

Challenges Facing the South Pacific Islands in Ensuring Universal Access to Communications Services

Vanuatu a case history in the making

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Abstract—This document covers the experience of Vanuatu in tackling the issues associated with rolling out Broadband Internet Services.

Keywords—component; Vanuatu; Regulation; TRR; Information and Communications Technology; ICT; Universal Access; Small Island Development States; SIDS; Broadband; AusAid

I. INTRODUCTION

Some of the most wonderful but remote places on earth are in the South Pacific Ocean. They are havens which have been life savers for many sailors ever since man has been able to cross oceans. But people within these remote havens now wish to be connected through modern high speed internet so as to both enjoy their surroundings and have the advantages of the connected developed world. However they face significant challenges to achieve their desire. Vanuatu is one such country facing up to these challenges.

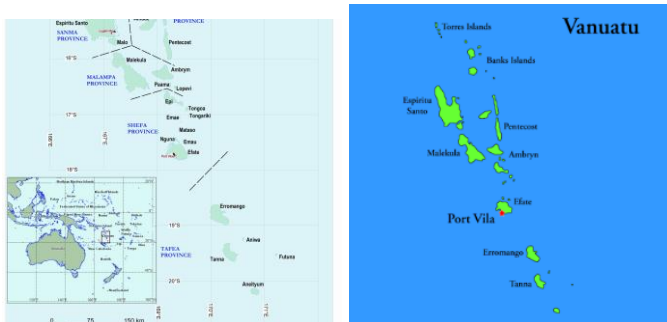


Figure 1 - Location of Vanuatu

Vanuatuⁱ is in the Melanesian group of countries in the South Pacific and has 63 inhabited islands, an aggregate land area of 12,200 square kilo meters and a total population of 234,000 (2009 census).

II. CHALLENGES

GDP per capita stands at around US \$ 5,500 (ppp) approximately one tenth of Australia. Vanuatu has a democratically elected parliament with 52 MPs.

Vanuatu falls within the United Nations definition of a Small Island Development State (SIDS)ⁱⁱ.

The country is experiencing social and economic challenges in meeting the millennium goalsⁱⁱⁱ which is further exacerbated by young adults having to leave their Island for higher education and to seek employment. Population is currently growing at 3.5% in the urban areas and 1.9% in rural areas more than twice that of Europe. Predications are for urbanization to increase.^{iv} Vanuatu, like many South Pacific countries, is seeking ways to address the issues of relatively high population growth, urbanization, higher education in rural areas, level of health care, climate change, land registration disputes and a negative balance of trade.

The cost of electricity and difficulties of transportation adds to the challenge in particular to remote islands. The Government^v supports regional cooperation in many areas as a way to tackle some issues with the University of the South Pacific cited as one successful regional initiative in the higher education sector.

The only form of international electronic communication is via Satellites. Domestically some islands are connected via microwave to the capital Port Vila, however much of the country remains unconnected.

Many Islands are just too far for microwave connectivity. Satellite communication has traditionally been expensive and subject to high latency although developments in medium orbiting satellite systems may be changing this. Submarine

cable provides the highest bandwidth at the lowest unit cost and could provide the much needed links to Pacific Islands. However capital costs are high and provide challenges to the commercial sector to fund due to the distances, current low traffic levels, affordability and difficulty in forecasting potential growth. Concession funding is often required. The World Bank has been involved in supporting SIDS and has earmarked US \$88 Million to fund submarine cables in a number of South Pacific Countries. However Satellite will still remain the only practical and cost effective solution for many outer islands making up SIDS.

