mirror popular Internet sites locally and direct traffic to those sites by including them in a 'freezone'
- implement local branches of online commercial content sites, with content updated during off-peak times
- 'almost real-time' news sites such as sports results may also be able to be mirrored.

2.4 Reducing the digital divide

Universal access

The Digital Strategy proposes universal access (UA) to public services in telecoms. For PICs with highly dispersed populations across many different islands the provision of universal access is a difficult and costly undertaking. We reviewed the progress of PICs over the last four years in developing and implementing universal access or service policies. While in much of the more recent legislation there is provision for UA regimes,

15 *Ibid*, section 3.1.

currently many PICs are still in the process of developing appropriate policies (Exhibit 2.5). Some of the smaller PICs, while recognising that UA is an important issue, do not appear to be actively developing policies. Niue, despite not having a formal UA policy or regulations does have access to telephony in every village, through a Government undertaking. Only one country (Vanuatu) is currently actively implementing its UA scheme, and has benefitted in this regard from considerable support from AusAID.

The slow progress with UA can be explained largely by a lack of technical expertise and resources, although some partners are currently providing assistance with this (for example, the World Bank in Kiribati and Papua New Guinea).

Country	*Existing UA/US Policy*	*Developing UA/US policy*	*Provision in legislation for UA/US*	*Implementing UA/US*
Cook Islands				
Federated States of Micronesia				
Fiji	✓		✓	
Kiribati		✓	✓	
Marshall Islands				
Nauru				
Niue				✓
Palau				
Papua New Guinea		✓	✓ (bill)	
Samoa		✓	✓	
Solomon Islands		✓	✓	
Tonga		✓	✓	
Tuvalu		✓		
Vanuatu	✓		✓	✓

Exhibit 2.5: *Status of universal access/service in PICs [Source: Network Strategies]*

Telecentres

In rural and remote areas it may not be feasible to have telecommunications access available on an individual level, instead the aim is to provide telecommunications access

on a community level. Every person should be able to have access to services at a convenient public place, for example a community telecentre – a place were the public can access and use computer and telecommunications services, usually including the Internet. A telecentre will usually have a small staff to run the centre, serve the users and arrange training courses. Telecentres are common in developed and developing countries and may be run commercially, or primarily for community benefit.

The importance of telecentres lies in their ability to overcome the barriers to telecommunications access for rural and remote communities. Telecentres make feasible the provision of access to ICTs to regions where individual access would not be possible, and can provide affordable access to a wide range of ICTs to members of the community. The ability to provide training in the use of the technologies available is also a benefit.

Some examples of telecentres in Pacific island nations include:

Solomon Islands

In the Solomon Islands a project was carried out in 2001 to improve connectivity in the more remote areas – the People First Network.[16] The initiative consisted of 25 stations that provide Internet and email access using a short-wave radio, a low-end computer and solar power. The stations are located in accessible and secure public facilities, such as clinics and schools. The People First Network received funding from a variety of sources including:

- Solomon Islands Development Administration Planning Programme (SIDAPP)
- United Nations Development Programme (UNDP)
- Asia-Pacific Development Information Programme (APDIP)
- NZAID
- EU Solomon Islands Association of Rural Training Centres
- AusAID Community Peace and Restoration Fund.

16 http://www.peoplefirst.net.sb/general/PFnet.htm

Prior to the establishment of this system the only forms of communication in these areas were short-wave radios and satellite telephones, both of which were expensive and burdensome to use.

Samoa

As part of Samoa's Universal Access objective, community-run telecentres (Feso'ota'i centres) have been set up in 12 rural villages throughout Savaii and Upolu. The telecentres aim to make affordable ICT available, providing services including Internet access, photos, printing, copying, scanning, phone, fax, webcam, projector hire and CD burning, with training on how to use the equipment also offered at the centres.

The telecentre project is sponsored by a number of donors, including the government of Samoa, ITU, UNDP, VIA Technology and APR, with the intention being for the centres to become sustainable businesses over time.[17] At this stage it is not clear whether this will be possible.

Federated States of Micronesia

During 2009 FSM began implementation of a telecentre pilot project to connect three school-based community Internet centres in Pohnpei, Chuuk and Kosrae, funded by the Asia-Pacific Telecommunity and the government of Japan. The telecentres will be utilised by members of the community as well as by the schools, with the long-term objective being to duplicate the model throughout rural communities and remote islands in FSM.[18]

The outer islands of Yap have a radio-based network of telecentres, similar to that of the Solomon Islands' People First Network.

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17 Ministry of Communications and Information Technology (2010), *Rural Connectivity Program*, http://www.mcit.gov.ws/ICT4DevelopmentProjects/RuralConnectivityProgram/tabid/4163/language/en-US/Default.aspx.

18 Government of the Federated States of Micronesia (2009), *Implementation begins on FSM telecenter pilot project*, 29 June 2009. Available at http://www.fsmgov.org/press/pr062909.htm.

Kiribati

Telecoms infrastructure on the outer islands varies depending on the island's location and population. Three outer islands in the Gilbert group are linked to Tarawa via satellite earth stations, delivering voice and limited Internet access. Outer islands that are sufficiently close to either Tarawa or islands with earth stations are linked to these using microwave systems. Each of these outer islands has a telecentre with a small number of fixed lines and payphones.

The government-owned telecommunications provider, TSKL, had planned to extend its fixed line and mobile coverage to all major outer islands through the installation of satellite earth stations and telecentres. However this network expansion has been delayed or stalled due to lack of funding.

Internet services on the outer islands are principally provided by the satellite VSAT PACRICS system. Through the sponsorship of the Telecommunications Authority of Kiribati (TAK), all outer island senior high schools have all been supplied with PACRICS.

Based on the success of PACRICS in senior high schools, TAK extended the concept in 2009 with the funding of a PACRICS-based telecentre for Arorae Island. Based on current and projected revenues, it is expected that the telecentre will generate sufficient funds to cover the ongoing operational and bandwidth costs. TAK is now considering the funding of similar telecentres on other Outer Islands.

PACRICS

The Pacific Rural Internet Connectivity System (PACRICS) aims to address some of the major telecoms challenges facing rural and remote communities in Pacific Islands by providing a low-cost, reliable and easy-to-use system to connect to the Internet. Developed under the Pacific Plan to provide affordable and reliable Internet connectivity to any rural

and remote area in the Pacific region, PACRICS provides Internet connectivity via VSATs, and is connected to the US Tier 1 backbone via Hawaii.

By the end of 2009, PACRICS had been used to deploy 16 pilot sites and approximately 25 "public good"[19] and 48 commercial sites.[20] Further, each PACRICS site will be a hub for the OLPC programme, and on average each site is expected to support 500 children.[21]

PACRICS was launched in early 2008 by the SPC with funding from AusAID. The capital and ongoing costs for the pilot sites have been fully funded, whilst the fees payable by "public good" sites for satellite bandwidth have been subsidised. Commercial sites pay the prescribed rates. At the end of 2009, AusAID funding ceased, but financial support is being provided by SPC until the end of 2010.

Based on feedback from our stakeholder consultation this initiative has been very successful. For example, in Kiribati, the PACRICS project is believed to have brought considerable educational benefits to high schools where PACRICS terminals have been installed. Upgraded VSAT modems have been made available from February 2010, which has resulted in a marked improvement in the quality of the Internet service.

2.5 ICT capacity building

A number of initiatives have worked toward the Digital Strategy objective of building capacity in telecoms and ICT. From our stakeholder consultation it was evident that considerable progress has been made over the last four years, although capacity building should still be considered as work-in-progress.

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19 A "public good" site would be an installation in a rural or remote location that does not compete with an existing Internet service, and is being used to improve access to communication services in the community in which its located.

20 Source: PACRICS website, http://pacrics.net/.

21 Source: *One Laptop per Child – Concept Note*. Available at: http://wiki.laptop.org/go/OLPC_Oceania.

A number of our interviewees indicated that the major influence of regional digital strategy activities flowing through to the national level has been the availability of training and capacity building services. However emerging difficulties and gaps included:

- the need to institute a process to ensure that such training is passed on to a wider group within countries
- although currently individuals receive training which assists their work on a short-term basis, these skills are lost to Ministries and agencies as people move jobs, change roles, and in some cases leave the country to obtain work overseas.

Key initiatives include the following:

ICB4PIS — This new initiative between the EC and the ITU has not yet offered capacity building opportunities to PICs, but one of its main objectives is to build to build human as well as institutional capacity in the region. Plans are currently underway to secure the requisite expertise to deliver training and other knowledge transfer options as and where needed.

PITA — Through PITA, training and capacity building opportunities are made available to all PICs, and to industry players, and it regularly organises and facilitates seminars and workshops on a range of telecoms and ICT issues. One key training event organised by PITA is the Pacific Network Operator's Group meeting (PacNOG). Further, PITA's Annual General Meeting, which usually incorporates a conference and trade show, along with topical meetings hosted by other interest groups, is an important event in the region.

SOPAC ICT Outreach — Through its outreach programme, SOPAC has been providing its member countries with technical and policy assistance towards ICT capacity building. To that end, it has developed a number of training courses both in-country and at the regional level in fields including GIS, remote sensing, GeoCMS, network administration and the

Linux operating system.[22]

UN-APCICT — For at least the last two years, the APCICT has been hosting e-government workshops at its Academy in Korea geared towards government officials in PICs. Additionally, in conjunction with SOPAC, workshops based on portions of the Academy of ICT Essentials' programme have been held in the Cook Islands, Kiribati, Samoa, Tonga and Tuvalu.[23]

USP — USP has been offering a number of ICT-related courses, particularly in the computing and information science faculty, including formal degrees and non-credit courses through the Community and Continuing Education Programme, using university computer laboratories and USPNet[24]. Additionally, it is offering professional certification in Red Hat Linux, CompTIA A+, and Cisco Certified Network Associate (CCNA). Further, ICT elements are being incorporated into most subject areas, including science and engineering, economics, tourism, governance, creative media and statistics.[25]

2.6 Regional harmonisation and assistance

This Section outlines some of the key advances that have occurred with ICT regional harmonisation and assistance. In addition it should be noted that there are a number of organisations that currently address (or will be addressing) telecoms/ICT issues. Information on these organisations is provided in Section 5 and in Annex E.

22 Source: SOPAC website, http://www.sopac.org.

23 Source: UN-APCICT website, http://unapcict.inigo-tech.com/.

24 USPNet – the satellite-based WAN used to to deliver and integrate distance learning, educational and administrative services throughout USP's participating countries.

25 Source: The International Development Research Centre, http://www.idrc.ca/panasia/ev-127150-201-1-DO_TOPIC.html.

The Council of Regional Organisations in the Pacific

The aim of the Council of Regional Organisations in the Pacific (CROP) is to coordinate and avoid gaps and/or duplication in regional programmes. A number of cross-sectoral working groups were established including an ICT group, however we understand that this particular working group is no longer active.

Nevertheless CROP agencies are engaged in a number of active ICT projects across the region, and SPC is now the lead CROP agency with respect to ICT. From our stakeholder consultation it was clear that SPC is regarded within the PICs as one of the most active agencies in key ICT development activities such as capacity building. SPC's active role may improve regional coordination in the future.

Regional Resource Centre

In March 2006 an ICT Task Force proposed that a regional resource facility support regional governments in the areas of ICT legislation, policy and regulation. In 2009 an options report on the Pacific Regional Regulatory Resource Centre was completed by the World Bank and financed by PPIAF. The report's conclusions were adopted by the regional ICT community, and implementation will commence in 2010, to be financed through the Pacific Regional Infrastructure Fund (PRIF). Although the initial proposal was to co-locate the Resource Centre with the ITU's office within the Forum Secretariat, the World Bank has commenced a review of this option. A number of possible locations are being considered for the Centre and the World Bank has undertaken to determine the most appropriate location.

The proposed objectives of the Centre are:

- the collation of industry data
- provision of information on specific policy or regulatory issues
- advisory services
- to issue best practice statements on policy, laws, implementing rules and regulatory instruments
- function as a restricted clearinghouse for formal or online training from other providers

- maintain a roster of expertise.[26]

Japan-Pacific ICT Centre

The Japan-Pacific ICT Centre is a new initiative between the Japanese government and the University of the South Pacific (USP). It is hoped that the Centre will assist the USP to realise its vision of becoming a Centre of Excellence, and by 2013 it aims to achieve success in the following areas:

- ICT regional security policies, laws and regulation
- distance flexible education
- research, innovation and staff development
- industrial liaisons
- regional development and international collaboration.[27]

Other developments in regional harmonisation

ICB4PIS The EC/ITU subproject *Capacity Building and ICT Policy, Regulatory and Legislative Frameworks Support for Pacific Island States* (ICB4PIS) was launched in November 2009. Its primary aim is to build human and institutional capacity through a range of targeted training, education and knowledge sharing measures, as well as developing background material for possible harmonised policies for the ICT market.[28]

ICT4P The European Union and African, Caribbean and Pacific (ACP) Secretariat concluded a Contribution Agreement with SOPAC to

26 Webb, Douglas (2008), *An assessment of options for a Pacific Regional Telecommunications and ICT Resource Centre*, 9 December 2008. Available at http://go.worldbank.org/AXC74KF4D0.

27 USP(2009), *Japan-USP Pacific ICT Centre*. 1st PacCERT Working Group Meeting, 25 November 2009.

28 Source: ITU website, http://www.itu.int/ITU-D/projects/ITU_EC_ACP/icb4pis/index.html.

fund, from its @CP-ICT Programme, the Project 'ICT Access for the Poor: Improving access to ICT by informing and engaging Pacific ACP Legislators' (ICT4P). This project aims to engage, empower and support policy makers and legislators by facilitating and enabling members of Pacific ACP parliaments to be better informed about ICT access issues, and learn about successful ICT legislation and interventions. Activities under this project include awareness raising activities, regional meetings, and in country training workshops and information seminar.

PacCERT — The ITU, in collaboration with the Australian government, commissioned a readiness assessment for establishing a Pacific Computer Emergency Response Team (PacCERT). In May 2009, the PacCERT Working Group was formed to spearhead the establishment of PacCERT. USP is to host PacCERT at the Japan Pacific ICT Centre.

PICISOC — The Pacific Islands Chapter of the Internet Society (PICISOC) addresses and advises on Internet issues and developments within and that are of interest to Pacific Islands.[29]

Further details on the above initiatives are provided in Annex D.

Regional operators

Digicel — Digicel[30] has been operating in the Caribbean since 2001, expanding into Central America and the Pacific in 2006. Digicel now operates in six Pacific countries: Samoa, Papua New Guinea, Tonga, Vanuatu, Fiji and Nauru.

29 Source: PICISOC website, http://www.picisoc.org/tiki-index.php?page=PICISOC.

30 http://www.digicelgroup.com/en/about.

B-Mobile Pacific Mobile Communications, a subsidiary of Telikom PNG, has been operating its GSM mobile network B-Mobile[31] in Papua New Guinea since 2003. In 2009 B-Mobile was awarded a mobile licence in the Solomon Islands in a competitive tender, in which Digicel had also entered a bid.

Pactel Pactel[32] provides satellite telecommunications and broadcast services in the Asia-Pacific Region. During 2008 Pactel invested in a new company (Pactel Mobile) to facilitate rollout of mobile services in the Pacific. In 2009 Pactel was appointed by Tuvalu Telecom Corporation to install a replacement mobile phone network, with the network launched in November 2009.

2.7 Conclusions

With the liberalisation that has occurred in a number of Pacific telecoms sectors over the last four years the availability and affordability of mobile services in the region has improved considerably. It is not possible to link all of the observed sectoral change directly with the Digital Strategy. Some of the structural changes that have occurred were already in progress prior to the Digital Strategy and initiated by other driving forces (such as Finance Ministries) rather than ICT policymakers. Nevertheless some developments have been driven by the Digital Strategy, particularly the contributions of partners in the form of capacity building and technical assistance.

An improvement in access to communications technology has been achieved through PACRICS. Developed under the Pacific Plan to provide affordable and reliable Internet connectivity to any rural and remote area in the Pacific region, PACRICS has deployed many sites throughout the Pacific.

31 http://www.pacificmobile.com.pg/index.html.

32 http://www.pacificteleports.com/default.aspx

A number of key advances have occurred with ICT regional harmonisation and assistance. Of particular note is the proposed Pacific ICT regulatory resource centre which will provide regulatory advice, training and data to PICs, and the Japan-Pacific ICT Centre at USP.

Key gaps and emerging issues identified include:

- In some of the smaller Pacific countries telecoms market structures and services have changed little and it appears that it is a difficult process for these governments to develop updated ICT policies and legislation, mainly due to capacity and resource constraints.
  - competition may be feasible in some of the PICs with population sizes of around 100 000 (as demonstrated by the success evident in Tonga)
  - a competitive solution may not be an option for some of the very small PICs, and consideration should be given in these cases to special sub-regional solutions.

- The PICs may be considered to be particularly vulnerable to cyber threats for a number of reasons, but at present there is no consistent approach to dealing with this issue. For example in different PICs the issue is dealt with variously in ICT, Spam, Computer Crimes, Electronic transactions/business and Telecoms Acts, and a Crimes Decree.

- The expense of international capacity continues to be a major issue for the development of telecoms/ICT in and among Pacific Islands, with international bandwidth requirements set to increase substantially in the next five years. Satellite services will remain essential for the foreseeable future as the most cost-effective service for the very sparsely distributed, relatively small, regional populations. PICs in general find satellite costs high and there is high demand in the region for submarine connectivity.

- Due to the high cost associated with its deployment, international connectivity via submarine cable is relatively scarce among PICs. The SPIN project which would have brought considerable advances to the region in terms of submarine connectivity was unsuccessful in raising the necessary funding. However, there have been a number of

recent successful projects with additional ventures either forthcoming or under discussion.

- In many PICs there has been slow progress with policies and implementation of universal access schemes, largely due to a lack of technical expertise and resources

- While telecentres demonstrate considerable benefits, it is not clear in all cases that it is possible for such ventures to be self-sustaining beyond the short-term

- The benefits of training and capacity building efforts must be spread over a wider segment of the population and communities.

In summary, while it is evident that considerable progress has been made in some of the larger countries with liberalisation, sectoral change has not occurred in smaller PICs. In most cases ICT policies are still work-in-progress, as are initiatives to reduce the digital divide. Feedback at the national level indicates that regional assistance and capacity building efforts are reaping returns, and this assistance is unlikely to have been forthcoming in the absence of a regional strategy.

3 ICT in the Pacific: accessibility and affordability

Two key priorities of the Digital Strategy are to improve the accessibility of communications technology in the Pacific and to reduce costs. In this section we use standard quantitative measures of communications penetration and affordability to review progress towards achieving these objectives.

Standard measures of ICT access are fixed and mobile penetration, international Internet bandwidth or household access to the Internet and computers. ICT usage can also be assessed using such indicators as Internet use and fixed or mobile broadband uptake. Affordability may be assessed using a methodology that compares prices of a standard basket of services across countries. Regular scrutiny of these measures for the Pacific is essential to measure progress against ICT national and regional objectives.

3.1 Accessibility of communications technology in PICs

Fixed telephone penetration in PICs from 2004 to 2008 is shown in Exhibit 3.1. Over these five years fixed penetration has remained less than 20% in most of the countries, with little movement in this measure. There is also no consistent trend for increasing or decreasing penetration over the countries. Niue has consistently had the highest fixed penetration at over 60%, with a mostly upwards trend. The other two highest fixed penetration countries – Palau and the Cook Islands – have experienced a decrease in fixed penetration from 2007 to 2008. The largest overall change has occurred in Tonga, where fixed penetration has nearly doubled from 12.9% in 2004 to 24.7% in 2008.