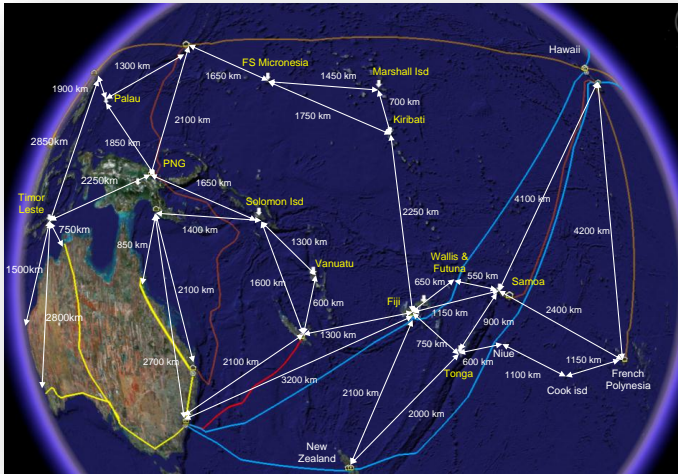


Figure 2 – Distances & Submarine Cables in South Pacific

Figure 2 indicates the significant distances between countries. The blue lines indicate submarine cables which can provide vast bandwidth and lower the cost per megabit per month significantly when compared to satellite communications. SIDS within the Pacific who do not become connected will remain at a significant economic and social disadvantage.

III. LIBERALISATION

Government separating Policy and Regulation from ownership together with the creation of an independent Regulator (Supported by AusAID^{vi}) has been a vital factor in the success of the telecommunications sector in Vanuatu. The 2009 Act establishes the independent Telecommunications and Radiocommunications Regulator^{vii} (TRR). The Regulator is responsible for enforcement of the 2009 Act^{viii}, making administrative decisions and advising the Minister as to policy matters.

The major turning point in the Telecommunications market occurred in 2008, when Government exchanged its 33.3% shares in the incumbent operator, Telecom Vanuatu Limited^{ix}

(TVL), for ending the monopoly 3 years early. This paved the way for the Licensing of a second mobile operator Digicel^x. As a result in just over 2 years mobile penetration increased from 20 to over 70% with around 90% of the population having coverage. Key to this success was the Licence obligation for Digicel to cover 85% of the population with mobile services. Further importation duty was waived on all infrastructure equipment and no charge was made for the spectrum and Licence other than 2.25% of net revenues to cover the costs of the Office of the independent Regulator.

IV. NATIONAL ICT SERVICES POLICY

Vanuatu fully supports the goals set out by the ITU Broadband Commission^{xi} for Regional Development. In particular Vanuatu sees use of ICT and Broadband connectivity will considerably assist in meeting the Millennium Goals.

Based on the ITU Regionally led framework Vanuatu has prepared a National ICT Services Policy^{xii}, tailored to its state of development. The Policy was developed by a multi stakeholder group, chaired by the Director General (DG) of the Ministry of Infrastructure and Public Utilities (MIPU). The Draft Policy was distributed for Public comment and also presented at a number of public meetings throughout the country. The National ICT Vision is “ICT for all” and sets out seven main goals:

- GOAL 1: Ensure accessibility and affordability of reliable access to information services to all
- GOAL 2: Ensure development of human resources & institutions in the use of ICT
- GOAL 3: Support economic growth
- GOAL 4: Support achieving a healthy educated nation
- GOAL 5: Support good governance
- GOAL 6: Support and protect our environment
- GOAL 7: Support effective security and protection of the nation and individuals

The Council of Ministers considers the policy in August.

A National ICT Steering Committee (SC) will oversee and coordinate the strategic actions of stakeholders in implementing the Policy. Vanuatu has the opportunity, through this Policy and the ICT SC, effectively to move forward at a rapid pace.

V. BROADBAND POLICY

Goal 1 of the National ICT Services Policy demands there be Broadband Service in Urban Areas and Access in Rural Areas. We require exploring Policy enablers which encourages market driven penetration of Broadband. Vanuatu like many SIDS does not have the wealth for Government to subsidise

Broadband Infrastructure. Largely therefore it is the private sector which has to carry the burden. In Vanuatu the Licence obligation has resulted in Digicel rolling out cellular services into uneconomic areas. No such obligation has been placed on any licensee for Broadband Internet. However the Universal Service Fund has been established which can be used as a key instrument to funding Broadband infrastructure and services.