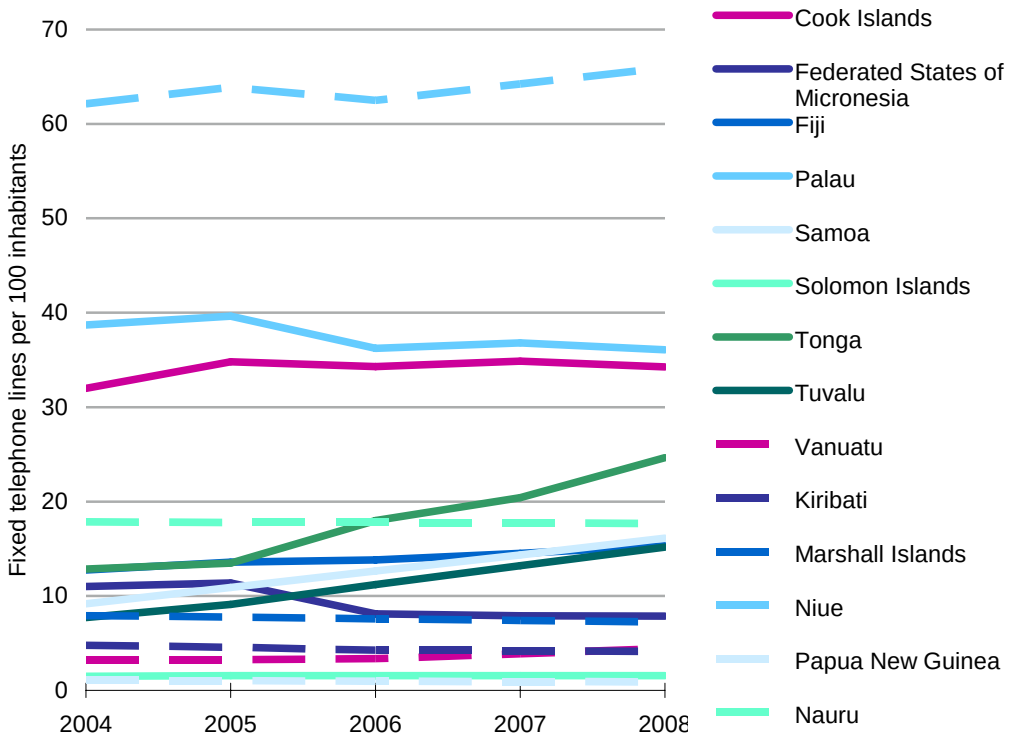


Exhibit 3.1: *Fixed telephone penetration in PICs from 2004 to 2008 [Source: ITU]*

Conversely, almost all the PICs have experienced large increases in mobile penetration over the same five year period (Exhibit 3.2). By 2008, most of the PICs had higher mobile penetration than fixed, with the exceptions of the Cook Islands and the Marshall Islands. Also note that Niue, which in 2004 had the highest mobile penetration at 38.5%, has not had mobile services since the network was effectively destroyed by cyclone Heta during that year. Nauru is not included on the graph as the country's first mobile operator was launched in 2009.

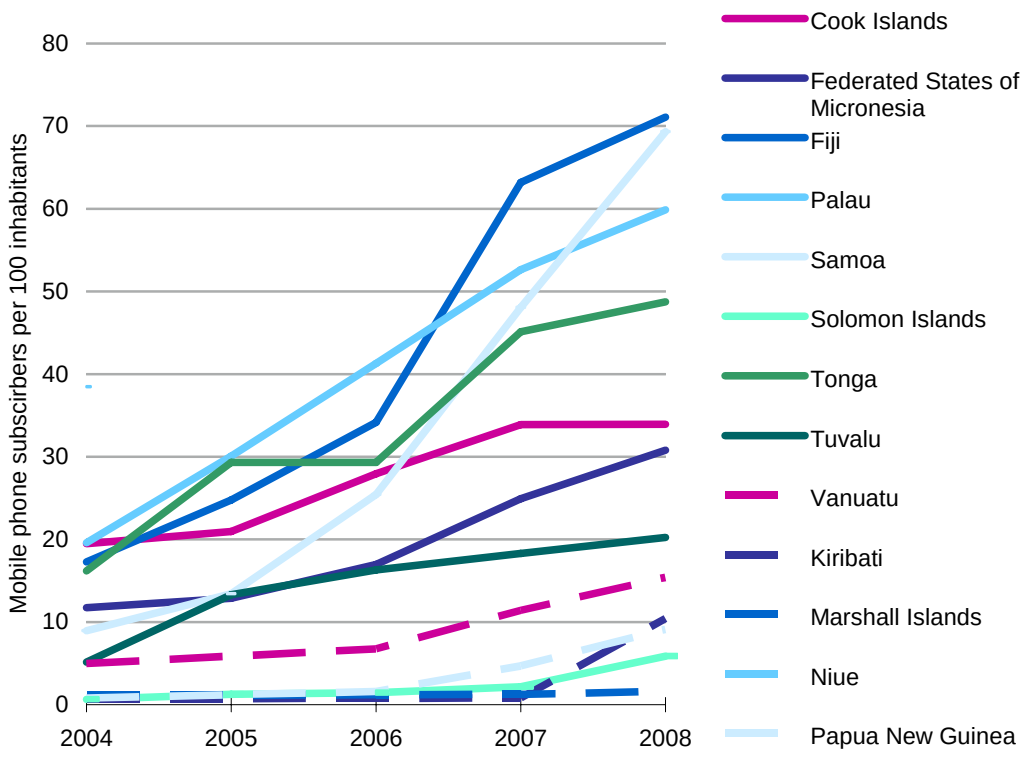


Exhibit 3.2: *Mobile phone penetration in PICs from 2004 to 2008 [Source: ITU]*

Internet penetration has increased in most PICs from 2004 to 2008, with the highest increase shown in Niue and Tuvalu (Exhibit 3.3). Growth in Palau and the Cook Islands has been stagnant, and there has been a slight decline in Kiribati and the Marshall Islands.

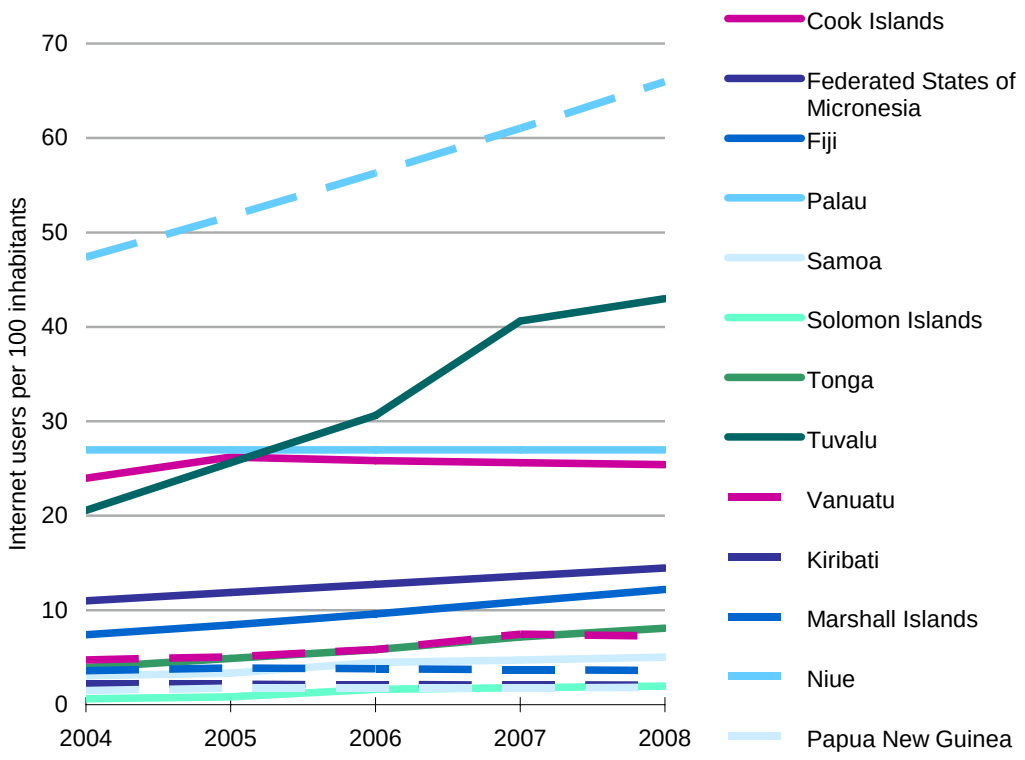


Exhibit 3.3: *Internet penetration in PICs from 2004 to 2008 [Source: ITU]*

There has been little change in broadband penetration in most of the PICs where the service is available, with the exception of Tuvalu and Fiji which have experienced large increases (Exhibit 3.4).

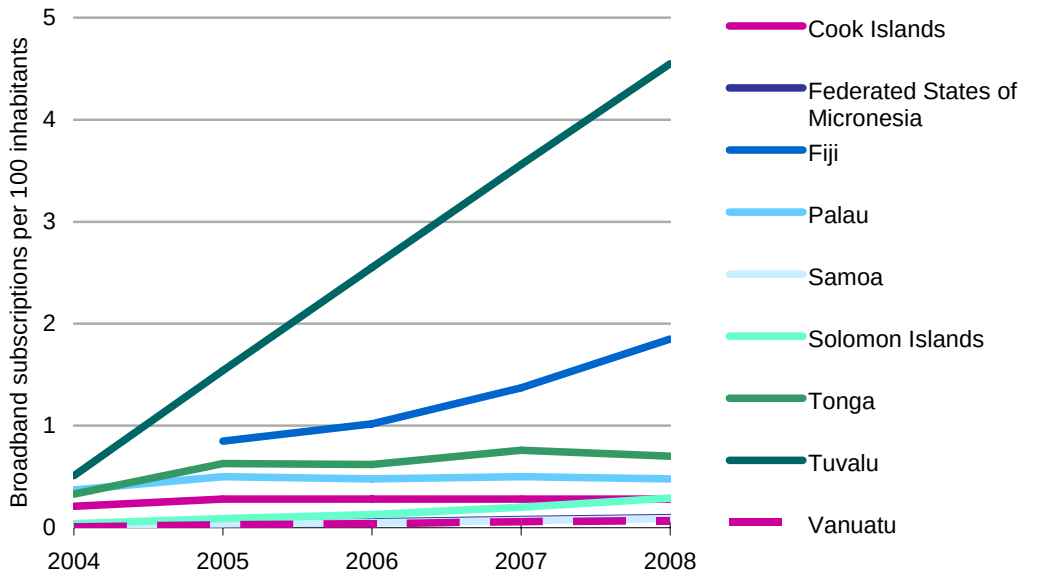


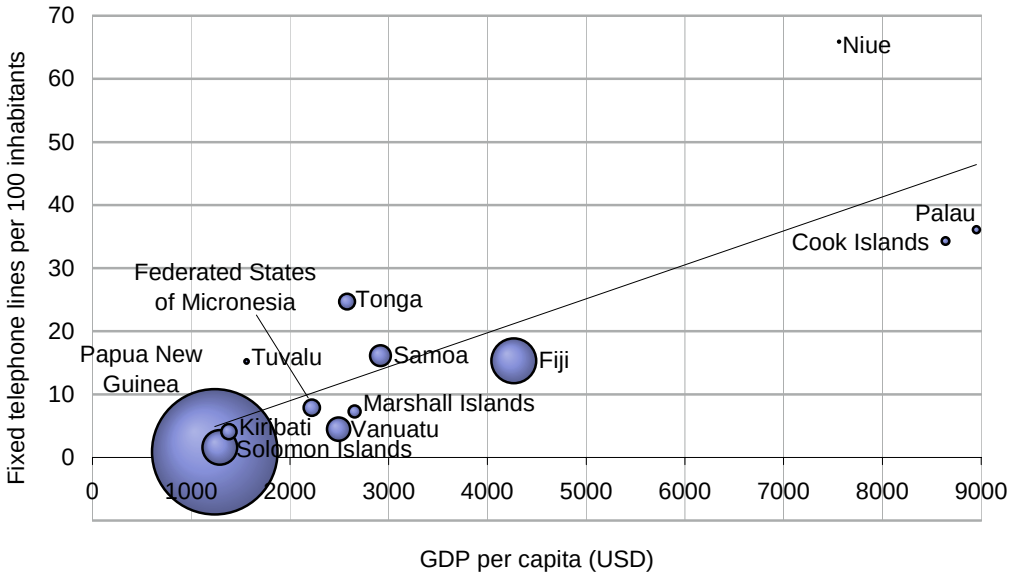
Exhibit 3.4: *Broadband penetration in PICs from 2004 to 2008 [Source: ITU]*

Thus we conclude that substantial progress has been made in the accessibility of mobile communications in a number of PICs since 2006, while in general we have not seen significant advances in the accessibility of fixed, Internet and broadband services. The slow rate of increase (or even slight decrease) in fixed penetration in various countries does not imply that access to telephony services overall is not improving as this is occurring in parallel with the increase in mobile penetration. The relatively high set-up costs for fixed telephony in the remote island countries compared to that of mobile means that mobile tends to be a more attractive proposition for telecoms operators. As such the potential for competition in fixed services is likely to be limited. One issue with the low fixed penetration rates, however, is that this may limit the potential for provision of Internet and broadband services that do not rely on wireless technologies.

The key question is whether current penetration levels are consistent with what we would expect given the level of country income?

For fixed (Exhibit 3.5) and mobile (Exhibit 3.6) services there is typically a clear relationship between penetration and GDP per capita (income). In the case of the PICs this relationship appears to be most evident in the case of fixed telephone penetration; however,

Niue and Tonga do have higher fixed telephone penetration than would be expected for their income levels, whereas Vanuatu, Cook Islands and Palau have lower fixed penetration than expected. Fixed penetration for the PICs in general is fairly low, with only three countries having more than 30 fixed telephone lines per 100 inhabitants, and with Niue being the only country with more than 60 fixed lines per 100 inhabitants.

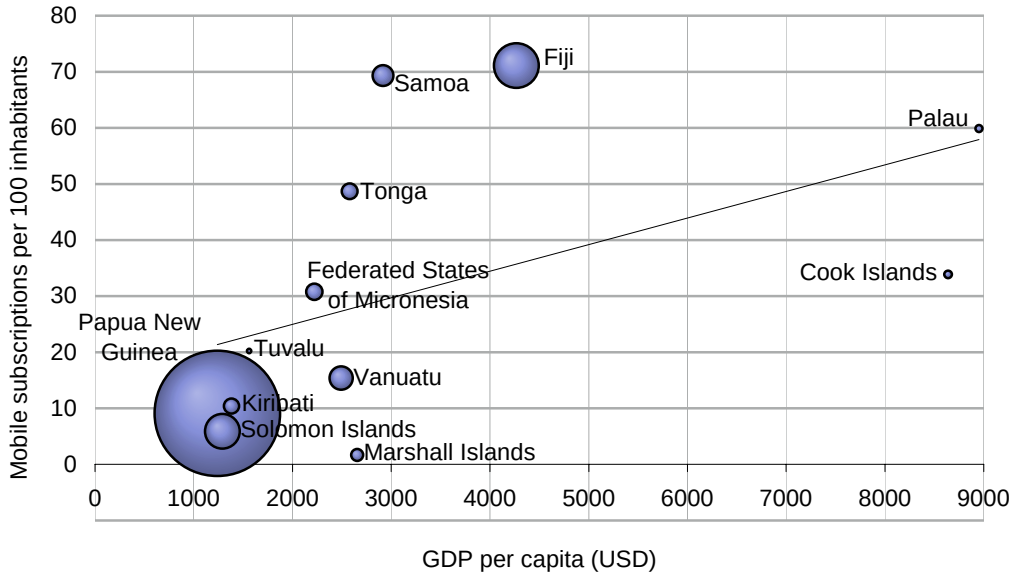


Note: size of the bubble represents population

Exhibit 3.5: *Fixed telephone penetration in PICs, 2008 [Source: ITU, World Bank, national statistics offices]*

In the case of mobile phone penetration there is a very wide variation in penetration levels, ranging from less than ten subscribers per 100 inhabitants in Kiribati, the Solomon Islands and Papua New Guinea up to 71 subscribers per 100 inhabitants in Fiji. The mobile penetration does not seem to correlate very highly to income in the PICs. The four countries with highest mobile penetration – Fiji, Samoa, Palau and Tonga – all have two competing mobile phone operators, and also have the lowest prices for mobile services. With the exception of the Marshall Islands, the countries with lowest mobile penetration are those with the most expensive mobile services. It should be noted, however, that the

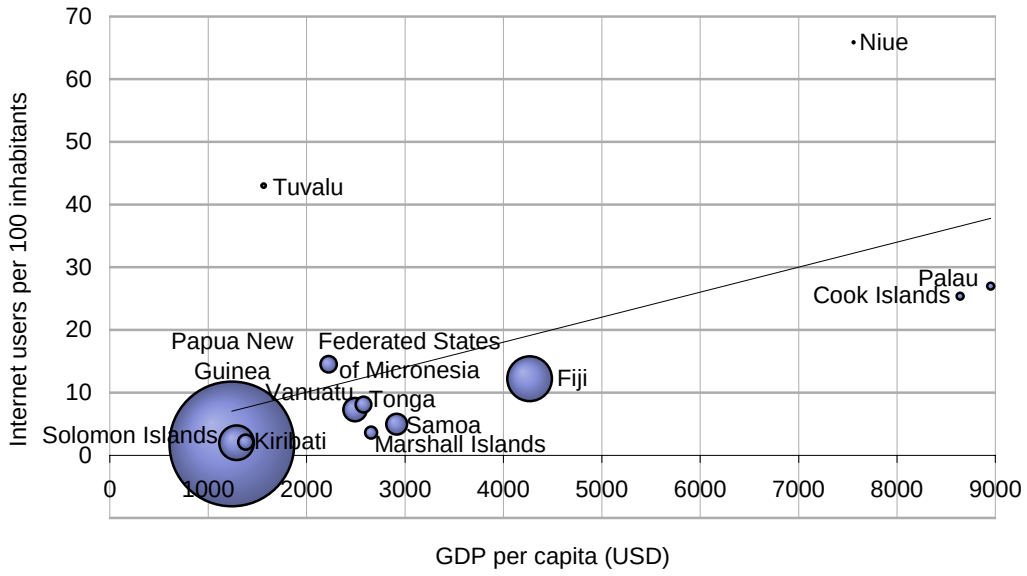
situation in Papua New Guinea and the Solomon Islands is currently changing rapidly with the recent introduction of competition in mobile markets.



Note: size of the bubble represents population

Exhibit 3.6: *Mobile phone penetration in PICs, 2008 [Source: ITU, World Bank, national statistics offices]*

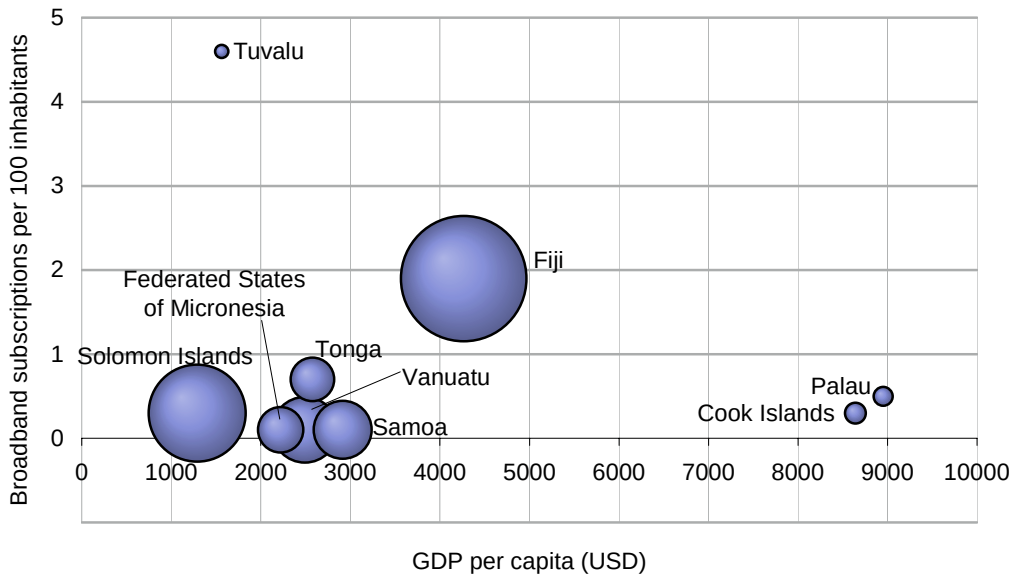
Internet usage is fairly low in most PICs, at less than 30 users per 100 inhabitants (Exhibit 3.7). There are three countries that stand out with higher than expected Internet use: Niue, Tuvalu and Nauru. In the case of Niue this would be based on the high fixed line penetration combined with the free WiFi Internet for citizens offered through the Internet User's Society of Niue.



Note: size of the bubble represents population

Exhibit 3.7: *Internet penetration in PICs, 2008 [Source: ITU, World Bank, national statistics offices]*

Broadband access is only available in nine of the 14 PICs, and penetration levels are very low at less than five subscriptions per 100 inhabitants (Exhibit 3.8). In fact Tuvalu and Fiji are the only countries with more than one subscription per 100 inhabitants.



Note: size of the bubble represents population

Exhibit 3.8: *Broadband penetration in PICs, 2008 [Source: ITU, World Bank, national statistics offices]*

3.2 Costs of communications technologies

We have assessed the affordability of fixed telephone, mobile, dial-up Internet and broadband services in PICs. This is illustrated as the percentage of monthly income required to pay for a specified level of service use over a month for each type of telecoms service. In each instance GDP per capita divided by twelve was used as a proxy for average monthly income. Each of the affordability results described below represents the cheapest available option for those services in each country, based on tariffs published on operators' websites as at February 2010. Not all PICs have been included in the affordability assessment as prices were not available in all instances.

For fixed services we calculated the cost for two levels of use based on OECD fixed baskets of usage, where low level usage consists of 33 local calls, five national calls and ten calls to mobiles per month, and high level usage comprises 114 local calls, 16 national

calls and 62 calls to mobiles per month.[33] Whilst the OECD usage baskets do not necessarily give a true indication of usage levels in PICs as the OECD comprises mainly of highly developed countries, we have used these for our calculations as there is an lack of Pacific-specific usage data.

The percentage of average monthly income required to pay for a low level of fixed telephone use is shown in Exhibit 3.9. This figure ranges from 1.6% of income in Palau up to 26.4% in Kiribati. Most of the countries require less than 9% of average monthly income to pay for a low level of fixed telephone use. In the case of high level usage the affordability is much worse, in particular in Kiribati, where more than 90% of average monthly income is required for this amount of calls (Exhibit 3.10). Only in Palau and Papua New Guinea is the cost for a high volume user less than 10% of income. Note that these percentages are only indicative due to the proxy nature of the GDP per capita being used as an measure of individual income. In reality there would be a wide income distribution so any particular user would not necessarily pay such high percentages of their monthly income on telecoms services.

33 OECD (2006), *Revised OECD Telecommunications Price Comparison Methodology*, July 2006, available at http://www.olis.oecd.org/olis/2006doc.nsf/.

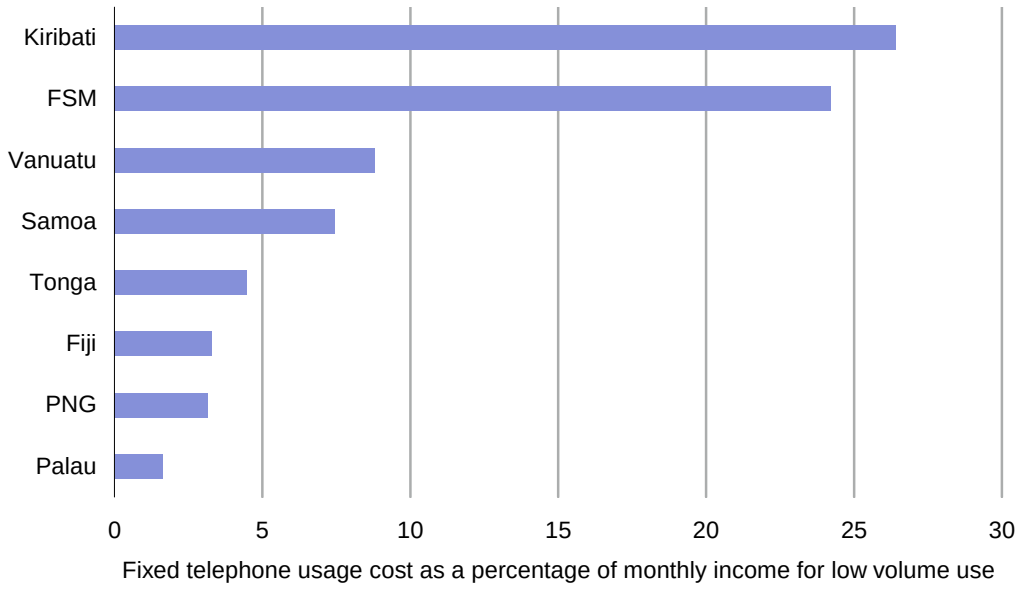


Exhibit 3.9: *Percentage of average monthly income required for fixed telephone usage for a high volume user in PICs, February 2010 [Source: Operator websites]*

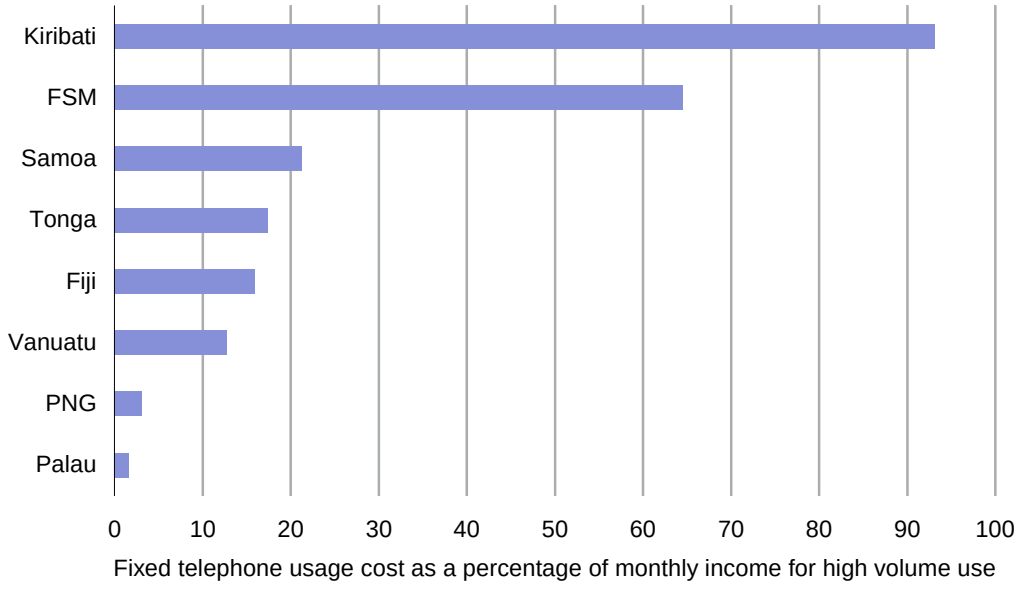


Exhibit 3.10: *Percentage of average monthly income required for fixed telephone usage for a high volume user in PICs, February 2010 [Source: Operator websites]*

Mobile affordability was calculated similarly as for fixed services, with low and high usage levels determined using the OECD mobile baskets of usage, where low level usage comprises 30 calls and 33 text messages per month, and high level usage consists of 140 calls and 55 text messages per month.[34] Once again we have used OECD usage baskets due to the absence of Pacific-specific usage data, noting that they may not give true representations of mobile phone usage levels in PICs.

For low level use less than 20% of average monthly income is required for mobile services, with half of the countries requiring less than 6% of income (Exhibit 3.11). For a high level of use Palau is the most affordable country, requiring 7.6% of average monthly income, with all other countries requiring more than 10% (Exhibit 3.12). Mobile services in Papua New Guinea are the by far the least affordable with a high level of mobile phone use costing 101% of average monthly income. In general, the countries with two competing mobile operators have the most affordable mobile services, compared to the countries with monopolies; notable exceptions are the Federated States of Micronesia being the third most affordable for low level use despite having a monopoly operator, whereas Papua New Guinea, with two mobile operators, has the lowest affordability for mobile services.

34 OECD (2006), *Revised OECD Telecommunications Price Comparison Methodology*, July 2006, available at http://www.olis.oecd.org/olis/2006doc.nsf/.

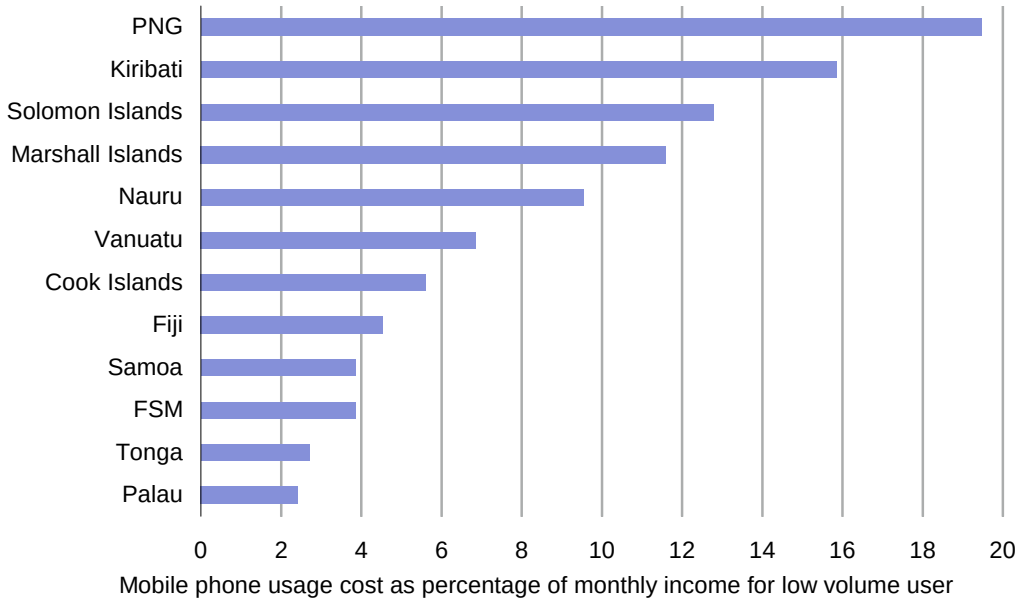


Exhibit 3.11: *Percentage of average monthly income required for mobile phone usage for a low volume user in PICs, February 2010 [Source: Operator websites]*

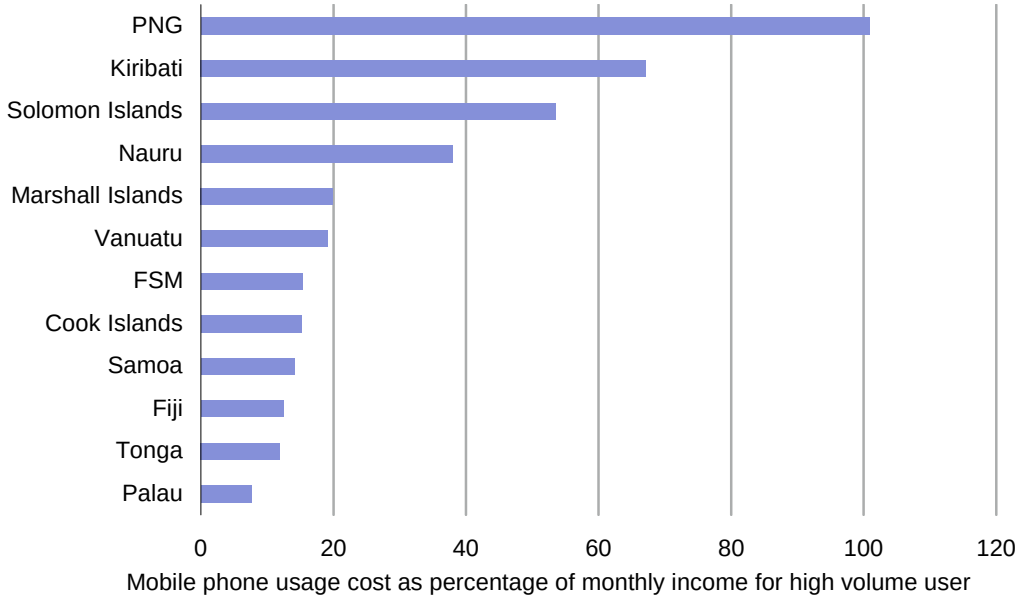


Exhibit 3.12: *Percentage of average monthly income required for mobile phone usage for a high volume user in PICs, February 2010 [Source: Operator websites]*

The affordability of dial-up Internet access was calculated as the percentage of average monthly income required for ten hours of use per month. Here Niue is a notable case with the free Internet access offered for personal use through the Internet User's Society of Niue (Exhibit 3.13). Affordability in other PICs ranges from 2.4% of average monthly income in Fiji up to 11% in Vanuatu.

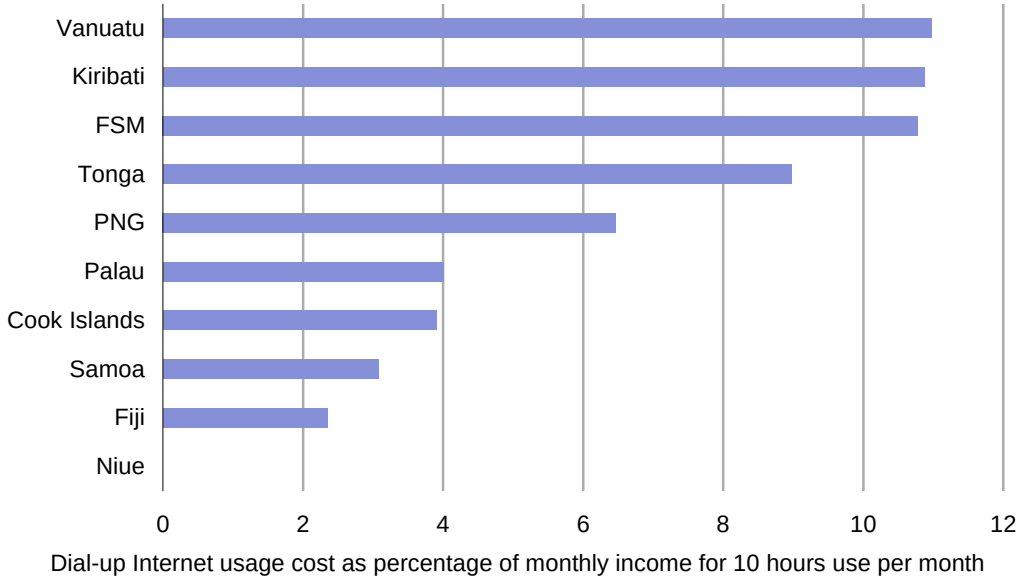


Exhibit 3.13: *Percentage of average monthly income required for 10 hours of dial-up Internet access in a month in PICs, February 2010 [Source: ISP websites]*

Broadband affordability was calculated as the percentage of average monthly income required to pay the monthly fee of the least expensive available broadband plan. The speed and data allowance between these plans varies significantly; speeds range from 64Kbit/s to 512Kbit/s and monthly data allowances from 30MB up to unlimited usage. The monthly cost of broadband plans in PICs ranges from 5.3% and 5.8% of average monthly income in Fiji and Cook Islands respectively, up to 60.5% of average monthly income in Palau (Exhibit 3.14).

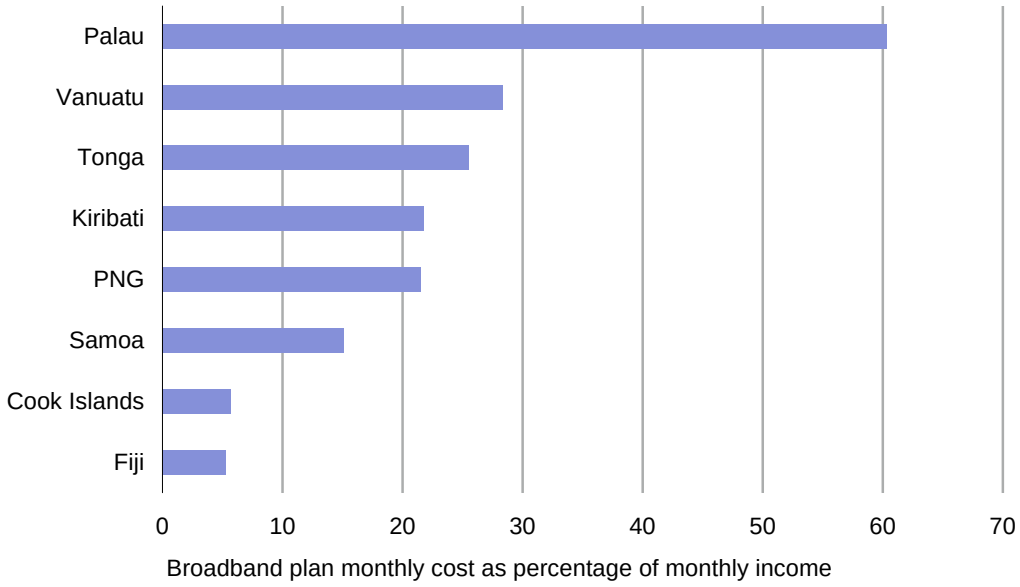


Exhibit 3.14: *Percentage of average monthly income required for monthly fee of cheapest available broadband plan in PICs, February 2010 [Source: ISP websites]*

3.3 Conclusions

Over the last five years it is clear that ICT sectors in many PICs have undergone significant change with competitive reforms and market entry leading to improving service availability, reach and pricing. In particular we have seen rapid expansion in mobile telephony penetration in countries that have opened telecoms markets to allow entry of a second mobile operator. Nevertheless there are a number of gaps and emerging issues:

- Telecoms penetration and availability in many of the PICs are generally low when compared to developed countries, for basic voice as well as more advanced services such as Internet access, broadband and mobiles.

- The availability and affordability of broadband data speeds are basic issues in the development of effective ICT, and are critical if the anticipated economic and social benefits are to be achieved. As yet even basic Internet access is still a challenge in many PICs, and the availability of broadband is extremely limited.

It is important to note that for this quantitative analysis we have used data from a number of sources, including ITU, World Bank, national statistics offices, and national operators. It was not unusual to find conflicting data from different sources[35]. Accuracy of the results would be substantially improved if reliable and up-to-date data were collected at the national level. It is evident that this type of data collection is not currently occurring in most PICs. In some countries the collection and reporting of ICT measures is the responsibility of the regulator while in other countries this activity is undertaken by the national statistical office. Hence, national statistics offices could consider introducing (or in some cases extending) data collection for ICT measures for which data is collected. For example, it would be very useful for assessing ICT usage and skills to have data available on household and business usage of ICTs.

35 For example data from the ITU *World Telecommunication/ICT Indicators* – for fixed and mobile subscribers and penetration – were significantly different to data supplied to us by the regulator in Vanuatu. We have noted the sources for all data used in this report.

4 Utilisation of ICT in the PICs

The Digital Strategy does not focus on issues relating to utilisation of ICT. Nevertheless, if all the objectives of the Digital Strategy had been achieved by 2010 then we would expect countries to be in a position to utilise many different ICT applications and converged services. In this Section we review existing utilisation of ICT across the Pacific, and consider the potential of ICTs to meet future needs of PICs.

4.1 Definitions of ICT applications

The ITU-D ICT Applications and Cybersecurity Division[36] has identified a number of sectors where ICT Applications could be beneficial for delivering basic services in developing countries, particularly in remote and rural areas. These include government, education, health, commerce and agriculture, as defined below.

e-government The ITU defines e-government as:[37]

> the use of information and communication technologies in Government to provide public services to improve managerial effectiveness and to promote democratic values and mechanisms; as well as a regulatory framework that facilitates information intensive initiatives and fosters the knowledge society.

36 ITU (2010), *ICT Applications*, available at http://www.itu.int/ITU-D/cyb/app/index.html.

37 ITU (2008), *Electronic government for developing countries (draft)*, August 2008.

e-Learning As defined by the World Summit on the Information Society:[38]

> e-Learning has been defined as the use of new multimedia technologies and the Internet to improve the quality of learning, to make it accessible to people out of reach of good educational facilities, and to make new and innovative forms of education available to all. E-learning should be more than just a tool for formal education to be used in the classroom.

e-Health The World Health Organisation's definition is a follows:[39]

> e-Health is the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research.

e-Commerce As defined by the OECD:[40]

> Electronic commerce refers to the commercial transactions occurring over open networks, such as the Internet. Both business-to-business and business-to-consumer transactions are included.

e-Environment The ITU defines e-Environment as follows:[41]

> e-Environment is: a) the use and promotion of ICT as an instrument for environmental protection and the sustainable use of natural resources; b) the initiation of actions and implementation

38 http://www.itu.int/wsis/basic/faqs_answer.asp?lang=en&faq_id=91.

39 World Health Assembly (2005), *Resolution 58/28: eHealth*, May 2005. Available at http://apps.who.int/gb/ebwha/pdf_files/WHA58/WHA58_28-en.pdf.

40 OECD (2002), *Glossary of statistical terms: electronic commerce*, available at http://stats.oecd.org/glossary/detail.asp?ID=4721.

41 ITU (2009), *International Telecommunication Union e-Environment toolkit and readiness index (EERI), Draft of discussion*, 4 December 2009.

> of projects and programmes for sustainable production and consumption and the environmentally safe disposal and recycling of discarded hardware and components used in ICTs, and; c) the establishment of monitoring systems, using ICTs, to forecast and monitor the impact of natural and man-made disasters, particularly in developing countries, least developed countries and small economies.

e-Agriculture e-Agriculture is defined as:[42]

> an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. More specifically, e-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use information and communication technologies (ICTs) in the rural domain, with a primary focus on agriculture.

4.2 ICT in government

The use of ICT in government can be implemented in a variety of ways. Nevertheless, a common objective is to use technology and computer applications to increase productivity and efficiency within government and when dealing with stakeholders, which generally falls under the term e-government.

E-government services can be classified into four types: government-to-government (G2G), government-to-employee (G2E), government-to-business (G2B), and government-to-citizen (G2C). However, the provision of those services by a government can be considered quite advanced, as it presumes that the country possesses the requisite infrastructure, hardware, applications, skills and expertise to maintain such a facility.

42 http://www.e-agriculture.org/about.html.

While most Forum countries plan to implement e-government, many are still grappling with the evolutionary steps that lead to e-government (Exhibit 4.1).

Evolutionary steps	*E-govt services*
1. Computerising ministries, departments and other government agencies	G2G, G2E
2. Establishing networks within and between ministries, departments, etc	
3. Securing Internet connectivity and emailing facilities	
4. Developing ministry/government websites	G2B, G2C
5. Developing and running applications providing G2B and G2C services	

Exhibit 4.1: *Key steps to realise e-government [Source: Network Strategies]*

To varying degrees most countries have implemented steps 1 to 4, but they tend not to possess all of the capabilities required to offer a comprehensive suite of e-government services, in particular those that:

- automate or computerise existing paper-based procedures
- provide new options for transacting business, and interacting with stakeholders
- provide new and alternative means of organising and delivering information.