Vanuatu has now three backbone networks; the Government Voice & Data network, Digicel and TVL. Collaborative working is planned to explore each being linked to support redundancy and maximize the use of the spare capacity. On commercial wholesale terms the Government IP backbone could support carrying what is expected to be an ever increasing amount of data traffic. These networks will be connected to the international submarine cable, when it comes on line, in 2012 -2013. Access is expected to mainly use wireless technology, linked to one or more of the backbone networks. Where this is not possible satellite technology will be used. Over time all but the very remotest Islands should be connected to a backbone network and hence to the submarine cable.

VI. UNIVERSAL ACCESS POLICY

To support Goal 1, of the National ICT Service Policy, Vanuatu has drafted a Universal Access Policy^{xiii} (UAP). One of the key points fed back from the public consultation was the need to make UAP Funded infrastructure available to other licensees at rates set by the Regulator. Key objectives of the UAP are to support achieving “Ubiquitous Broadband Communications” ICT for all. The fund will be used to finance expansion and/or maintenance of designated networks/services that would not otherwise be commercially sustainable.

It is envisaged to provide subsidy funding to build infrastructure where there is market failure, to facilitate extension of voice & Broadband Internet to uneconomic, unserved or underserved areas. Not only can the fund be used for access technology but also backhaul, international access and ICT related training. A key policy is the use and funding of Public Access Telecenters to support the roll out of Broadband and achieving ICT for All.

The UAP Fund can receive up to 4% of net revenues of Licensees, Government money and aid from Donors. Further any persons may contribute to the Fund and have it ring-fenced for specific projects. The UAP Fund is Public money and placed in a trust account and administered by the Telecom Regulator as a trustee. The fund is administered and distributed in an open, transparent, non-discriminatory, objective and competitively neutral manner and be audited

annually by an independent qualified auditor. UAP contracts will be awarded according to a Competitive Tender Procedures that has been approved by the Vanuatu Tender’s Board.

VII. BROADBAND PILOT

In late 2010 Government requested that four rural pilot areas have schools and health centers connected to the Broadband Internet. In March 2011 TRR issued a tender for four pilot areas surrounding Southwest Bay Health Centre on Malekula, Nebul Health Centre on Ambrym, Rensarie High School on Malekula and Melsisi High School on Pentecost. Each area has formed a coordinating committee headed by a local chief or Headmaster.

In each area the winning bidder has to ensure a minimum connectivity of 512 Kbit/s down and 128 Kbit/s up speed with a maximum contention ratio of 20:1. The winning bidder was requested to take a holistic approach and provide a Telecentre, PC’s associated business equipment and training as well as service to the school or Health Centre.

The service has to run for 12 months before the final payment is made. The pilot projects are being run to gain experience in the approach required to achieve sustainability through stimulating economic development. Partners such as the National bank of Vanuatu and Post Office are being encouraged to participate with service providers. The Health and Education Ministries are also exploring how existing programmes can be improved with the availability of the internet and PCs. In preparing the Tender TRR drew upon the wealth of experience on sustainable Telecenters.^{xiv}

The Regulator has awarded, by competitive tender, the production of a documentary of the people being impacted by the new services. The objective of the documentary is to support the general awareness building throughout Vanuatu, of the benefits derived by the community from the broadband internet access. This is based upon the theory that if communities better understand benefits they will generate the funds required to stimulate the private sector to make the investment in the Broadband infrastructure negating the need for public funds. Consideration is being given to the production of a play to be managed by a travelling theater to focus on building the awareness of the benefits of internet access to communities.

The results of the four pilots will be fed into a larger project, to commence in 2012, when it is expected that over the coming three years all schools and health centers with permanent staff will be connected provided with Broadband Internet Access and Telecentres established in many areas.