Nevertheless most Pacific governments now do have the pre-requisites for e-government: computerisation and networks, a government website and email addresses (Exhibit 4.2). At the same time, many individual Ministries do not have websites and this represents a major obstacle to progressing e-government services. A summary of the status of PIC government and ministry websites is provided in Annex B.

Country	*Computerised/ network*	*Government website*	*email*	*Interaction between ministries*	*Interaction with public*
Cook Islands	✓	✓	✓		
Federated States of Micronesia	✓	✓	✓		✓
Fiji	✓	✓	✓	✓	✓
Kiribati	✓				
Marshall Islands	✓	✓	✓		✓
Nauru	✓	✓	✓		
Niue	✓	✓			
Palau	✓	✓	✓		
Papua New Guinea	✓	✓	✓		
Samoa	✓	✓	✓		
Solomon Islands	✓	✓	✓		
Tonga	✓	✓	✓	✓	
Tuvalu	✓	✓	✓		
Vanuatu	✓	✓	✓		

Exhibit 4.2: *Progress towards e-government in the Pacific [Source: Network Strategies, Country Ministries]*

In the sections that follow, ICT/e-government initiatives in select Forum countries are examined.

Cook Islands

In 2005, the Cook Islands prepared an e-government strategy to realise the following goals:

- to increase government's efficiency and effectiveness
- to increase transparency and accountability in decision-making

- to enhance delivery of public service to citizens efficiently and cost effectively.[43]

The initial strategy, which would be implemented over a five-year period, was constructed around five key elements:

- deploying the requisite basis infrastructure to all government agencies
- preparing a portfolio of common applications
- identifying and preparing ministry-specific applications and e-services for citizens
- preparing a standards framework for all e-government projects
- establishing an enabling environment for e-government goals to be realised.[44]

In January 2006, a joint project was established between the government and United Nations Development Programme (UNDP). Project objectives included:

- establishing an e-government system, including the development if network infrastructure and an e-government portal
- training system administrators
- developing and implementing an e-island system, aimed at improving links between outer islands
- establishing e-island pilot programmes to connect island offices to each other and to central government
- developing e-government and e-islands services.[45]

Fiji

In April 2008, the Fijian government has established an *eGovernment Master Plan*, which set out the long-term strategic development of e-government in Fiji. The overarching goal

43 Source: Office of the Prime Minister, Cook Islands website, http://www.pmoffice.gov.ck/index.php?option=com_content&view=article&id=84&Itemid=79.

44 *Ibid*.

45 *Ibid*, http://www.pmoffice.gov.ck/index.php?option=com_content&view=article&id=102&Itemid=78.

of the plan is to realise a "well-informed connected and united Fiji"[46], built on the national objectives and strategic thrusts summarised in Exhibit 4.3.

National objectives	*Strategic thrusts*
• Raise and sustain GDP growth • Reduce unemployment • Build competencies • Alleviate poverty • Maintain law and order	• Financially sustainable service models • Citizen-centric services • Operational effectiveness and efficiency • ICT competency

Exhibit 4.3: *Key objectives and focal points of e-government in Fiji [Source: government of Fiji[47]]*

As at the writing of the report, the government of Fiji has launched an e-government portal at http://www.egov.gov.fj/, which is planned to cater to the needs of government employees, businesses and citizens. However, while the basic structure for the website has been established, content is still being added as many of the links have not been activated.

Solomon Islands

While not necessarily an orthodox e-government/ICT initiative, in the Solomon islands the People First Network (PFnet) is a unique system that facilitates connectivity between remote locations. Initially established in 2001 as a UNDP-UNOPS[48] project, the PFnet is an email system based on robust, proven and sustainable technology that allows remote locations on the Solomon Islands access to the Internet and email using a computer, short-wave radio, and solar power. Ultimately, PFnet aims to promote and facilitate equitable and sustainable rural development and peace building, by enabling better information sharing and knowledge building among and across the communities of the Solomon Islands.[49]

46 Available at http://unpan1.un.org/intradoc/groups/public/documents/un/unpan030565.pdf.

47 *Ibid*.

48 UNOPS – United Nations Office for Project Services.

49 Source: UNESCO website, http://www.unescobkk.org/index.php?id=1867.

Since its commencement, funding for PFnet has been provided by Japan, New Zealand, Britain, China, Australia and the EU. However, it is now currently self-sustaining through the Rural Development Volunteer Association, which is a non-governmental organisation associated with the Ministry of Rural Development in the Solomon Islands.

Vanuatu

While Vanuatu has yet to prepare a national ICT policy, a fibre-optic network is being deployed to facilitate the provision of e-government services. Fibre networks will be deployed in and around Port Vila and Espirito Santo, and other provinces will be connected via a network of microwave towers. It is anticipated that over 100 government buildings will be connected to the e-government network.[50]

The network will support a number of services including voice, data, email, Internet and video conferencing. Further, it has been proposed that excess capacity on the network could be used:

- to carry radio and television signals to be retransmitted to remote communities near government facilities and
- for other initiative to improve the quality of life in provincial/rural areas and remote communities.[51]

4.3 ICT in education

While it may be self-evident that a critical channel for introducing ICT in societies is via schools, many educational institutions within the region are still grappling with a number of fundamental issues, such as:

- limited, unreliable or no access to telecoms networks

50 Datec Vanuatu, *e-Government – Opportunities and Threats*. Available at http://www.datec.com.vu.

51 *Ibid*.

- limited, unreliable or no access to electricity
- limited or no access to basic computing devices to improve school administration and/or for teaching purposes
- teachers untrained in the use of computers and to teach or facilitate the use of ICT among children
- the relatively high costs necessary to address these issues.

As a result, very few PICs are in a position to implement comprehensive ICT in education policies that can be applied in all schools. This finding was confirmed in our stakeholder consultation, although there is very little recent documentation available on progress towards ICT in education.

In the paragraphs below, ICT initiatives in education in a selection of PICs are highlighted.

Cook Islands

While the Cook Islands have enjoyed relatively high access to computers to schools, in 2005, the Edunet Training Programme was launched to provide onsite IT training for principals and teachers of outer island schools to improve efficiency and effectiveness in school administration and communication.[52] Training included:

- the use of Microsoft applications
- the use of email and other Internet applications
- basic computer and software maintenance and repairs[53].

Fiji

In Fiji, the use of ICT in education was established as an important strategic element in the overall development of the country. In its e-government plan and education strategic plan, a number of programmes were proposed, which included the following:

- establishing links to schools
- implementing databases

52 Source: Ministry of Education, Cook Islands, http://www.education.gov.ck/.

53 *Ibid*.

- establishing regular training and standards towards ICT certification
- exploring and using of technology
- establishing network systems for the Ministry of Education
- establishing IT centres and distance education centres at strategic locations.[54]

Additionally, the Fijian and Japanese governments are currently in the process of establishing a regional ICT centre at the University of the South Pacific (USP) campus in Fiji.[55]

Samoa

The Education Sector Project (ESP II) is a joint initiative between the ADB, AusAID, NZAID and the government of Samoa towards establishing a more equitable and effective education system in that country. It comprises six key components:

- curriculum reform and assessment system
- developing effective teachers
- improving access to quality education
- strengthening capacity to undertake research, evaluation, policy analysis and planning
- strengthening capacity to implement and manage development projects
- enhanced quality of education by delivering the curriculum, assessment, learning materials, teachers training and learning through ICT.[56]

54 Source: UNESCO website, http://www.unescobkk.org/education/ict/themes/policy/regional-country-overviews/fiji/.

55 As at March 2010 the ICT centre was still under construction at the USP campus. A Director has been appointed and is already in situ at the campus.

56 Source: Ministry of Education, Sports and Culture website, Government of Samoa, http://www.mesc.gov.ws/index.php?option=com_content&view=article&id=80&Itemid=147.

Regional initiatives

One Laptop per Child (OLPC) is a programme that aims to provide school children with inexpensive but sturdy computers, thus extending access to basic education. The programme is geared towards children between the ages of six and twelve years living in the world's poorest countries, who have limited or no access to education and live in communities of extreme poverty[57].

In the Pacific there are five countries that have been classified as Least Developed Countries: Kiribati, Samoa, Solomon Islands, Tuvalu and Vanuatu. In 2008, the SPC and OLPC formed a partnership to conduct pilots in Nauru, Niue, Solomon Islands, Papua New Guinea and Vanuatu. Additional pilots are planned for Fiji and Federated States of Micronesia, with the Solomon Islands considering further activity.

In its 2008 strategic plan for the Oceania region, the aim of the programme was to realise OLPC by 2015, through:

- strategic partnerships to facilitate sustainable deployment and use of laptops to deliver universal primary education
- raising awareness among decision- and policy-makers of the opportunities and benefits of supporting ICT for education for sustainable development.[58]

The OLPC initiative has not worked well in some countries, such as Niue where there have been concerns about children accessing inappropriate Internet content. In addition in some rural communities schools lack basic needs such as electricity, tables and writing materials. In such circumstances OLPC is clearly inappropriate, and arguably some of the more fundamental needs should be addressed first, followed by objectives such as one computer per classroom and Internet connectivity for all schools.

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57 Source: *One Laptop per Child – Concept Note*. Available at: http://wiki.laptop.org/go/OLPC_Oceania.

58 *Ibid*.

4.4 ICT in health

Although there might be considerable scope for ICT in health, most PICs are struggling to provide basic health services and to address basic needs. Many countries are still experiencing high infant mortality, teenage fertility and maternal morbidity, as well as a high prevalence of HIV/AIDS, tuberculosis and other communicable but preventable diseases. Nonetheless, there do not appear to be any major projects or initiatives geared towards facilitating ICT in the health sector in the region or in individual Pacific Island countries.

However, in the *Asia Pacific Strategy for Emerging Diseases* which is applicable to all PICs, and aims "to minimise the health, economic and social impact of emerging diseases in the Asia Pacific Region"[59], ICT is seen as a tool:

- to strengthen information management systems for early detection of emerging diseases
- to develop sustainable technical collaboration within the region.[60]

Our research and consultation has identified an e-health initiative in Fiji, where the Ministry of Health has implemented a Patient Information System (PATIS). On a patient's first visit to a PATIS facility they receive a National Health Card (NHC), with a unique number. Scanning the barcode of the NHC at any of the PATIS facilities allows the patient's medical record to be accessed.[61]

4.5 ICT in commerce

Electronic commerce refers to any form of business transaction that is undertaken electronically rather than through physical exchanges. More specifically, e-commerce functions can be classified into business-to-business (B2B), business-to-consumer (B2C),

59 World Health Organization (2005), *Asia Pacific Strategy for Emerging Diseases*, page *6.*

60 *Ibid*, pages 17 and 22.

61 Source: Fiji Ministry of Health website: http://www.health.gov.fj/PATIS/patis.html.

business-to-government (B2G), consumer-to-consumer (C2C) and mobile commerce (m-commerce). B2B concerns relationships between companies, for example supplier, inventory, distribution and payment management. B2C includes providing online information to customers as well as online selling, or providing online banking services. B2G generally requires the government to take the lead with e-government services. C2C includes online auctions and peer-to-peer systems, and m-commerce involves using wireless mobile devices to buy or sell goods.[62]

Our research indicates that in the PICs there is still much change required before ICT becomes commonplace in business. The required changes involve both accessibility and affordability of key infrastructure, and training in its use.

Since 2007 there has been progress in e-commerce use in PICs, for example online banking is now available in most of the countries, with the exception of Kiribati, Nauru and Tuvalu, with ATMs available except for in Nauru, Niue and Tuvalu. Several PICs now have at least some business offering online purchasing or bookings through their websites, including Cook Islands, Fiji, Marshall Islands, Niue, Palau, Papua New Guinea, Samoa, Tonga and Vanuatu.

4.6 Potential of ICTs to meet future needs of PICs

ICT is both a distinct sector in its own right as well as an enabler and facilitator of development in other sectors. The Digital Strategy describes ICTs as 'powerful tools for development' that are 'essential to social development and economic growth'.[63] In this section we consider the potential for ICTs to meet the developmental needs of PICs, together with emerging barriers and issues.

62 UNDP–APDIP (2003), *e-Commerce and e-Business*, May 2003.

63 PIFS (2006), Pacific Regional Digital Strategy, page 1.

4.6.1 ICT for Development

The term ICT for Development (ICT4D), generally refers to the use of ICTs to facilitate socioeconomic development, through the use of ICTs in a number of sectors. However, it is frequently focussed on the use of ICT to reduce poverty and to address the needs of disadvantaged populations, particularly in developing countries.

ICTs also have an important role to play in promoting gender equality in developing countries. ICTs can be used to provide access to education and information to women beyond the traditional schooling system, as well as providing women-friendly working opportunities, for example working from home.[64] A recent study by the ITU[65] found there was a statistical association between the proportion of women active in the workforce and the level of household Internet access in developing countries.

Perhaps the single most influential change in Pacific ICT over the last four years has been the increase in the availability of mobile services, driven by the introduction of pro-competitive reforms in telecoms sectors. So what has been the socio-economic impact of accessible and cheaper mobile telephony?

While to date there has been little research on this issue at the regional level, a recent study based on survey evidence in Vanuatu[66] provides evidence of the significant impact of mobile telephony on household livelihoods. Key benefits include reductions in household costs, improved ability to maintain social relationships, and decreases in household vulnerability. In addition it is becoming an essential tool for education, social life and emergencies.

The study found that 56% of mobile customers in the sample were using the service in a business capacity. Both urban and rural mobile users reported that the service has reduced business costs and is increasing business opportunities and as such it has become 'critical'

64 Navas-Sabater, J. (2006), *Gender and ICT: role of the World Bank Group*. Presentation for PREM Learning Week, May 2006.

65 ITU (2010), *Measuring the information society 2010*.

66 Pacific Institute of Public Policy (2009), *Social and economic impact of introducing telecommunications throughout Vanuatu*: *research findings*, Pacific Institute of Public Policy, December 2009.

to their economic activity. There is evidence of a change in the value chain as the mobile phone provides new and different sales avenues and altered transport and logistical possibilities. However it is also apparent that many mobile applications – such as mobile banking and the provision of information and business advice for small enterprises via mobile – are under-utilised.

As the accessibility of mobile telephony increases it is apparent that an initial gender gap in mobile ownership is reducing. As at the end of 2009 the study showed that women were engaging in wider ICT usage than in 2008. For example, use of SMS services by women is increasing, indicating that the average lower literacy level of women was less of a barrier than previously.

Another potential barrier for low socio-economic groups is price, and the study found that rural users are spending relatively high proportions of their income on mobile services compared to their urban counterparts. At the same time there is evidence that productivity benefits from the use of mobile services are having a positive effect on rural household income. Ultimately this may lead to an improvement in the distribution of resources amongst urban and rural areas.

The study also highlighted the major challenges ahead to ensure that the potential of ICT is fully harnessed for development. These include:

- the lack of complementary infrastructure, including electricity, roads, and shipping
- the high cost and lack of understanding of the Internet
- the gaps in knowledge of mobile applications that can assist small and medium sized enterprises (SMEs)
- the need to address remaining gender disparities with mobile usage
- remaining rural mobile coverage and cost issues.

4.6.2 Small and medium sized enterprises

In the Pacific, apart from government entities, the majority of business activity is conducted by SMEs. The Digital Strategy recognises the potential of ICTs to develop business opportunities for SMEs in the region:

> Small and Medium sized Enterprises (SMEs) are a significant and vital sector in the Pacific economy. ICTs have the potential to globally expand the markets for SMEs and shrink their costs, thus removing their isolation-related problems. To utilize this potential requires improved financial access to ICTs, more access to customers within the region, and better legal and financial environments. The ability of people to develop ICTs and use them, at both the business and consumer ends, needs significant improvement.[67]

From our stakeholder consultation it was clear that while improvements have been made in the last four years in the accessibility of ICTs for SMEs, there is still much work to be done in further extending the reach of ICTs and ensuring that owners of small businesses are in a position to use ICTs successfully.

One example is the tourism sector which in the Pacific consists largely of SMEs. We understand that across the region there are approximately 2 000 SMEs actively engaged in the sector. South Pacific Travel, a CROP agency, is promoting regional tourism primarily through online marketing and booking facilities, and consequently ICT is a critical component of a regional tourism strategy. Its membership consists of national tourism organisations and a number of private operators. A lack of access to the Internet and high Internet costs (both hardware and usage charges) constitute significant barriers to developing regional tourism. The agency is attempting to create online booking avenues for smaller PICs and enterprises that have no functional ICT systems, however even gathering the necessary information to put online is challenging where there is no Internet capability.

4.6.3 Linkages with other regional policies

While telecoms/ICT is being specifically addressed at the regional level through the Digital Strategy, ICT can serve as an important input to the activities and development of other sectors. It is notable that some sectors do not include ICT as part of their current regional policies (for example, energy policy), however below we outline examples of regional programmes for other sectors for which telecoms/ICT-related initiatives have been detailed.

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67 PIFS (2006), *Pacific Regional Digital Strategy*, page 1.

Energy

As part of our stakeholder consultation we visited the Pacific Power Association, a CROP agency which is active in regional energy policy. From this interview we understand that there is no ICT policy within regional energy policy. Given the importance of reliable public sources of energy, particularly electricity, to support the adoption of ICT hardware (such as computers), it is essential that policy be further developed in this area. To this end we note that regional energy policy[68] does state the goal for policy and planning is to:

> Promote sustainable energy options for electricity generation, transportation, water supply, health care, education, telecommunication, food supply and income generation.

The regional energy policy also has a goal for rural and remote islands as follows:

> Develop sustainable energy options appropriate to remote areas, through an integrated approach, for electricity generation, transportation, water supply, health care, education, telecommunication, food supply and income generation.

Given that these goals have already been established an important next step will be to establish detailed plans to achieve those goals. This may require further research to identify specific needs by location.

68 CROP (2002), *Pacific Islands energy policy and plan*, October 2002.

Climate change

The *Pacific Islands Action Plan on Climate Change* aims to ensure that Pacific Island people build the capacity to be resilient to the threats and effects of climate change. To this end, improvement of national and international telecoms capacity is sought to improve understanding and awareness of climate change.[69]

Disability

In a review of regional disability policy and legislation, the Biwako Millennium Framework for Action (BMF) focuses on the increasing divide between persons who are ICT-literate and have access to the requisite facilities and technologies, and persons with disabilities who do not.[70] Thus it is advocating for the ICT needs of persons with disabilities to be placed on national and regional agendas, and has specified as a priority "access to information and communications, including information, communications and assistive technologies".[71]

Education

Under the regional framework for education, the poor state of ICT tools – due to amongst other things, the lack of access, relatively high costs, poor infrastructure – has been recognised as a significant challenge for its use in education in the Pacific. Hence, the framework states as priorities:

- developing innovative strategies using ICT and distance learning
- promoting computer literacy among teachers
- making electronic resources available to schools
- encouraging regulatory authorities to create national ICT policies

69 SPREP (2006), *Pacific Islands Action Plan on Climate Change 2006-2015.*

70 PIFS, *Review of Regional Disability Policy and Legislation in the Pacific*.

71 UN-ESCAP (2003), *High-level Intergovernmental Meeting to Conclude the Asian and Pacific Decade of Disabled Persons (1993–2002)*.

- ensuring that ICT needs in education in the context of the regional Digital Strategy are being addressed.[72]

4.7 Conclusions

There is no doubt that ICTs offer huge potential for social and economic development in the Pacific. A number of regional organisations are clearly working to promote the benefits of ICTs at both the national and regional levels, and also in the private sector. However, there are a number of gaps and emerging issues:

- progress towards e-government is very slow in the Pacific with few countries possessing all of the capabilities required to offer a comprehensive suite of e-government services
- very few PICs are in a position to implement comprehensive ICT in education policies
- most PICs are struggling to meet basic needs in healthcare, with the result that ICT in health is not a high priority
- ICT is not commonplace in business due to accessibility and affordability of infrastructure
- ICT training will be necessary to encourage business uptake of ICT amongst SMEs
- many sectors do not include ICT as part of their current regional policies
- electricity represents vital complementary infrastructure and reliable public electricity supplies are still not available in many instances to support ICT in regional and rural communities, schools and other local facilities
- there is a lack of other complementary infrastructure such as roads and shipping that would support increased economic activity generated by improved ICT services
- a complete assessment of progress in many areas is difficult due to the many gaps in data and information, for example:
  - little documentation is available regarding progress towards ICT in education
  - little recent data is available on ICT use by businesses
  - there is little research on the socio-economic impact of ICT at the regional level.

72 PIFS (2009), *Pacific Education Development Framework (2009–2015)*, pages 13, 19.

We conclude that at present converged applications (such as e-government, e-commerce, e-health and e-education) are either non-existent or in their infancy in PICs. Recent information on progress in these areas is difficult to obtain readily, but a key finding of our research is that the accessibility and cost of communications technology still represent significant barriers. In many cases governments and households with scarce resources still struggle to meet very basic needs with the result that ICT cannot be a priority. While in some PICs the increase in availability and accessibility of mobile phones is certainly providing new social and economic opportunities, developmental potential offered by the Internet is still unattainable for most.