VIII. RESEARCH

There are a wide number of aspects to research from technology to social and demographic. The Pilot areas are representative of many SIDS which by their very nature are not easily accessible. The research study is needed to assist Government and Service Providers understand the best approach to make available broadband connectivity to remote islands in a sustainable and affordable manner. Such connectivity will enable people, through the World Wide Web, become an integral part of the modern international community, improve their living standards and in turn meet the Millennium Development Goals.

The research also has to arrive at a method by which cultural and social heritage can be preserved with the community benefiting from being connected and protected from the negative aspects of the internet. The proposed research will contribute to the general body of knowledge and research work in rolling out sustainable ICT & Broadband Internet into Remote Island developing Communities.

The research will be aimed at addressing:

- The demographic, social and economic characteristics of the rural community which needs to exist to maximize the success in the take up of ICT & Internet. The characteristics include Population density, Education levels, Economic activity, Schools, shops, health centers, post office, bank, Jetty/wharf and Landing strip.
- The best approach to offering public service covering Telecentre Management and ownership, public wide area wireless and Terms and Conditions.
- Policy & Regulatory incentives required to stimulate the provision of Internet services. Funding options covering both supply and demand side subsidies.
- How Government may best utilize Broadband Access to positively impact on education success levels, improve health services and Local Administration with the provision of eGovernment Applications.
- The alternative access technology for the Broadband Internet – capability, costs, reliability. The review will cover such technologies as Cellular (3G & LTE), Fixed line, Fixed Wireless such as WIMAX and IBurst. Back haul VSAT, MEO's (e.g. O3B^{xv}), LEOs, VHF, Microwave and cable.
- Power solutions covering both low powered devices to minimize demand and supply side such as solar, wind, diesel generators, hydro, geothermal and other forms of generation.

- Best approach to capacity building and training Maintenance staff, Telecentre operators and users.
- Economic impact of the provision of Broadband internet services, terminals and training covering including increase in sales of local products, new services and products developed and increase in tourism, job creation and reduction of Brain Drain.

IX. TENDER AWARD

The contract with the winning bidder for the four Broadband Pilot areas was awarded to Incite^{xvi}, a Vanuatu based company with key partner, Oceanic Broadband^{xvii} from Australia and was signed on the 4th July 2011. Incite combines extensive local knowledge with considerable regional knowledge within its partner company. The primary supplier of the technology, Oceanic Broadband Pty Ltd, has extensive experience through the Pacific, including the installation of satellite dishes on 12 islands for the National Bank of Vanuatu (NBV).

TRR and Incite have agreed to install the first Pilot Telecentre at, Rensarie, Malekula in October and only ship the next three Telecenters after completion of the first installation. This approach will enable experience from the first Pilot to be used to make any final adjustments at the factory to the Telecentre building before shipping.

The next three sites will then be installed in sequence – Melsisi, Pentecost, Nebul, North Ambrym and South West Bay Malekula.

Of critical importance is the formation and effective working of the local community committees who signed MOU with TRR and with Incite confirming their role in taking responsibility for the Telecentre in terms of providing land, security and supervision.



Figure 3 – Prefabricated Telecentre

The key attributes of the solution proposed by Incite includes:

- The entire Telecentre is prefabricated and comes in parts, each of a size and weight that two men can handle. Solar power system is integral with the building.
- Inside the Telecentre there will be 3 workstations for public use, plus 1 main management computer for the Telecentre Operator (TO). These PCs have been specified to be generic computers using generic parts.
- Basic test equipment and spare parts will be kept on-site to facilitate diagnosis and rapid repair of equipment. All PCs and communications equipment can be accessed and supported remotely, allowing rapid diagnosis and repair and reducing the need for downtime and site visits.
- The Telecentre is also equipped with the required printers, scanner, fax, copier, TV & video, digital camera, projector and screen.
- Pre-paid ticketing system is a ZyXel N4100 Wireless Hotspot Gateway. Customers of the Telecentre will be given a number of pre-paid tickets after completion of their training.
- A Proxim Dual Band 5.8/2.4 GHz Radio (or equivalent) external transmitter will be mounted on the Telecentre. This radio will provide Wifi (802.11 B/G wireless) for connection at the Telecentre and immediate surrounding area for customer usage as well as a 5.8Ghz mesh backbone for interconnection to the Health Centre and School. The Internet connection can be extended in any direction that has clear Line of Sight, up to a distance of 20km in a single hop using wireless Point to Point equipment. Even over 20km the speed of this link will be greater than 2Mbps. Long distances, or non-Line Of Sight segments, may require additional towers.
- The internet connection proposed is an independent satellite link using a VSAT dish. The cost of this connection forms around 5% of the overall project, and the operation of the Telecentre and any downstream connections is totally independent of the type of connection provided. Where an alternative internet feed is available that is cheaper and/or faster, then the Telecentre will be connected to this feed and hence to a National backbone and onto the international submarine cable.

The Telecentre is a purpose built building, hence is not compromised in any way by weather, ownership, or access. The building is cyclone rated, water-tight, and requires no concrete to erect. The walls of the building are lined with steel mesh, able to withstand personal attacks or strikes from airborne projectiles during a cyclone. Being cyclone proof, electrically self-contained and internet connected, the Telecentre can double as an Emergency Response Centre for the community. For wheelchair access, a wooden ramp will

be constructed that can be placed in the main doorway when needed. The building is all on one level so there are no obstacles within the building.

The Telecentre and equipment for the schools and Health Center will all be delivered in one 20 foot container which can be shipped to site. This reduces the risk of loss or damage. It also means the equipment will stay sealed onsite during the construction phase.

X. TRAINING

Training represents a major part of the contract. In conjunction with the Community Council two Telecentre Operators will be selected for Training the Trainers course in Vila as well as training on PCs and software applications.

The TO staff will be training in basic maintenance of all equipment. Training will also be performed throughout a 12 month period at the Pilot sites on effective use of PC's and internet for commercial applications.

In addition to internet access and use of the PC and ancillary equipment the Telecentre may offer services such as Banking, Postal Services, Shipping Agent, Movie Nights, PC / Internet Training, Phone Card Sales and DVD Library.

XI. CHOICE OF TECHNOLOGIES

The issue of lack of power is a key consideration as well as remoteness in respect to spare parts and replacement of reusable parts. All electronic equipment has been selected balancing power consumption with reliability and their requirement to replace items such as ink cartridges. Vanuatu is within the tropics at Latitude of 17°42'S, and Longitude of 168°18'E. Given the number of sunny days solar power is a common form of power generation. The four Pilots use a self-contained Solar Power System. There is no reliance on power from any other source. This means the power will be reliable and clean, extremely important to the reliable operations of the equipment.

The solar panels are connected in 4 groups of 5 and connected on separate isolation switches. Batteries are connected in 4 banks of 24Volts so each bank is able to be isolated. Each bank has a separate remote telemetry measurement so the state of the batteries can be monitored locally and also from Port Vila. The AC circuits within the building are separated into two, essential and non-essential. Each circuit is powered by a separate 3kva inverter to provide redundancy. The Generator backup input will power 2 x 25A battery chargers. These will charge the batteries should there be long periods of cloudy skies.

Internet will be supplied via a 1.8m "C" Band Satellite Dish. "C" Band, while slightly more expensive than "Ku" band, is

not affected by heavy rain, hence is a more reliable circuit. The NSS 9 satellite operated by SES World Skies^{xviii}, has a very strong footprint over Vanuatu and is connected to a ground station in Adelaide Australia. With the 1.8m dish and a 5 watt transmitter, a solid and reliable signal should be expected. This is large enough to handle uplink speeds of 2Mbps. The receiver is capable of handling download speeds of 20mbps. The equipment supplied can deliver up to 20/2 mbps without any changes to hardware. Initially, the circuit connected will be a 512/256 mbps connection at an 8:1 contention ratio.