5 Partners and players

From the Digital Strategy it is clear that partners, donors and regional agencies have a key role in assisting in the realisation of targets of the three Pillars. In this section we provide an overview of roles and contributions, and we review the level of coordination of associated activities.

5.1 Roles and contributions

Many partners and players participate actively in Pacific ICT, undertaking a variety of roles at the regional and national level including:

- technical assistance and advice
- capacity building and training
- supporting infrastructure projects (including pilots)
- funding specific projects or initiatives, through a number of mechanisms, including direct grants and loans.

Exhibit 5.1 lists the key active partners, donors and organisations and highlights their main roles in Pacific ICT.

We have not analysed the role of individual donor countries in ICT in the Pacific in circumstances where the country has no developmental aid programme. It is certainly the case that such countries do provide assistance in Pacific ICT projects (for example, via loans and technical input), but in our view their involvement is driven by factors other than those listed above, such as commercial and/or political interests and the desire to further business opportunities.

Partner	*Technical assistance*	*Capacity building & training – funding and delivery*	*Infrastructure projects*	*Funding (other than for capacity building)*
ADB	✓		✓	✓
APT	✓	✓		
AusAID	✓	✓		✓
DBCDE	✓	✓		
ITU	✓	✓		
NZAID	✓	✓		✓
PIFS	✓	✓		
PITA		✓		
SOPAC	✓	✓		
SPC	✓	✓	✓	✓
UNDP		✓		
UNESCAP		✓		
USP		✓		
World Bank	✓	✓	✓	✓

Exhibit 5.1: *Roles of ICT partners, donors and organisations in the Pacific [Source: Network Strategies]*

We note that almost all partners provide assistance in capacity building and training and/or technical assistance. It should be noted that some of this assistance is provided to targeted groups or members of the provider organisation. The training offered by the above organisations tends to be limited to their members, or to specific countries of work in the case of AusAID and NZAID. Several of the organisation specialise in capacity training specifically for Government or other institutions, rather than offering training courses to individuals. In addition, some of the non ICT-specific donor organisations may have a limited capacity for providing ICT-related training.

Funding assistance is provided by only a minority of partners (ADB, AusAID, NZAID, SPC and the World Bank), while only three partners engage in infrastructure projects (ADB, SPC and the World Bank). SPC and the World Bank engage in all identified roles in ICT in the Pacific.

Further details of recent contributions of many Pacific partners and players have been provided in Annex E.

It should be noted that the quantum of partners engaging in this type of assistance is not in itself an indication of success. It is in fact very difficult with limited reporting mechanisms to assess how successful individual initiatives have been, and whether the totality of assistance has led to a significant change in national ICT capacity. To this end it would be useful to improve reporting on outcomes of capacity building exercises and initiatives, and for such information to be collated and collected at both national and regional levels.

So how well does this current structure of partners and players in ICT and their contributions support delivery of the objectives of the Digital Strategy? Under Pillar 1 regional capacity in addition to bilateral assistance is to be mobilised to support processes necessary to develop ICTs at the national level. Pillar 2 focuses on regional involvement and synergies, while Pillar 3 is concerned with representation at the global level. From our research we conclude that there are some areas in which substantial progress has been made in the last four years, many areas in which work is still in progress, and finally some aspects of the Pillars have had little attention.

Substantial progress	• Promote ICT within CROP (Pillar 2)
Work-in-progress	• Capacity building (Pillar 1) • ICT policies and plans (Pillar 1) • Expansion of telecoms access to rural and remote areas (Pillar 1) • ICT leadership (Pillar 2) • ICT harmonisation (Pillar 2) • Review development and promote usage of ICTs within CROP and to countries (Pillar 2) • Regional approaches to ICT education (Pillar 2)
Gaps	• Development of measures/statistics (Pillar 1) • Particular emphasis on government delivery of health and education services (Pillar 1)

- Re-examination of the state of broadcasting in the region (Pillar 2)
- ICT coordination (Pillar 2)
- Representation of unique Pacific issues, needs, attributes to Pacific and global fora (Pillar 3)
- Monitoring, analysing and assessing global ICT trends (Pillar 3)

The emphasis on capacity building, training and technical assistance from the partners is reflected in substantial and ongoing progress in all but one of the Pillar 2 targets and three of the Pillar 1 targets. The gaps we identified were from all three Pillars.

It is notable that two of the gaps relate to information collection and analysis. It remains extremely difficult to obtain current information on ICT markets, projects and initiatives in the Pacific, and there are no commonly used statistical measures to assess progress. Similarly there is as yet no repository for information on global ICT trends of relevance to the region. This may change however with the opening of the Regional Resource Centre.

To our knowledge there has been no study of broadcasting within the region and Pacific participation in global fora is extremely limited due to funding constraints.

Government delivery of health and education services using ICT has not emerged at all, primarily due to pressing basic needs in the sector. In the future programme and institutional leadership may have a key role to play in encouraging the adoption and use of ICTs in such areas. At present, for example, there is no regional policy or leadership with respect to ICTs in schools. Strong regional leadership may also provide a conduit for meaningful sharing of information on successful and duplicable programmes and initiatives.

5.2 Coordination

With the large number of organisations engaging in Pacific ICT developmental activities there is the potential for inefficiencies in the absence of formal regional coordination mechanisms. At the Ministerial Forum in 2009, the participating Ministers called for greater coordination among partners to minimise overlap and maximise the impact of

investments in ICT development projects.[73] Pillar 2 of the Digital Strategy also emphasised the need to improve inter-agency cooperation and effectiveness and included as items in an initial contract[74] amongst agencies, donors, countries and stakeholders:

- the establishment of a Pacific Islands ICT Council (PIIC) to drive ICT development and coordination
- a concerted effort by the CROP agencies to use ICTs to improve the effectiveness of the agencies, and to increase their coordination.

The PIIC was never established, and a number of the terms of the initial contract were not delivered or implemented. From our consultation process there are differing viewpoints concerning the contract. One view was that those involved in the decision-making stages of the Digital Strategy were different to those ultimately responsible for implementation, and inadequate communication channels led to a lack of action. Another possible explanation is that typically contracts are binding agreements with enforcement mechanisms. This does not appear to be the case with the Digital Strategy contract.

In the absence of the PIIC, a Taskforce on Regional Approaches to ICTs was established under the Wellington Declaration. We understand that the Task Force made a number of important contributions (such as spearheading the Regional Resource Centre initiative) but it is no longer active. CROP agencies also previously established an ICT working group that met regularly. Although the group did not meet for a period of time we understand that it is now active again. Furthermore it does not appear that PIFS has been in a position to provide an official channel for regular regional consultation and coordination, nor a mechanism through which regional ministers may engage in the planning of regional activities. This may have been due to inadequate resourcing.

The lack of an effective regional coordination mechanism does not imply that during the last four years there have not been opportunities for regional consultation. A number of important meetings or conferences have been convened by different partners (for example, PITA, ITU and APT), and these have provided valuable opportunities for different

73 Source: ITU Regional office for Asia & Pacific Region website, http://www.itu.int/ITU-D/asp/CMS/index.asp.

74 Pacific Regional Digital Strategy, page 9.

agencies and countries to share information and discuss progress of existing initiatives or proposed new initiatives. However it does appear that, with the exception of the annual April PITA AGM, meetings and conferences are convened on a very ad hoc basis and often at very short notice. As a result some countries and key stakeholders may miss meetings or even be totally unaware that a regional event is occurring. Another issue that limits country participation at regional meetings is the lack of budget to attend such meetings. From our country consultations for this study it was clear that in many instances Ministries could not afford to participate in key regional events without external funding assistance.

Also from our stakeholder consultation it was evident that there are significant gaps in knowledge amongst partners and players concerning specific current and planned activities, including upcoming meetings, capacity building projects, and even regional infrastructure initiatives. Furthermore partners frequently encounter problems with obtaining current information on the status of national telecoms markets and ICTs. Information is not published regularly (or at all), and the main channel of communications is often personal contact with country representatives at meetings or through country visits.

5.3 Conclusions

Further development of infrastructure in the region is still required, yet only a minority of partners engage in infrastructure-related pilots or projects, and/or provide funding assistance. Nevertheless in the last four years partners have made substantial and important contributions to capacity building and the promotion of ICT in the Pacific. This has resulted in considerable progress in Pillars 1 and 2 of the Digital Strategy although there is still much work-in-progress on key aspects such as national ICT policies and planning, accessibility of ICTs to rural populations, and regional ICT coordination and harmonisation. Pillar 3 (representation of Pacific ICT interests on the global stage) was extremely difficult to achieve due to the expense involved in attending global fora. Given that resources are limited and, in any event, many active Pacific partners are from outside the region, it is questionable whether global objectives should be included in the Pacific Digital Strategy.

With respect to the regional ICT coordination and harmonisation there is no effective regional coordination mechanism which results in gaps in information and knowledge

about current and planned activities amongst partners. The Digital Strategy had envisaged the formation of a regional coordination body (PIIC) which would have offered considerable potential, had it been convened, to facilitate regular ICT information exchange and coordination within the region. The updated Digital Strategy should address the issue of improved regional coordination in order that a more cost-effective use of resources may be achieved. At present in the absence of an effective regional coordination body, opportunities for stakeholder consultation and engagement appear to be very ad hoc, leading to considerable potential for overlap. This situation is exacerbated by the paucity of information and statistics available on ICT progress at the national level and the lack of published information on objectives, developments and outcomes of regional initiatives.

6 Concluding remarks

In the four years since the formulation of the Digital Strategy it is clear that progress has been made towards its five priorities. At the same time our review indicates that with respect to every single priority there remains considerable work to be completed and emerging gaps and needs to be addressed (Exhibit 6.1). The fundamental challenge is that despite the considerable advances in some areas (such as the accessibility and affordability of mobile services in liberalised PICs) there are still many outstanding infrastructure-related issues. Consequently as yet we see few converged services used for government, commerce and social purposes within the region.

Digital Strategy priority	*Achievements*	*Gaps and emerging needs*
Improving access to communications technology	Competition in mobile services brings substantial increase in accessibility and availability of basic service in liberalised markets PACRICS successfully launched in many PICs bringing Internet connectivity in places where previously unavailable Telecentre initiatives providing community-based ICT facilities	Most PICs are still at early stages of development of Universal Access policy Internet access remains limited, with few options for affordable broadband access. Uncertainty regarding ability of communities to fund ongoing costs of telecentres Lack of complementary infrastructure (e.g. power, roads)
Reducing costs	Competition in liberalised markets brings reduced prices Regional operators achieve economies of scale	Costs of Internet hardware and usage represent a major barrier to government, consumers and SMEs Costs of satellite connectivity remain high
Establishing higher bandwidth to the global ICT backbone	Six successful submarine cable initiatives	Demand for international bandwidth will increase significantly over the next five years Funding further submarine cable connectivity remains problematic
Removing inappropriate regulatory environments	Competition in seven PIC telecoms markets Independent regulators in six PICs Regional regulatory resource Centre to be established in 2010	Many ICT policies under development and in need of resource and technical assistance No competition in some of the smaller PICs Government ownership in telecoms companies remains strong Pre-2000 legislation in five PICs
Strengthening ICT skills	Many examples of technical assistance and capacity building initiatives Engagement of many partners, donors and agencies	ICT upskilling and training is ineffective if infrastructure is unavailable or inaccessible Need to ensure that training extended to wider community Difficulty of retaining ICT trained professionals in country Difficult to obtain information on the nature and outcomes of many initiatives

***Exhibit 6.1**: Review of achievements and gaps for Digital Strategy priorities [Source: Network Strategies]*

Annex A: Overview of ICT in the PICs

A.1 Cook Islands

	2008
Population	23 500
Land area (square kilometres)	236.7
GDP per capita (USD)	8 640
Fixed lines per 100 persons	34.3
Mobile subscriptions per 100 persons	33.9
Internet users per 100 persons	25.4
Broadband subscriptions per 100 persons	0.3

Exhibit A.1: *Cook Islands – key statistics [Source: National statistics office, ITU]*

The Cook Islands are located in the central Pacific and comprise 15 islands scattered over approximately two million square kilometres of ocean. The southern group consists of volcanic islands constituting approximately 90% of the total land area. Coral atolls predominate in the northern group. The main island of Rarotonga is a volcanic, mountainous island located in the southern group.

A.1.1 ICT overview

Market structure

Telecoms in the Cook Islands are governed under the Telecommunications Act of 1989, which was amended in 1992. This act is tailored for Telecom Cook Islands Limited (TCI)

as the sole provider of telecoms services. The Act protects the company by prohibiting any other person from operating a telecoms network in the Cook Islands.

In March 2009 Digicel made a takeover offer to TCI which was accepted, however Digicel subsequently withdrew from the deal claiming that the originally offered price was too high, with TCI not accepting a lower offer.

During 2009 Mervin Communications has been seeking approval to set up a competing mobile network (Kukicel) in the Cook Islands. The government is planning to undertake reforms to the market during 2010, changing the Telecommunications Act and opening up the market to competition.[75]

Telecommunications coverage

Broadband is available only on Rarotonga, Aitutaki, Atiu, Manihiki and Mangaia, Pukakpuka, Penrhyn and the entire southern group. VSAT services are available in Rarotonga, Atiu, Mangaia, Mitiaro, Mauke, Pukapuka and Manihiki.

Mobile coverage is provided to Rarotonga and Aitutaki.

75 Islands Business (2010) *Cook Islands PM keen on telecommunications reform*, 27 January 2010, Available at http://www.islandsbusiness.com/news/index_dynamic/containerNameToReplace=MiddleMiddle/focusModuleID=130/focusContentID=18225/tableName=mediaRelease/overideSkinName=newsArticle-full.tpl.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Mobile telephony	
Low usage	5.6%
High usage	15.2%
Internet	
Dial-up Internet: 10 hours per month	3.9%
Broadband: cheapest plan	5.8%

Exhibit A.2: *Affordability of telecoms services, Cook Islands [Source: Network Strategies]*

A.1.2 ICT policies and plans

In 2003, the Cook Islands prepared a National ICT Policy based on the draft PIIPS. The policy recognises three key ICT elements, namely infrastructure, applications and content/information, which must be supplemented with the requisite human resources, policy and governance in order to develop and sustain ICT in the Cook Islands. The policy sets out the following five guiding principles, for which key goals and objectives have been established:

- **Quality of Life** – improving quality of life through a more efficient delivery of services, including health and education, while maintaining and promoting traditional value system
- **Access for all** – ensuring comprehensive access to ICT products and services
- **Maximising economic growth** – using ICT to enhance productivity, innovation and efficient economic growth
- **Sustainable development** – ensuring appropriate and manageable ICT infrastructure and HR capacity to promote sustainable growth, while limiting negative effects on the environment

- **Policy and regulation** – Developing national ICT policies and legislation that balance the rights and interests of stakeholders.[76]

A reviewed policy has since been developed, with the following key components:

- sustainable ICT infrastructure
- ICT in government
- human resources for ICT
- ICT for sustainable development
- ICT legislation
- green computing.[77]

Providing an overarching framework for the National ICT Policy is the National Sustainable Development Plan (NDSP) 2007–2010, which is an interim phase towards realising the country's vision by 2020. The NDSP has been developed with eight wide-ranging strategic goals, for which a number of sub-strategies have been established for each goal. Few strategies explicitly include ICT-related targets, but ICT will be a mechanism through which many stated targets will be realised.

A.2 Federated States of Micronesia

	2008
Population	111 306
Land area (square kilometres)	702
GDP per capita (USD)	2 222
Fixed lines per 100 persons	7.9
Mobile subscriptions per 100 persons	30.8
Internet users per 100 persons	14.5
Broadband subscriptions per 100 persons	0.1

Exhibit A.3: *Federated States of Micronesia – key statistics [Source: World Bank, ITU]*

76 Government of Cook Islands (2003), National Information and Communications Technology (ICT) Policy, pages 8–10.

77 ITU, *Information request for ITU study of National ICT Policies in the Pacific*. 2010.

FSM is located to the north of the Equator in the Western Pacific. It consists of four states, Kosrae, Pohnpei, Chuuk and Yap, which contain a large number of islands spread over a vast sea area. Pohnpei, the largest island, is volcanic and mountainous, comprising almost half of the FSM landmass. Other outerlying atolls make up the remainder of Pohnpei State. Chuuk has many outer islands (192) and islands and islets in the Chuuk Lagoon. Yap Proper has rolling hills while the eastern Yap State contains a number of atolls. Kosrae is the only state with no outer islands.

A.2.1 ICT overview

Market structure

The FSM Telecommunications Corporations Act of 1981 governs telecoms in the Federated States of Micronesia. All telecoms services are provided by the public corporation FSM Telecommunications Corporation (FSMTC). Regulation of telecoms is the responsibility of the Department of Transportation, Communication and Infrastructure.

In February 2009 FSMTC signed a contract with Tyco Telecommunications to provide submarine fibre cable connectivity to Guam, with a target completion date of March 2010. This is phase one of a plan to improve telecoms access in FSM, which will eventually involve deploying submarine fibre cables between the local islands.

Telecommunications coverage

Mobile coverage is provided to town areas of Kosrae, Pohnpei, Yap and Chuuk islands.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Fixed telephony	
Low usage	24.2%
High usage	64.6%
Mobile telephony	
Low usage	3.9%
High usage	15.3%
Internet	
Dial-up Internet: 10 hours per month	10.8%

Exhibit A.4: *Affordability of telecoms services, Federated States of Micronesia [Source: Network Strategies]*

A.2.2 ICT policies and plans

FSM has developed a draft National ICT Strategic Plan, but must amend the FSM Telecom Act that mandates FSMTC as the sole service provider before the plan can be advanced. A Telecom Reform Bill has been submitted to Congress and is pending decision.[78]

Although there has been some progress with improving basic telecoms services, a monopoly still exists and tariffs are very high. There has been little improvement in rural and remote access to ICT in recent years.

Immediate ICT priorities are:

- Internet connectivity for schools and health clinics
- improving coverage and affordability in general and in particular for rural and remote communities.

78 ITU, *Information request for ITU study of National ICT Policies in the Pacific*, 2010.

The Digital Strategy has had little impact to date. In the future priority should be given to broadband (submarine fibre optic cables) connectivity and protection for the Pacific Region as "critical infrastructure" with financial assistance from donor countries.

A.3 Fiji

	2008
Population	838 724
Land area (square kilometres)	18 270
GDP per capita (USD)	4 267
Fixed lines per 100 persons	15.3
Mobile subscriptions per 100 persons	71.1
Internet users per 100 persons	12.2
Broadband subscriptions per 100 persons	1.9

Exhibit A.5: *Fiji – key statistics [Source: World Bank, ITU]*

Fiji is located in the central Pacific at the crossroads of Melanesia and Polynesia. It is an archipelago of some 300 islands varying from large volcanic masses to tiny coral atolls. Only about one-third of the islands are inhabited, with most Fijians living on the largest island, Viti Levu, which is 10 390 square kilometres in area. The capital, Suva, is located on the southern side of the island. Most of the tourist resorts, which are a large contributor to the Fijian economy, are on the west coast of Viti Levu or on island groups off the adjacent coast.

A.3.1 ICT overview

Market structure

The telecoms system in Fiji is governed by the Telecommunications Promulgation 2008, which establishes a regulatory body, the Telecommunications Authority of Fiji, as well as setting out responsibilities of the Ministry and the role of the Commerce Commission with regards to telecommunications issues. Telecommunications services are operated by ten companies, two of which have monopolies in their specific area:

- Telecom Fiji is the sole provider of local and long-distance fixed telephone services
- Vodafone Fiji and Digicel operate mobile telephone services
- Connect and Unwired are commercial Internet service providers (ISPs)
- FINTEL is the sole provider of international fixed telephone services
- Coms provides rural wireless services
- Fiji Directories is the non-exclusive provider of directory services
- Transtel provides calling card services
- Xceed Pasifika provides business communication and IT solutions.

Fiji has been moving towards market liberalisation with exclusive rights for Vodafone, FINTEL and some Telecom Fiji services having been recently terminated. Eight ISP licences have also been issued. There is also currently considerable focus on access price regulation.

Telecommunications coverage

Both Vodafone and Digicel provide mobile coverage to the coastal areas of the two main islands (Viti Levu and Vanua Levu), as well as most of the inner islands. There is also some coverage on Kadavu Island.

Connect provides broadband to areas within 5km of exchanges in major cities and towns. Wireless broadband is available in Labasa, Nabouwalu, Savusavu, Taveuni, Koro, Rakiraki, Levuka, Tavua, Ba, Lautoka, Nadi, Sigatoka, Korotog, Debua, Pac Harbour, Suva, Nausori, Korovou and Kadavu.