It is important that each Telecentre school and Health Center be eventually linked to one of the backbone networks of the two mobile operators or Government Data Network in order to take advantage of the submarine cable which is planned to be connected to the Capital, Port-Vila. To achieve this relies upon these operators investing in appropriate wireless technology either due to commercial justification in Urban areas or through support of the UAP Fund.

XII. IDENTIFICATION OF FURTHER SITES

Work is proceeding to identify the communities throughout Vanuatu where Telecentres might be established to assist in achieving “ICT for All”. The areas will most likely be those surrounding many of the 120 or so secondary schools each with around 300 pupils drawn from approximately 36,000 homes in the rural areas and 12,000 in urban areas.

Working with the Vanuatu National Statistic Office^{xix} TRR is identifying potential locations based upon reviewing potential demand. Demand will be generated based upon such factors as: Population density, Earnings per household, availability of raw materials, Schools and number of pupils, Medical Centers, Commercial activities, Tourism, Agriculture and Fishing. The outputs from the Pilots and further development of the UA Policy will assist us to adopt different models for the Telecentres which will maximize sustainability. Discussions are also being held with the main mobile and fixed operators to agree their own network roll out plans which will not need UAP Funding.

XIII. CONCLUSION

In order to succeed in achieving “ICT for All” there has and will be a need for collaborative working. Leadership has been given by Government initially in liberalising the market and establishing a UA Policy and Fund. Key to success is the National ICT Services Policy, the Broadband Policy and the effective working of the ICT Steering Committee supported by Licensees exhibiting a sound Corporate Social Responsibility (CRS). Government is showing the lead in creating demand by budgeting that every school and Health

center has internet. An eGovernment strategy has been developed to progressively develop applications to assist more effective government and more effective services. To fully roll out eGovernment requires that there is access to internet for all.

SIDS can overcome the hurdles of distance, low population density and low GDP through having a clear Policy; orchestrated strategic actions; coordinating demand; consolidating international traffic; strategic use of modern Satellite services; public private partnerships in submarine cables; stimulating demand and creating awareness of the benefits of being connected.

Vanuatu looks forward to learning from the four Pilot Broadband UA funded sites (See Vanuatu Broadband Pilot Blog^{xx}) and driving forward the Government’s vision of “ICT for All”.

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- i <http://vanuatu.travel/>
 - ii http://www.un.org/esa/dsd/dsd_aofw_sids/sids_aboununit.shtml
 - iii <http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm>
 - iv http://pacificpolicy.org/index.php?option=com_rokdownloads&view=folder&Itemid=93&utm_source=PiPP+Mailout&utm_campaign=c298fde2b8-D18_URBAN_HYMNS7_22_2011&utm_medium=email
 - iv <http://www.governmentofvanuatu.gov.vu/>
 - v <http://www.governmentofvanuatu.gov.vu/>
 - vi <http://www.ausaid.gov.au/country/country.cfm?CountryId=17>
 - vii www.trr.vu
 - viii http://www.trr.vu/index.php?option=com_content&view=category&layout=blog&id=29&Itemid=32&lang=en
 - ix <http://www.tvl.net.vu/index1.html>
 - x <http://www.digicelvanuatu.com/en/>
 - xi <http://www.broadbandcommission.org/about.html>
 - xii <http://www.trr.vu/attachments/article/15/ICT%20Services%20Policy%20Vanuatu%20Consultation%20030211.pdf>
 - xiii <http://www.trr.vu/attachments/article/46/Final%20Draft%20Vanuatu%20UAS%20Policy%20250111%20Final.pdf>
 - xiv www.telecentre.org & , <http://www.ictregulationtoolkit.org/en/Section.3185.html>
 - xv <http://www.o3bnetworks.com/o3b-advantage/why-o3b.aspx>
 - xvi <http://incite.vu/>
 - xvii http://www.oceanicbroadband.com.au/index.php?option=com_content&view=article&id=1&Itemid=3
 - xviii <http://www.ses-worldskies.com/worldskies/index.php>
 - xix <http://www.vnso.gov.vu/>
 - xx <http://vanuatabroadbandpilot.blogspot.com/>