Unwired provides wireless broadband coverage to Lami, Nasinu, Nakasi, Suva and Nausori.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Fixed telephony	
Low usage	3.3%
High usage	14.7%
Mobile telephony	
Low usage	4.5%
High usage	12.5%
Internet	
Dial-up Internet: 10 hours per month	2.4%
Broadband: cheapest plan	5.3%

Exhibit A.6: *Affordability of telecoms services, Fiji [Source: Network Strategies]*

Availability of enhanced services and applications

Both Digicel and Vodafone offer mobile data services.

A.3.2 ICT policies and plans

Fiji includes some telecoms-related objectives in its 20-year Development Plan (2001–2020), including:

- increasing access to basic telecoms infrastructure by indigenous Fijians
- improving access to telecoms service in rural areas
- upgrading networks in rural areas to levels similar to those in urban areas
- providing improved quality of service in rural areas
- exploring initiatives and incentives to facilitate the provision of telecoms services, including Internet, in rural areas.[79]

79 Ministry of Finance and National Planning (Fiji) (2002) *20-year Development Plan (2001–2020) for the Enhancement of Participation of Indigenous Fijians and Rotumans in the Socio-economic Development of Fiji*. Parliamentary paper No. 73 of 2002.

In 2004 a national ICT development policy was formulated with the key objective of creating an information economy for Fiji through the establishment of online government, e-enabling business and e-empowering communities. In recent years there has been a concerted focus on e-government, and strategic plans and policies for this area are being implemented with funding from a Chinese government loan.

Additionally, Fiji is being promoted for investment opportunities in ICT and the Fiji Islands Trade and Investment Bureau has compiled a suite of incentives for investors including:

- income tax exemptions
- tax holidays
- duty free concessions
- partial exemptions from taxes for exporters of locally made products and services
- low corporate taxes
- generous depreciation allowances
- carry forward of losses for up to eight years
- easy repatriation of profits
- skilled labour available in the IT sector.[80]

A.4 Kiribati

	2008
Population	96 557
Land area (square kilometres)	811
GDP per capita (USD)	1 382
Fixed lines per 100 persons	4.1
Mobile subscriptions per 100 persons	1.0
Internet users per 100 persons	2.1
Broadband subscriptions per 100 persons	n.a.

Exhibit A.7: *Kiribati – key statistics [Source: World Bank, ITU]*

80 Fiji Islands Trade and Investment Bureau, *Information Communication Technology: investment opportunity in "ICT' in Fiji*. Available at http://www.ftib.org.fj/uploaded_documents/ICT_profile.pdf.

Kiribati is located in the mid Pacific, straddling the equator. It consists of 33 atolls totalling 811 square kilometres, scattered over 3.5 million square kilometres of ocean. Of the three main island groups (Gilbert, Phoenix and Line Islands), most inhabitants are located in the Gilbert islands, particularly the atoll of Tarawa which contains the capital.

A.4.1 ICT overview

Market structure

Telecoms in Kiribati are governed under the Telecommunications Act of 2004. The legal framework facilitates entry of competition, with there being a keen interest in introducing competition to the market, in the hope that this will facilitate outer island connectivity. The industry regulator is the Telecommunications Authority of Kiribati. Telecom Services Kiribati Limited (TSKL) is the sole provider of telephone services. There are two ISPs – TKSL (Coconut Wireless) and Maurinet – offering wireless Internet services.

Telecommunications coverage

Mobile coverage is provided to South Tarawa, Kiritimati Island and some parts of North Tarawa.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Fixed telephony	
Low usage	26.4%
High usage	93.3%
Mobile telephony	
Low usage	15.9%
High usage	67.2%
Internet	
Dial-up Internet: 10 hours per month	10.9%
Broadband: cheapest plan	21.8%

Exhibit A.8: *Affordability of telecoms services, Kiribati [Source: Network Strategies]*

A.4.2 ICT policies and plans

At the time of writing this report, Kiribati was developing a new ICT policy. Efforts had been made in 2005 to prepare an ICT Plan, but the plan was never finalised. Nevertheless, the country recognises the importance of improving access to telecoms. In its 2008–2011 Kiribati Development Plan, ICT-based strategies were included to address certain priority issues, such as:

- to raise education standards and quality – by encouraging the use of computers in schools
- to increase and expand economic growth – by developing and improving economic infrastructure (e.g. airports, terminals, roads, shipping, telecoms, utilities, etc)
- to improve development on Outer Islands – by developing telecoms services on the Outer Islands
- to improve and expand communications to Outer Islands – by continuing to extend telephone service to Outer Islands.[81]

81 Government of Kiribati (2008), *Kiribati Development Plan 2008–2011*.

The major influence of regional digital strategy activities on Kiribati has been the availability of training and capacity building services. A component of the national ICT plan will be a process to ensure that such training is passed on to a wider group within Kiribati. Currently, individuals receive training which assists their work on a short-term basis, but is lost to agencies as people move jobs and change roles.

The largest impact of ICT over the past few years has been in education through the availability of Internet connections to a selection of remote schools. There is no evidence of ICT substantially changing the ways in which traditional businesses operate, due to both difficulty of access to ICT services and ignorance of the efficiencies that could be gained. The principal agencies contributing to ICT development are seen to be SPC and the ITU.

Additionally, in mid-2009 the government of Kiribati requested technical assistance from the World Bank to improve access to telecoms, including Internet and broadcasting services. The assignment, which is currently ongoing and is expected to be completed by June 2010, has the following objectives:

- to assist the government of Kiribati in developing a comprehensive ICT Policy and Strategic Plan
- to review and advise on revisions to existing sector legislation and regulations
- to advise on specific options and implementation strategies for telecoms market liberalisation including prospective tendering of new licenses
- to advise on options for achieving universal access/service.[82]

There are currently no methods defined or in place to measure ICT development. Measurement procedures are expected to be part of the new ICT policy to be finalised in 2010. It is not clear who will undertake the monitoring, but it is likely that additional capacity will be required.

82 World Bank (2009), *Kiribati: Increasing Access to Telecommunications Service, Advisory Assistance: Terms of Reference (Draft).*

A.5 Marshall Islands

	2008
Population	59 667
Land area (square kilometres)	181.3
GDP per capita (USD, 2007)	2 655
Fixed lines per 100 persons	7.3
Mobile subscriptions per 100 persons	1.7
Internet users per 100 persons	3.6
Broadband subscriptions per 100 persons	n.a.

Exhibit A.9:
Marshall Islands – key statistics [Source: National statistics office, ITU]

The Republic of the Marshall Islands consists of more than 1000 flat coral islands, grouped into 29 coral atolls. They are located north of the equator in the central Pacific and comprise two nearly parallel island chains that run roughly north-south.

A.5.1 ICT overview

Market structure

The National Telecommunications Authority Act of 1990 establishes the National Telecommunications Authority (NTA) as the sole provider of telecoms services in the Marshall Islands. The Act grants exclusivity rights for NTA and provides for privatisation of NTA. NTA has 90% government and 10% private investor ownership. Tyco Telecommunications is currently deploying a submarine fibre cable connecting the Marshall Islands to Guam.

Telecommunications coverage

Fixed telephone coverage is provided to Majuro and Ebeye. Mobile coverage is provided to Majuro, Ebeye, Jaluit, Kili, Rongelap and Wotje. Internet access is available in Majuro, Ebeye, Jaluit, Kili and Wotje.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Mobile telephony	
Low usage	11.6%
High usage	19.9%

Exhibit A.10: *Affordability of telecoms services, Marshall Islands [Source: Network Strategies]*

A.6 Nauru

	2008
Population	10 000
Land area (square kilometres)	21
GDP per capita (USD, 2007)	2 251
Fixed lines per 100 persons	17.7
Mobile subscriptions per 100 persons (2001)	14.9
Internet users per 100 persons (2001)	29.9
Broadband subscriptions per 100 persons	n.a.

Exhibit A.11: *Nauru – key statistics [Source: National statistics office, ITU]*

Nauru is located 42 kilometres south of the equator. It is a small, single island of 21 square kilometres. The interior has been deforested and mined for phosphate, leaving a pinnacled landscape.

A.6.1 ICT overview

Market structure

The Telecommunications Act of 2002 transferred telecoms regulatory responsibility from the government to the Republic of Nauru Telecommunication Corporation (Rontel). This

state-controlled corporation has a monopoly in fixed telecoms services and systems. Rontel may, however, also license other providers.

In August 2009 Digicel launched a mobile network in Nauru, offering GSM mobile communications for the first time on the island.

Telecommunications coverage

Digicel provides mobile coverage to the whole of Nauru.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Mobile telephony	
Low usage	9.5%
High usage	38.0%

Exhibit A.12: *Affordability of telecoms services, Nauru [Source: Network Strategies]*

A.7 Niue

	2008
Population (2004)	1 761
Land area (square kilometres)	260
GDP per capita (USD, 2006)	7 560
Fixed lines per 100 persons	65.9
Mobile subscriptions per 100 persons (2004)	38.5
Internet users per 100 persons	65.9
Broadband subscriptions per 100 persons	n.a.

Exhibit A.13: *Niue – key statistics [Source: National statistics office, ITU]*

Niue is located in the central Pacific and is a raised atoll island, with dramatic cliffs falling to the sea. It is relatively flat with a slightly hilly interior. Niue has no outlying islands.

A.7.1 ICT overview

Market structure

The Communications Act of 1989 (amended in 2000) granted Cabinet the power to issue public communications service licences. The government Department of Post and Telecommunications has a monopoly in the field of telecoms.

Note that after Cyclone Heta in 2004, the mobile network is largely non-operational – there is only a single remaining base station operating at less than 50% performance. A tender was set up late 2009 to develop a business case for a new mobile network in Niue.

Since 1997 the Internet User's Society of Niue has provided free Internet access for residents, initially dial-up and more recently WiFi. DSL services are also provided to government departments and for commercial use, as well as to public access points in downtown Alofi.

Telecommunications coverage

Niue has telephony available in every village.

Telecommunications affordability

WiFi Internet access is free for residential users through the Internet User's Society of Niue.

A.7.2 ICT policies and plans

The Niue National Strategic Plan 2009-2013 has goals for the development of ICT, including the development of an ICT Policy. Niue has started the process towards developing an ICT Policy, with the visit of an expert to assess the situation. A lack of human resources is cited as a limiting factor for policy development.[83]

A.8 Palau

	2009
Population	20 279
Land area (square kilometres)	458
GDP per capita (USD)	8 952
Fixed lines per 100 persons	70
Mobile subscriptions per 100 persons	66.6
Internet users per 100 persons	27.0
Broadband subscriptions per 100 persons	0.5

Exhibit A.14: *Palau – key statistics [Source: World Bank, ITU, operator]]*

Palau is located in the westernmost part of the Caroline Islands, to the north of the equator. It is an archipelago of high limestone islands and low coral atolls. Babeldaob Island, which contains most of Palau's land area and is thickly vegetated, lies just to the north of the capital Kosrae.

A.8.1 ICT overview

Market structure

The government-owned Palau National Communications Corporation (PNCC) was established in 1982. The PNCC is the sole provider of fixed, mobile and Internet services

83 ITU, *Information request for ITU study of National ICT Policies in the Pacific*, 2010.

in Palau. The PNCC is a not-for-profit corporation and, as such, it all profits are invested in network development.

A private roaming arrangement enables Palau Mobile Corporation, an offshore company, to provide international services to some commercial users (such as hotels), but it provides no mobile coverage.

Telecommunications coverage

PNCC provides mobile coverage throughout Palau. DSL services are available in Airai, Koror, Melekeok and Ngaraad.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Fixed telephony	
Low usage	1.5%
High usage	1.5%
Mobile telephony	
Low usage	2.4%
High usage	7.6%
Internet	
Dial-up Internet: 10 hours per month	4.0%
Broadband: cheapest plan	60.3%

Exhibit A.15: *Affordability of telecoms services, Palau [Source: Network Strategies]*

A.8.2 ICT policies and plans

Palau has has established an “Action for Palau’s Future”, a medium-term development strategy (MTDS) that mentions telecoms strategies. The MTDS, which specifies key

strategies and actions to realise economic social, environmental and cultural goals during the period 2009 to 2014, aims to achieve sustainable national development through:

> [a] sustained and widespread improvement in the general standards of living while preserving cultural and environmental values for the people of Palau.[84]

Telecoms issues have been primarily classified as infrastructure-related. As indicated in Section A.8.1, telecoms services in Palau are still provided by a monopoly government-owned entity. Hence most of the strategies are geared towards better positioning the incumbent while attempting to establish an enabling environment for market liberalisation and competition. Key strategies stated in the MTDS include:

- introducing competitive neutrality in the sector – by developing a comprehensive regulatory framework and addressing Universal Service Obligations
- ensuring that the incumbent telecoms operator remains sustainable and fully self-financing – through debt restructuring
- increasing the incumbent's attractiveness to prospective investors – by identifying suitable strategic partners
- improving governance – through increased government oversight and by benchmarking efficiencies with comparable Pacific nations
- improving telecoms services for the tourism sector.[85]

There is also an ICT policy that expired in 2007. We understand that, pending development of an updated policy, the old policy is still in use.

84 Government of Palau and the Asian Development Bank (2009), *Actions for Palau's Future: the Medium-term Development Strategy 2009 to 2014*, page 1.

85 *Ibid*, pages 51, 102–103.

A.9 Papua New Guinea

	2008
Population	6 448 918
Land area (square kilometres)	452 860
GDP per capita (USD)	1 238
Fixed lines per 100 persons	0.9
Mobile subscriptions per 100 persons	9.1
Internet users per 100 persons	1.8
Broadband subscriptions per 100 persons	n.a.

Exhibit A.16: *Papua New Guinea – key statistics [Source: World Bank, ITU]*

Papua New Guinea is the largest of the Pacific islands. It consists of the rugged and mountainous eastern half of the island of New Guinea plus a number of populated outer islands.

A.9.1 ICT overview

Market structure

The Telecommunications Act of 1996 established PANGTEL (the Papua New Guinea Radiocommunication and Telecommunication Technical Authority) as the regulator and licensing authority for telecoms and broadcasting in Papua New Guinea. Subsequently, the enactment of the Independent Consumer and Competition Corporation (ICCC) Act of 2002 and the Telecommunications Industry Act of 2002 transferred licensing of telecoms services to the ICCC, which also regulates Telikom PNG's – the government-owned incumbent's – pricing.

In June 2009 a National ICT Bill was drafted setting out the creation of a National Information and Communications Technology Authority (NICTA), which would assume all telecoms regulation duties. The Bill outlines new a licensing framework, Universal Access regime and interconnection and wholesale access, customer protection and retail pricing controls, and has an emphasis on promoting competition in the telecoms market.

Currently Telikom PNG has a monopoly for fixed telephone services. There are two mobile telephone operators: Telikom PNG's wholly-owned subsidiary Pacific Mobile Communications operating under the name B-Mobile, and Digicel. There is also some competition with other ISPs for Internet services.

Telecommunications coverage

B-Mobile provides coverage to Wewak, Madang, Mt Hagen, Goroka, Lae and Port Moresby. Digicel currently provides coverage to Port Moresby and the provinces of Central, Morobe, Madang, Chimbu, Eastern Highlands, Western Highlands, Milne Bay, East New Britain, New Ireland and the autonomous region of Bougainville. Coverage is also provided by Digicel in parts of East Sepik, Sandaun, Manus, Enga, West New Britain and Southern Highlands, with plans to extend coverage in these provinces during 2009. Digicel also plans to extend coverage during 2009 to include Ora, Gulf and Western provinces.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Fixed telephony	
Low usage	3.2%
High usage	3.2%
Mobile telephony	
Low usage	19.5%
High usage	100.9%
Internet	
Dial-up Internet: 10 hours per month	6.5%
Broadband: cheapest plan	21.6%

Exhibit A.17: *Affordability of telecoms services, Papua New Guinea [Source: Network Strategies]*

A.9.2 ICT policies and plans

PNG's most recent National ICT Policy was finalised in April 2008. This was an upgrade of the 2007 policy and also considered recent developments in the sector. The 2008 ICT policy has been developed around seven key objectives:

- securing the social and economic benefits of an efficient ICT across all sectors, including education, health, national security, justice, agriculture, government administration and ecommerce
- having an efficient ICT infrastructure as the backbone of ICT policy with the use of technology appropriate to PNG's circumstances
- substantially increasing access to basic telecoms services at affordable prices
- transforming the incumbent fixed line operator, Telikom PNG, into an efficient entity
- enjoying effective and sustainable competition to deliver market discipline and economic benefits
- improving international capacity and connectivity
- securing benefits that result from increase availability and use of the Internet.[86]

PNG's ICT policy has been conceptualised around two phases: a transitional period from the *status quo* to open competition (Phase 1), and thereafter, initiatives that will be promoted in a competitive environment (Phase 2). During the transitional period, areas of focus include transforming the incumbent, and updating the legislative and regulatory structures and processes. Phase 2 was scheduled to commence in October 2009, following the establishment of a National ICT Authority (NICTA). In this stage, PNG intends to promote Internet use across all key sectors, with additional programmes geared towards capacity development, and Internet regulation and security.

86 Department of Communication & Information (2008), *National Information & Communication Technology (ICT) Policy, pages 7–8.*

A.10 Samoa

	2008
Population	181 528
Land area (square kilometres)	2 934
GDP per capita (USD)	2 916
Fixed lines per 100 persons	16.1
Mobile subscriptions per 100 persons	69.3
Internet users per 100 persons	5.0
Broadband subscriptions per 100 persons	0.1

Exhibit A.18: *Samoa – key statistics [Source: World Bank, ITU]*

Samoa consists of two main islands (’Upolu and Savai’i), two other inhabited islands (Manono and Apolima) which are located in the strait between the two main islands, and several uninhabited islets. The islands are volcanic in origin and mountainous.

A.10.1 ICT overview

Market structure

Telecoms in Samoa is governed under the Telecommunications Act 2005, which established the Office of the Regulator to have responsibility for all aspects of telecoms regulation.

Fixed telecoms services are provided solely by SamoaTel which is still wholly owned by the Samoan government. Note however that there is a project in place to privatise SamoaTel. Mobile communications services are provided by SamoaTel and Digicel. There are several companies offering ISP services.

There is currently a focus on Universal Access, with a draft policy recently released for public comment.

Telecommunications coverage

Digicel provides service to the coastal regions of the two main islands (Savai'i and 'Upolu), covering at least 80% of the population.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Fixed telephony	
Low usage	7.5%
High usage	21.3%
Mobile telephony	
Low usage	3.9%
High usage	14.1%
Internet	
Dial-up Internet: 10 hours per month	3.1%
Broadband: cheapest plan	15.1%

Exhibit A.19: *Affordability of telecoms services, Samoa [Source: Network Strategies]*

Availability of enhanced services and applications

SamoaTel offers mobile data services.

A.10.2 ICT policies and plans

Samoa was one of the first PICs to launch a national ICT strategy in 2004, which was based on the PIIPP agreed in 2002. This strategic plan expired in 2008, however the government has recently embarked on a preliminary review of the 2004–2009 period of the ICT Strategic Plan. The key components of the plan are:

- access to ICT

- confidence and security in the use of ICT
- ICT as a development tool
- gender equality
- benefits of ICT.[87]

The next version of the Strategic Plan is likely to cover the period 2011–2015.

Samoa's National Communications Sector Policy 2003 (revised in 2005) is also currently under review. The communications policy resulted in a World Bank-funded reform of telecommunications policy, legislation and regulations. The telecoms market has been fully liberalised since 2009, when the last exclusivities were removed. Other current ICT initiatives include:

- the ADB-funded SchoolNet programme rolling out computer labs and Internet connectivity for secondary colleges
- the development of an e-Government strategy by the ICT Steering Committee
- Oceania University of Medicine use of the Internet for distance learning.

Overseeing policy development is a National ICT Committee, chaired by the Prime Minister and including representatives from:

- Ministry of Communications and IT
- Ministry of Health
- Ministry of Finance
- Ministry of Education, Sports and Culture
- Public Service Commission
- Office of the Attorney General
- Electric Power Corporation
- SamoaTel
- National University of Samoa
- Samoa Chamber of Commerce and Industry
- Samoa Association of Manufacturers and Exporters
- Samoa Umbrella of NGOs

87 ITU, *Information request for ITU study of National ICT Policies in the Pacific*, 2010.

- Samoa IT Society.

Some ICT/telecoms-related initiatives have been specified in the government's most recent development plan, Strategy for the Development of Samoa (SDS) 2008–2012. The overarching vision of SDS is "improved quality of life for all", which requires realisation of seven developmental goals grouped into three priority areas: economic policy; social policy; and public sector management and environmental sustainability.

Cognisant of its importance as a driver for economic and ultimately national development, telecoms/ICT was discussed within the context of private sector-led economic growth and employment creation, and improved education outcomes. Noting that access to affordable telecoms services had dramatically increased with the liberalisation of the sector in 2004, within the 2008–2012 developmental period efforts would be directed at strengthening the sector by:

- improving the telecoms regulatory framework
- addressing matters related to network build-out, and universal access/community service obligations
- improving domestic and international connectivity, including access through submarine cable
- facilitating the privatisation of the incumbent telecoms operator, which is government-owned
- improving the use of ICT in education.[88]

88 Ministry of Finance (2008), *Strategy for the Development of Samoa 2008–2012*, May 2008.

A.11 Solomon Islands

	2008
Population	506 967
Land area (square kilometres)	27 540
GDP per capita (USD)	1 288
Fixed lines per 100 persons	1.6
Mobile subscriptions per 100 persons	5.9
Internet users per 100 persons	2.0
Broadband subscriptions per 100 persons	0.3

Exhibit A.20: *Solomon Islands – key statistics [Source: World Bank, ITU]*

The Solomon Islands archipelago is the third largest in the Pacific. It contains a variety of landforms, from large, mountainous, volcanic islands to tiny, low-lying coral atolls. The islands are a scattered double chain that extends some 1660 kilometres south-east from Bougainville in PNG. The islands are spread over some 1.35 million square kilometres of ocean.

A.11.1 ICT overview

Market structure

Telecoms in the Solomon Islands are governed under the Telecommunications Act of 1972, which gives telecoms regulatory authority to the Ministry of Post and Communications. Solomon Telekom Company Limited ('Solomon Telekom') is the sole provider of telecommunication services, and had an exclusive licence up to 2003.

In 2003, the government granted Solomon Telekom a 15-year exclusive licence. With the change of government in 2006, there were moves to open the telecoms market to competition by granting an 'experimental' licence to the mobile operator Digicel, however Solomon Telekom successfully took legal action against the government to uphold its exclusive licence.

In June 2009 a settlement agreement was signed to terminate Solomon Telekom's monopoly, phase in competition and transfer regulatory functions to a new independent regulator. The new telecommunications law was enacted by parliament in August 2009. The government also launched a competitive tender for a second mobile licence, which was awarded to B-mobile – which also operates in Papua New Guinea – in December 2009.

Telecommunications coverage

Mobile coverage is provided to Honiara only.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Mobile telephony	
Low usage	12.8%
High usage	53.5%

Exhibit A.21: *Affordability of telecoms services, Solomon Islands [Source: Network Strategies]*

A.11.2 ICT policies and plans

The Solomon Islands does not have a national ICT plan or policy framework, although there is an intention to develop a plan – assistance has already been provided by SPC in this regard. Due to funding constraints there is limited ability to participate in regional ICT meetings. In fact, there have been no Solomon Islands participants at regional Digital Strategy meetings and consequently ICT developments occurred in isolation to the Strategy framework.

The government instituted a new telecom sector policy in 2009 opening the way for competition in mobile services in 2010, and full competition in the sector from April 2011.

The government's objective in liberalising the sector was to improve the accessibility, reach and reliability of services and reduce prices, bringing developmental benefits to the country. In particular, the government recognises the need for affordable and reliable telecoms services, to assist in the creation of wealth and jobs, particularly in the presently under-served rural and remote areas of the country.

Solomon Telekom's national PSTN network is available in only eight of the country's nine provinces. Recently, with the threat of competition Solomon Telekom has rolled out a mobile network to all nine provinces. Although access to and quality of the mobile service is still relatively poor, we understand that Solomon Telekom is addressing key problems in order to improve the service.

The government appreciates that ICT offers a potential solution to the communications challenges imposed by the Solomon Islands' difficult topography with hundreds of islands. Furthermore there is recognition of the potential value of ICT across a whole host of sectors, including commerce, social development, transport, education and health. However the Solomon Islands face some immediate obstacles to furthering the potential of ICT, namely:

- limited broadband capacity
- limited terrestrial network
- insufficiently developed policy direction.

Addressing the limited broadband capacity is regarded as a key priority. Currently broadband in the Solomon Islands is only available via satellite, which provides relatively expensive coverage and relatively slow speeds. This arrangement makes it difficult from a commercial perspective to extend ICT services. There is considerable interest in the possibility of connectivity via submarine cable. With regard to the terrestrial network, existing coverage is still limited, although there are hopes that with the introduction of competition coverage will expand rapidly, bringing scope to expand ICT services. With regard to policy direction, the government's focus to date has been on introducing competition and establishing an appropriate regulatory structure. While a policy function within the Ministry has been established, there is limited internal capacity to advise on ICT issues.

A.12 Tonga

	2008
Population	103 566
Land area (square kilometres)	718
GDP per capita	2 578
Fixed lines per 100 persons	24.7
Mobile subscriptions per 100 persons	48.7
Internet users per 100 persons	8.1
Broadband subscriptions per 100 persons	0.7

Exhibit A.22:
Tonga – key statistics [Source: World Bank, ITU]

Tonga is located to the east of Fiji, in the central south Pacific. It has four main island groups stretching from north to south. Much of the land area in the main island of Tongatapu has been cleared for agriculture.

A.12.1 ICT overview

Market structure

The Tonga Communications Act of 2000 established the Department of Communications as the body responsible for communications, with the power to issue licences. There is currently competition between two companies for telecommunication services: the Tonga Communication Corporation (TCC) and Digicel.

Telecommunications coverage

Both Digicel and TCC provide mobile coverage to Tongatapu, and areas of the island groups of ‘Eua, Vava’u and Ha’apai. Internet access is provided to the whole of Tonga.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Fixed telephony	
Low usage	4.5%
High usage	17.5%
Mobile telephony	
Low usage	2.7%
High usage	11.9%
Internet	
Dial-up Internet: 10 hours per month	9.0%
Broadband: cheapest plan	25.5%

Exhibit A.23: *Affordability of telecoms services, Tonga [Source: Network Strategies]*

Availability of enhanced services and applications

Digicel offers mobile data services.

A.12.2 ICT policies and plans

In May 2009 the Ministry of Information Technology and Communications was established in Tonga. One of the main tasks of the Ministry is to implement Tonga's new ICT plan. The plan was written in 2008, with the assistance of an ITU consultant, and involved community consultation and workshops. A key priority in the plan is an e-government initiative that seeks to connect all government Ministries and departments, especially those with offices located in outer islands (such as the Ministry of Lands and Survey, the Ministry of Environment, and the Ministry of Education). The initiative will be particularly beneficial to the accounting and finance divisions of Ministries, facilitating efficient administration and providing an interface with the financial system of the Ministry of Finance.

Tonga was an early mover in terms of telecoms reform, introducing competition in 2003, with the issue of a second licence to Tonfon which was subsequently purchased by Digicel in 2008. Consequently some of the issues in the Digital Strategy were already being addressed by Tonga's Ministry of Finance prior to 2006, and the benefits of competition were already apparent by the time of publication of the regional Strategy.

The main challenges that Tonga currently faces with furthering development objectives through ICT are:

- the high cost of satellite connectivity
- the high cost of ICT hardware, particularly computers and handsets
- ensuring the connectivity of outer islands.

With respect to satellite, Tonga has followed with interest previous regional discussions concerning the possibility of a regional approach involving potential demand aggregation. In addition the government is currently investigating options for cable connectivity through the Southern Cross Cable in Fiji.

A number of schools have Internet facilities, including computer labs and training, and this is improving computer literacy amongst the younger generation. Nevertheless usage of the Internet has been slow to develop in Tonga, and one of the main barriers is the high capital and maintenance costs of computers. TCC has embarked on a project to provide low-cost computers (at USD500 rather than the standard USD1000) but this program is still at an early stage.

Finally, the government is considering potential universal service arrangements for the provision of telephony services in outer islands. Work is currently underway to establish the likely costs, and various funding options are being explored, including the possibility of a fund with contributions from government and operators.

A.13 Tuvalu

	2008
Population	9 561
Land area (square kilometres)	26
GDP per capita (USD, 2002)	1 562
Fixed lines per 100 persons	15.2
Mobile subscriptions per 100 persons	20.2
Internet users per 100 persons	43.0
Broadband subscriptions per 100 persons	4.6

Exhibit A.24: *Tuvalu – key statistics [Source: National statistics office, ITU]*

Tuvalu consists of seven coral atolls and two low-lying coral islands totalling 26 square kilometres in land area, spread over 800 kilometres of ocean. It is located in the central Pacific, just south of Kiribati.

Telecoms in Tuvalu is governed under the Telecommunications Ordinance of 1979 and the Telecommunications Corporation Act of 1993. The Tuvalu Telecom Corporation has a monopoly for providing telecoms services in Tuvalu.

Tuvalu is the process of developing a National ICT Policy, with a draft policy having been submitted to the Ministry.[89]

89 ITU, *Information request for ITU study of National ICT Policies in the Pacific*, 2010.

A.14 Vanuatu

	2008
Population	231 142
Land area (square kilometres)	12 200
GDP per capita (USD)	2 492
Fixed lines per 100 persons (2009)	3.0
Mobile subscriptions per 100 persons (2009)	19.5
Internet users per 100 persons	7.3
Broadband subscriptions per 100 persons (2009)	0.2

Exhibit A.25: *Vanuatu – key statistics [Source: World Bank, ITU, regulator]*

Vanuatu consists of some 80 islands, spread in a Y-shaped chain in a north-south direction, just south of Solomon Islands. The islands are volcanic in origin and are mountainous. Its 12 200 square kilometres of land area is spread over some 860 000 square kilometres of ocean.

A.14.1 ICT overview

Market structure

From March 2008, a non-exclusive telecoms licence was issued to incumbent provider Telecom Vanuatu Limited (TVL), thereby opening Vanuatu's telecommunication market to competition. TVL had previously been operating under an exclusive licence. Digicel was also issued a non-exclusive licence to provide mobile telecoms services in Vanuatu in March 2008.

The original Telecommunications Act of 1989 envisaged that a Telecommunications Regulatory Authority would be established, however this did not occur. A new Telecommunications Act was drafted in 2007, establishing telecommunications sector management would be performed by the Minister for Infrastructure and Public Utilities and the Utilities Regulatory Authority (URA). Currently an interim regulator is in place.

Restricted licences have been granted to Pacific Data Solutions (PDS) and Global Data Transfer (GDT). Under these restricted licences operators cannot provide telephony services to the general public.

Telecommunications coverage

Telecom Vanuatu provides mobile coverage to limited areas in Santo, Ambae, Maewo, Malekula, Efate and Malo islands. Digicel provides coverage to areas in Santo, Malekula, Ambae, Maewo, Pentecost, Ambrym, Epi, Efate, Erromango and Tanna.

Telecommunications affordability

Telecoms service	*Price as % of average monthly income*
Fixed telephony	
Low usage	8.5%
High usage	10.6%
Mobile telephony	
Low usage	6.9%
High usage	19.1%
Internet	
Dial-up Internet: 10 hours per month	11.0%
Broadband: cheapest plan	28.4%

Exhibit A.26: *Affordability of telecoms services, Vanuatu [Source: Network Strategies]*

Availability of enhanced services and applications

Digicel offers mobile data services.

A.14.2 ICT policies and plans

Vanuatu does not have a national ICT policy or plan. Arrangements are currently being made through the Ministry of Infrastructure and Public Utilities (MIPU) to facilitate development of a policy, with the establishment of a steering committee, appointment of a project manager, and securing of financial support and technical assistance through a donor agency.

Using a draft Telecoms Policy prepared by the World Bank and through donor assistance from AusAID, Vanuatu has been able to make progress with respect to the stated priorities of the regional Digital Strategy, such as:

- improving access to communications technology through market liberalisation and the entry of a new mobile operator
- the establishment of an independent regulator
- reduced prices and increased access to mobile services.

Since the introduction of competition in the mobile market in mid 2008, changes in Vanuatu are evident. Over 80% of the population now have mobile coverage, with rural and remote access to telecoms services promoted through UAP (Universal Access Policy) obligations placed on the incumbent and the new mobile entrant. The incumbent was allowed to claim reimbursement for shortfalls in revenue from loss-making customers. The new mobile entrant was under an obligation to achieve over 80% population coverage guaranteed by a performance bond. The new entrant has achieved the coverage obligation, but the incumbent has yet to submit any claims for reimbursement for loss-making customers. As a result, there has so far been no need for UAP contributions. Donor agencies have made contribution towards UA. Funding is likely to be requested for network build-out and other UAP initiatives.

At the same time there have been other noteworthy non telecoms-related changes that have had an impact on development. Vanuatu is the recipient of considerable donor assistance, which is being used for capital projects and technical assistance. Since 2008 some major roads in the more populous islands have either been upgraded or constructed, which has improved physical access and connectivity.

There appears to be considerable potential for further sectoral and economic development through telecoms/ICT in Vanuatu:

- given its tax haven status, the local financial services sector could benefit from reductions in transaction costs with further reductions in ICT costs
- outer islands (and even Vanuatu as a whole) are dependent on remittances, but money transfers are very costly, thus there would be great benefit from telecoms-facilitated services
- extensive scope to improve the education and health sectors.

Key challenges that Vanuatu faces as it continues to develop its ICT sector include:

- electricity/energy costs
- ensuring that there is independent regulation of those sectors
- ensuring that the infrastructure is maintained and developed
- ensuring that coverage continues to expand
- improving secondary infrastructure such as roads and transport networks to facilitate ICT development
- securing more affordable international connectivity options.

Vanuatu's current perceived priorities for ICT development are:

- improving international connectivity – particularly submarine cable access
- improving Internet connectivity – once the UAP Fund has addressed expansion of mobile coverage, there is interest in developing projects to upgrade Internet access, especially in secondary schools and in the health sector
- cyber law and Internet governance.

Annex B: Status of PIC government websites

Almost all of the Forum countries have developed some government websites. The status of these websites is summarised below.

Cook Islands	The government has a website, which has a general Cook Islands news section, but this has not been kept up-to-date with the latest news dated December 2008. Half of the ministries and government agencies also have websites, and all of the ministries have contact email addresses. Parliament has a separate website which lists Acts and Regulations, which are not available online but can be purchased. The parliament website is also out-of-date, with the most recent information being from the end of 2008. The Office of the Prime Minister also has a separate website, with news which is again out-of-date. Copies of certain policies and plans are available online, for example the National ICT Policy and the e-government strategy.
Federated States of Micronesia	There is a government website, which is kept up-to-date with government press releases and public statements. Certain government forms are available online, for example passport applications. Very few of the government departments have websites and email addresses. Congress has a website, which is kept up-to-date with congress news, and has public laws available online.
Fiji	The government has a website, which is kept up-to-date with government and cabinet press releases and forthcoming events. All government departments have websites and email addresses.

	Various government documents are available online, including policies and decrees. There is also an e-government portal which provides information and services for government, business and citizens. Users register to access online services, such as filling in application forms online.
Kiribati	There is no government website for Kiribati.
Marshall Islands	The government has a website, which is kept up-to-date with government news and speeches. government departments have email addresses, and some have websites. The government's strategic development plan is available online. Various government forms are also available online, for example passport applications.
Nauru	There are government and parliament websites which are up-to-date. All government departments have email addresses.
Niue	There is an up-to-date government website, which has an online newsletter with both government-specific and general Niue news. government departments do not have their own websites or email addresses. Niue laws are available online.
Palau	The government has a website, and most ministries have email addresses. The senate has its own website, which has legislation available online, however this website is not up-to-date.
Papua New Guinea	There are websites for both government and the Office of the Prime Minister. The website of the Office of the Prime Minister has copies of some policies are available online, however this website is not up-to-date. Some of the government departments have websites and email addresses.
Samoa	The government has an up-to-date website, as do all the Ministries. Relevant policy documents are available on Ministry websites.

Solomon Islands	Parliament has a website, which is kept up-to-date. Legislation is available online, including current Bills before Parliament. The Office of Prime Minister and Cabinet has a website. Most government departments have email addresses.
Tonga	The government has a website, which is kept up-to-date with government-specific news and media releases. Some of the government departments have websites and email addresses. Legislation is available online.
Tuvalu	There is a government website listing contact details for government departments, only some of which have email addresses. The Constitution of Tuvalu is available online.
Vanuatu	The government has an up-to-date website, with information about the Ministries, but very few have their own websites. The government website is not a portal. Various government documents are available online, including the government speeches and the budget.

Annex C: Submarine cable connectivity

The status of submarine cable projects that have been proposed or implemented within the Pacific region is outlined below.

ASH cable — Part of the cable for the decommissioned PACRIM East system which connected New Zealand and Hawaii, has been redeployed to provide connectivity between American Samoa and Hawaii (ASH), with a spur to Samoa.

Gondwana — Gondwana is a submarine cable system between Noumea (New Caledonia) and Sydney (Australia), which was commissioned in 2008 to replace satellite connectivity as the medium for international access in New Caledonia. Cable connectivity was also expanded to the Loyalty Islands (part of the New Caledonia island group) through a separate network called Picot.

HANTRU1 — The HANTRU1 Guam-Kwajalein System is being extended to connect the Federated States of Micronesia (Pohnpei) and the Republic of the Marshall Islands (Majuro). When the deployment is completed – anticipated in 2010 – both countries will have direct connectivity to Guam, which is a regional node with a number of onward connectivity options.

Honotua — The Honotua cable aims to provide submarine cable access across French Polynesia. It will connect Papeete (Tahiti) to Hawaii, and Papenoo, Moorea, Uturoa and Vaitape. The system should be commissioned in 2010.

PPC-1	The Pipe Pacific Cable 1 (PPC-1) provides submarine connectivity between Sydney (Australia) and Guam, with a spur to PNG. It was commissioned in 2005, with an expected lifespan of 25 years.
PPC-2	The Pipe Pacific Cable 2 (PPC-2) will extend PPC-1 to Auckland, (New Zealand) and is expected to be commissioned in 2010. While the cable will not connect any other Pacific Island, it is seen as a promising development towards extending international connectivity closer to other Forum countries.
Southern Cross	Southern Cross operates two cable systems that run between Sydney (Australia), Auckland (New Zealand), Fiji, Hawaii and the west coast of the United States. The cable was commissioned in 2000, with an expected lifetime of 25 years.
SPIN	The South Pacific Island Network was devised as a private venture to provide submarine cable connectivity to Pacific Islands: from Solomon Islands in the east to Papeete (French Polynesia) in the west, and connecting with the Gondwana-1 cable (between New Caledonia to Australia) and Honotua cable between Papeete and Hawaii. As the time of the writing this report, there have been difficulties in securing the necessary funding for this project, and it appears that the initiative may fail.

Annex D: Regional initiatives

ICB4PIS

In conjunction with the European Community (EC), the ITU has established a project to support the preparation of harmonised ICT policies in Asian, Caribbean and Pacific (ACP) regions. Key objectives of the project are:

- to develop and promote ICT market policies and guidelines for individual ACP countries
- to support regional organisations and economic groupings to develop and promote the use of harmonised ICT market policies and regulations
- to build human as well as institutional capacity in the field of ICT through a range of targeted training, education and knowledge sharing measures.[90]

In the Pacific region, the subproject *Capacity Building and ICT Policy, Regulatory and Legislative Frameworks Support for Pacific Island States* (ICB4PIS) was launched in November 2009. Its primary aim is to build human and institutional capacity through a range of targeted training, education and knowledge sharing measures, as well as developing background material for possible harmonised policies for the ICT market.[91] At the November launch, the following list of priorities was adopted:

- national ICT policy
- interconnection, including cost modelling and international roaming

90 Source: ITU website. Available at http://www.itu.int/ITU-D/projects/ITU_EC_ACP.

91 Source: ITU website, http://www.itu.int/ITU-D/projects/ITU_EC_ACP/icb4pis/index.html.

- cyber-securing
- licensing
- universal access
- numbering.[92]

PacCERT

In 2008, the ITU, in collaboration with the Australian government, commissioned a readiness assessment for establishing a Pacific Computer Emergency Response Team (PacCERT).[93] This report noted that in assessing overall cyber security priorities, there was a consensus among stakeholders that there was a greater need for:

- improving overall reliability and robustness of ICT infrastructure as well as availability to remote/rural areas of Pacific Island nations
- providing training to improve access to appropriately trained and qualified personnel in a broad range of areas – this includes providing a broad approach to ICT and information and cyber security training via formal tertiary education as well as industry and vendor certifications
- developing and delivering a cyber security awareness raising programme across all levels of society that is meaningful and relevant to the cultures and values with Pacific Island communities.

In May 2009, the PacCERT Working Group (PacCERT-WG) was formed to spearhead the establishment of PacCERT. At the first PacCERT stakeholder meeting and working group meeting held in late November 2009, the following important recommendations were made:

- that the University of the South Pacific (USP) will host PacCERT at its Japan-Pacific ICT Centre at USP

92 Pacific Islands Forum Secretariat (2010), *ICT project for Forum countries*, press statement, 18 February 2010, Available at http://www.forumsec.org.fj/pages.cfm/newsroom/press-statements/2010/ict-project-for-forum-countries.html.

93 AusCERT (2008), *Study to ascertain the readiness of Pacific Island nations to establish a regional Pacific Island CERT capability*. Available at http://www.docstoc.com/docs/10152875/Draft-Feasibility-Study.

- that the PacCERT will be governed by a varied board comprising representatives from select regional groupings and ICT-related organisations
- that organisations based in Pacific countries would be eligible for membership
- that initially, the scope of PacCERT services would include:
  - point-of-contact database
  - incident response coordination
  - outreach programmes
  - advisory services
  - PacCERT portal
  - training/mentoring.[94]

At the November meeting, it was expected that business and project plans for PacCERT would be completed before the end of January 2010, with a follow-up meeting of the PacCERT-WG to be held in February. Additionally, it was planned for PacCERT to be installed at the Japan-Pacific ICT Centre in April 2010.

PICISOC

The Pacific Islands Chapter of the Internet Society (PICISOC) is a chapter of the Internet Society (ISOC) that serves the purpose of addressing and advising on Internet issues and developments within, and that are of interest, to Pacific Islands.[95] It has been a key player in raising awareness on a number of issues including:

- the move to IPv6
- Domain Name Servers (DNS)
- Free and Open Software (FOSS)
- cyber security leading the establishment of PacCERT.[96]

94 PacCERT-WG (2009), *Final Report,* 1st PacCERT Working Group Meeting, 25 November 2009.

95 Source: PICISOC website, http://www.picisoc.org/tiki-index.php?page=PICISOC.

96 *Ibid.*

UN-APCICT

The United Nations–Asian and Pacific Training Centre for Information and Communication Technology Development (UN-APCICT) is a subsidiary of UNESCAP, with the responsibility for strengthening the efforts of UNESCAP member states:

> ... to use ICT in their socio-economic development through human and institutional capacity building.[97]

Based in Korea, the UN-APCICT has organised its work under three pillars: training, research and advisory. It offers training via its Academy of ICT Essentials for Government Leaders and the APCICT Virtual Academy, which offers a suite of training modules including:

- ICT for development policy, process and governance
- e-government applications
- ICT trends for government leaders
- Internet governance
- network and information security and privacy.[98]

Additionally, UN-APCICT has established an e-collaborative hub (E-CO HUB) through which policy makers, trainers and practitioners can access and search for various knowledge resources on ICT4D issues. The E-CO HUB also includes a workspace in which users can discuss and collaborate on ICT4D projects.[99]

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97 Source: UN-APCICT website, http://www.unapcict.org/aboutus.

98 Source: UN-APCICT website, http://www.unapcict.org/academy/academy-modules/english.

99 Source: UN-APCICT website, http://www.unapcict.org/ecohub.

Annex E: Regional partners and players

ADB

Established in 1966, the Asian Development Bank (ADB) is a development finance organisation that is owned and financed by its members, which include all the PIF countries. Its main objective is to help its developing member countries reduce poverty and improve the quality of life of their citizens.[100]

In its long-term strategy for 2008–2020, the ADB plans to focus on three areas within the context of reducing poverty and addressing critical issues affecting the poor and vulnerable:

- inclusive growth
- environmental sustainable growth
- regional integration.[101]

Based on this agenda, the ADB is unlikely to finance telecoms/ICT-related matters, unless they will advance these strategic objectives. To that end, the ADB is currently offering technical assistance to the region on using ICT to facilitate inclusive growth and to reduce poverty. The project, *Information and Communication Technology-Based Inclusive Growth and Poverty Reduction in the Pacific*, is expected to:

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100 Source: ADB website, http://www.adb.org/About/.

101 ADB (2008) *Strategy 2020, The Long-Term Strategic Framework of the Asian Development Bank 2008–2020.*

> … identify and prioritize specific ICT strategies and interventions to generate the benefits of ICT applications such as improved access to affordable and reliable communications service, basic services including education and health and markets, especially among the poor and populations in the remote areas.[102]

Thereafter, the following additional projects are being proposed:

- technical assistance towards preparing a Fiji-Tonga submarine cable project
- loan funding for an ICT connectivity project.

APT

The Asia-Pacific Telecommunity (APT) was established in 1979 through a joint initiative of UNESCAP and the International Telecommunication Union (ITU). Its main objectives are:

- to promote the expansion of ICT services and infrastructure and the maximisation of the benefits of ICT for the welfare of the people in the region
- to develop regional cooperation in areas of common interest, including radio communications and standards development
- to undertake studies relating to developments in ICT infrastructure, policy and regulation in coordination with other international organisations
- to encourage technology transfer, human resource development and the exchange of information for the balanced development of ICT within the region
- to facilitate coordination within the region with regard to major issues pertaining to ICT infrastructure and services with a view to strengthening the region's international position.[103]

For the period 2009–2011, the APT's strategic direction will consist of the following activities:

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102 Source: ADB website, http://www.adb.org.

103 Source: APT website, http://www.aptsec.org.

- assisting members to develop sound ICT policy and regulatory frameworks, including radio and standardisation issues and Internet security
- assisting members to provide improved connectivity and accessibility to telecoms and ICT services, and promoting the development of e-strategies, e-services with an emphasis on applications
- closely coordinating with partner organisations to reduce duplication of effort and to provide a clearer focus on issues and reduced costs
- ensuring that all APT programmes run efficiently, within budget and providing high quality programmes for member needs.[104]

AusAID

The Australian Agency for International Development (AusAID) administers Australia's international aid programme, which is primarily focussed at assisting developing countries to reduce poverty and achieve sustainable development in line with Australia's interests.[105] AusAID has established developmental partnerships in African, Middle East, Southeast Asia and Pacific regions, and its aid program is organised around four main themes:

- accelerating economic growth
- fostering functioning and effective states
- investing in people
- promoting regional stability and cooperation.[106]

In the Pacific, AusAID has established individual developmental partnerships with most of the Forum Countries, and with regional agencies. Assistance is being offered across a wide range of aid themes, including, health education, governance, infrastructure, environment and climate change.

104 *Ibid.*

105 Source: AusAID website, http://www.ausaid.gov.au.

106 *Ibid*.

With regard to telecoms/ICT, assistance is usually rendered under the infrastructure theme. AusAID's contribution to telecoms/ICT development is evident through the Governance for Growth programme established in Vanuatu, which provided critical and timely assistance to the government during the liberalisation process.

CROP

The Council of Regional Organisations in the Pacific (CROP) is chaired by the Forum Secretariat with membership comprising the heads of the following organisations:

- Forum Fisheries Agency
- SPC
- South Pacific Regional Environment Programme (SPREP)
- South Pacific Applied Geosciences Commission (SOPAC)
- South Pacific Tourism Organisation
- University of the South Pacific
- Pacific Islands Development Programme
- Fiji School of Medicine
- South Pacific Board for Educational Assessment.

The aim of CROP is to coordinate and avoid gaps and/or duplication in regional programmes. A number of cross-sectoral working groups were established including an ICT group, however we understand that this particular working group is no longer active.

Nevertheless CROP agencies are engaged in a number of active ICT projects involving installation of hardware and software into ministries across the region. For example, SPREP has been deploying the Pacific Environment Information Network (PEIN), an environmental database/knowledge management system into environmental ministries (funded under a European Union programme from 2000 to 2008), SPC has been implementing land information systems, SOPAC has implemented agriculture and GIS systems, and USP a marine resources information system.

A major issue that has arisen with the CROP ICT projects has been considerable fragmentation across various knowledge management systems in different government

agencies. The sectoral approach has resulted in a lack of system interoperability and there is no local capacity or funding to provide IT support. This means that regional governments depend on the CROP agencies that installed the systems for their IT support.

DBCDE

The Department of Broadband, Communications and the Digital Economy (DBCDE) is the Australian government ministry responsible for ICT and ICT-related matters. DCBCE – and its predecessor, the Department of Communications, Information Technology and the Arts – has been actively involved telecoms and ICT matters in the region. In recent years, its activities included:

- commissioning studies on key issues for the Pacific, such as satellite connectivity
- capacity building to assist countries in transition, particularly in the Asia-Pacific region
- providing technical assistance and expertise in preparing the framework for the proposed regional resource centre.

ITU

The International Telecommunication Union (ITU) is a United Nations organisation that provides technical guidance on ICT matters and is a focal point for its 191 member countries and for private sector organisations. Its mission is:

> ... to enable the growth and sustained development of telecommunications and information networks, and to facilitate universal access so that people everywhere can participate in, and benefit from, the emerging information society and global economy.[107]

A primary concern of the ITU is bridging the "Digital Divide" between developed and developing countries, which it believes can be achieved by:

- building information and communication infrastructure

[107] Source, ITU website, http://www.itu.int/net/about/mission.aspx.

- promoting adequate capacity building
- establishing confidence in the use of cyberspace through enhanced online security.[108]

In the Pacific, the ITU has recently revitalised its commitment to the region and is participating in a number of initiatives including:

- Connect Villages, in association with Nokia Siemens
- ICB4PAC, in association with the European Commission
- One Laptop Per Child
- strengthening the ITU Academy Centres of Excellence network in the Asia-Pacific region, in association with PITA
- establishing a new Internet Training Centre in Tonga, in association with the Tongan government and other agencies
- providing direct country assistance to individual countries and to the Pacific region as a whole.[109]

NZAID

The New Zealand Agency for International Development (NZAID) manages New Zealand's official development assistance (ODA) programme and provides policy advice on international development issues,[110] with the objective of supporting:

> … sustainable development in developing countries in order to reduce poverty and to contribute to a more secure, equitable, and prosperous world.[111]

NZAID operates worldwide, offering assistance in Asia, Africa, Latin America and the Pacific, assisting its development partners to achieve Millennium Development Goals and international development targets. Its programmes are generally focussed on ten areas

108 *Ibid*.

109 Source: ITU website, http://www.itu.int.

110 Source: NZAID website, http://www.nzaid.govt.nz.

111 *Ibid*.

including education, environment, health, leadership and governance, and trade and development.

In the Pacific, NZAID offers assistance to a number of Forum Countries, and to regional organisations, such as PIFS. However, its largest commitments are to Melanesia, particularly PNG, Solomon Islands and Vanuatu, with the focus of:

- addressing basic needs
- accelerating economic growth
- supporting the rule of law and access to justice.[112]

PIFS

The Pacific Islands Forum Secretariat (PIFS) is the administrative arm of the Pacific Islands Forum, a political group of 16 independent and self-governing states.

The goals of PIFS are to stimulate economic growth and improve political governance in the region, and to encourage regional cooperation and integration. To this end, the primary roles of the Forum Secretariat are to provide:

- policy advice and guidance in implementing the decisions of the leaders
- coordination and assistance in implementing the decisions of the leaders
- support to the leaders' meetings, ministerial meetings and associated committees and working groups.[113]

Three working programmes have been developed from the above goals:

- Economic Governance Programme – to provide policy advice, capacity building assistance and support for economic reform, trade policy, regional economic integration and private sector development

112 *Ibid*.

113 Source: PIFS website, http://www.forumsec.org.fj/index.cfm.

- Political Governance and Security Programme – to provide policy advice, coordination and implementation assistance for regional political governance, with regards to crisis responses, conflict prevention, security and human rights
- Strategic Partnerships and Coordination Programme – to provide monitoring, coordination and assistance to help build and strengthen partnerships between organisations. This working programme includes coordinating implementation of the Pacific Plan.[114]

PITA

The Pacific Islands Telecommunications Association (PITA) is a non-profit organisation that represents the interests of Pacific Island Countries, with the aim of improving, promoting, enhancing, facilitating and providing telecoms services within member countries.[115] Membership is open to any telecoms entity operating in the Pacific and to equipment and service vendors and suppliers.

PITA has been an important resource in the region for training and capacity building by hosting a number of seminars and workshops on both telecoms and ICT issues. Additionally, it has established important linkages with several regional agencies and programmes, and has become a valuable channel for coordinating and networking member countries.

SOPAC

The Pacific Islands Applied Geoscience Commission (SOPAC) is a regional organisation geared towards promoting sustainable development in its member countries, which consist of all Forum countries, American Samoa, French Polynesia, Guam, New Caledonia and Tokelau. Through its secretariat located in Fiji, SOPAC's assistance can be categorised into three focal areas:

114 PIFS (2008), *Corporate Plan 2008-2012*.

115 Source: PITA website, http://www.pita.org.fj.

- oceans and islands – which is generally concerned with non-living resources in ocean and island systems
- community lifelines – which is directed at strengthening national capacity in energy, water, health and sanitation, and ICTs
- community risks – which is a diverse programme aimed at reduction of community vulnerability through improved hazard assessment and risk management.[116]

With regard to ICT and as a member of CROP, SOPAC has been involved in a number of regional and in-country initiatives in areas such as:

- e-government
- telecentres
- ICT and disaster management
- Geospatial Content Management System (GeoCMS)
- Geographic Information Systems (GIS)/remote sensing.[117]

However, with effect from 1 January 2010, most of SOPAC's functions would have been assigned to Secretariat of the Pacific Community (SPC), whilst those related to the environment, such as climate change and meteorology, would have been transferred to the Secretariat of the Pacific Regional Environment Programme (SPREP).[118]

SPC

Founded in 1947, the Secretariat of the Pacific Community (SPC) provides technical assistance, policy advice, training and research services to 22 Pacific Island countries and territories in areas such as health, human development, agriculture, forestry and fisheries. While the organisation's focus is primarily public health, land and marine resources, and human development, it recognises the synergies of ICT to complement its focal areas and the overall development of its member countries. To that end, and through joint strategies

116 Source: SOPAC website, http://www.sopac.org.

117 *Ibid*.

118 Source: Island Business website, http://www.islandsbusiness.com/.

developed with individual member countries, the SPC has been offering technical assistance to:

- develop national ICT policies, regulations and e-government initiatives
- support RICS pilot projects to sustainability
- implement and support OLPC pilot projects to sustainability.

UNDP

The United Nations Development Programme (UNDP) is an organisation that advocates change in a number of United Nations member countries by facilitating knowledge, experience and resources to effect change. A critical focal point of UNDP is assisting countries to achieve Millennium Development Goals, by helping countries to build and share solutions to the challenges of:

- democratic governance
- poverty reduction
- crisis prevention and recovery
- environment and energy
- HIV/AIDS.[119]

UNESCAP

Established in 1947, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) is a development unit of the United Nations addressing the needs of the Asia-Pacific region. The scope of its work encompasses the following areas:

- macroeconomic policy and development
- statistics
- sub-regional activities for development
- trade and investment

119 Source: UNDB website, http://www.undp.org/about/.

- transport
- environment and sustainable development
- ICT and disaster risk reduction
- social development.[120]

With regard to ICT, which is addressed by its Information and Communications Technology Disaster Risk Reduction Division (IDD), UNESCAP is addressing issues such as:

- increasing knowledge-sharing among member states on a range of ICT and ICT-related issues
- strengthening regional cooperative mechanisms in support of ICT connectivity
- improving the institutional capacity of member states to apply ICT for socio-economic development by supporting the work of other sister agencies.[121]

World Bank

The World Bank is an international development agency that provides financial and technical assistance to developing countries, and is owned by 186 member countries. Headquartered in the United States, and with offices worldwide, the World Bank comprises two development institutions: the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA), through which a range of services are offered to its member countries including:

- low- or no-interest loans
- grants to countries
- analytic and advisory services
- capacity building.[122]

120 Source: UNESCAP website, http://www.unescap.org/about/index.asp.

121 Source; UNESCAP-IDD website, http://www.unescap.org/idd/our_strategy.asp.

122 Source: The World Bank website, http://www.worldbank.org.

A critical focal point of the World Bank's resources is to reduce global poverty, promote sustainable development and facilitate realisation of the Millennium Development Goals. To that end, technical and financial assistance is available to member countries in a number of wide-ranging topics, such as agriculture and rural development, education, energy, ICT poverty, rural development, trade, and transport.

Regarding telecoms/ICT in the Pacific, the World Bank has been offering technical assistance and funding across the region. Recent examples include:

- providing a loan to the government of Samoa for reform of its telecoms and postal sectors
- facilitating a study on international connectivity options in the Pacific, with particular focus on submarine cable
- providing advisory assistance to the government of Fiji on telecommunications sector strategy, including liberalisation, competition, new licensing regime, new legal and regulatory framework and rural access
- securing the services of a telecoms regulatory specialist to advise to the government of Vanuatu on key legal and regulatory requirements for its telecoms sector
- advising the government of the Solomon Islands during its negotiations with the incumbent to end the exclusive licensing arrangement
- providing financial assistance to Papua New Guinea towards its rural telecoms project
- initiating a study on the requirements to establish a regional resource centre
- providing advisory assistance to the government of Kiribati on increasing access to telecoms services.

Annex F: Stakeholder consultation

We are grateful for input from the following countries and stakeholders:

- Australia
  - Mr Richard Brown (Director, Regional Cooperation Section, International Branch, Department of Broadband, Communication & the Digital Economy)
  - Mr Trevor Jenner (Regional Cooperation Section, International Branch, Department of Broadband, Communication & the Digital Economy)
- Federated States of Micronesia
  - Jolden Johnnyboy (Assistant Secretary, Department of Transportation, Communications & Infrastructure)
- Fiji
  - Mereseini Waibuta (Acting Chief Economist, Ministry of Industry & Trade)
- Kiribati
  - Bwanouia Aberaam (CEO, Telecommunications Authority of Kiribati)
  - Teekoa Ietaake (Secretary, Ministry of Communications, Transport and Tourism Development)
- New Zealand
  - Nick Manning (Manager, Ministry of Economic Development)
  - Frank March (ICT Advisor, Ministry of Economic Development)
- Niue
  - Tutuli Heka (Director Post and Telecommunications)
- Palau
  - Richard Misech (Palau National Communications)
  - Blanche Salii (Palau National Communications)

- Samoa
  - Tua'imalo Ah Sam Asamu (CEO, Ministry of Communications and Information Technology)
- Solomon Islands
  - Jeffrey Wickham (Permanent Secretary, Ministry of Communications and Aviation)
  - Matthew Hodge-Kopa (Advisor – Economic Reform Unit, Ministry of Finance)
  - Robert Bokelema (Director of Communications, Ministry of Communications and Aviation)
- Tonga
  - Paula Mau (Acting Secretary for Communications, Department of Communications)
- Vanuatu
  - John Crook (Interim Telecommunications Regulator, Office of the Telecommunications Regulator)
  - Dalsie Baniala (Office Administrator, Office of the Telecommunications Regulator)
  - Nikunj Soni (Executive Director, Pacific Institute of Public Policy)
  - Dr. Bimbika Sijapati Basnett (Senior Research Officer, Pacific Institute of Public Policy)
  - Chris Bleakley (Governance for Growth – AusAID)
  - Wilson Vuti (Director General, Ministry of Infrastructure and Public Utilities)

We are also grateful to the following additional partners and stakeholders for their insights:

- Professor Eduard Babulak (Director Japan Pacific ICT Centre, University of the South Pacific)
- Natasha Beschorner (World Bank)
- Professor Rajesh Chandra (Vice-Chancellor, University of the South Pacific)
- Gordon Chang (Pacific Power Association)
- Stuart Davies (APT)
- Uzumme Erume (PIFS)
- Scott Hook (PIFS)
- Kisione Finau (Director of IT Services, University of the South Pacific)
- Amit Kumar (UNDP)

- Andrew Nihopara (South Pacific Travel)
- Helen Po'uliva'ati (South Pacific Travel)
- Gisa Fuatai Purcell (ITU)
- Kapeni Matatia (IT Manager, SPREP)
- Peter Murgatroyd (Information Resource Centre Manager, SPREP)
- Sai Too Go (South Pacific Travel)
- Sanjesh Naidu (PIFS)
- Siaosi Sovaleni (SOPAC)
- Ian Thompson (SPC)

Annex G: Terms of reference for this study

Below we reproduce the Terms of Reference for the study.

In March 2006, the Wellington Declaration was promulgated, recognising that the Forum Leaders had requested a regional Digital Strategy to be developed as an essential component of the Pacific Plan with a view to improving the uptake and use of ICT in the region.

The purpose of this review is to broadly assess the impact the Digital Strategy has made on ICT in the Pacific region and provide a platform for a revised Digital Strategy (DSII) to be developed in light of the gaps and emerging needs identified through the assessment and Member consultation.

Part A: Research, review and consult

Technological capacity

(a) **A top level assessment of the current state of Information Communication Technology capacity and usage in the Pacific Island Countries (PICs).** The assessment would include the sector governance, structure and ownership, the coverage, reach and penetration of connectivity, the extent to which the present connectivity is used for enhanced services and applications, and an in-depth focus on the degree to which converged services exist and are exploited for government, commerce and social purposes.

(b) **A review of the potential of ICTs to meet current and future socio-economic needs in the PICs** detailing potential to improve productivity of the economy and delivery of new services.

The consultants are expected to review (a) and (b), against the DS objectives, noting the nature of measurements used for the assessment and highlighting any gaps between the set objectives and current capacity. The consultants should also review the contribution partners have made towards achieving the broad objectives set out by each component of the DS and identify those areas that are considered work in progress.

Market structure

(c) **A review of the current structure of partners and players in ICT to determine competitive advantage, leverage, access to resources and potential modalities of delivery of support. The review would also include how the market structure impacts on issues identified in sections (a) and (b) above.**

Part B: Recommendations that will form the basis of a Revised Digital Strategy

Provide recommendations for a Draft Digital Strategy II (DSII) to be used as a basis for discussion by national and regional stakeholders, and to assist in the development of a DSII that addresses identified gaps and emerging needs from Part A.