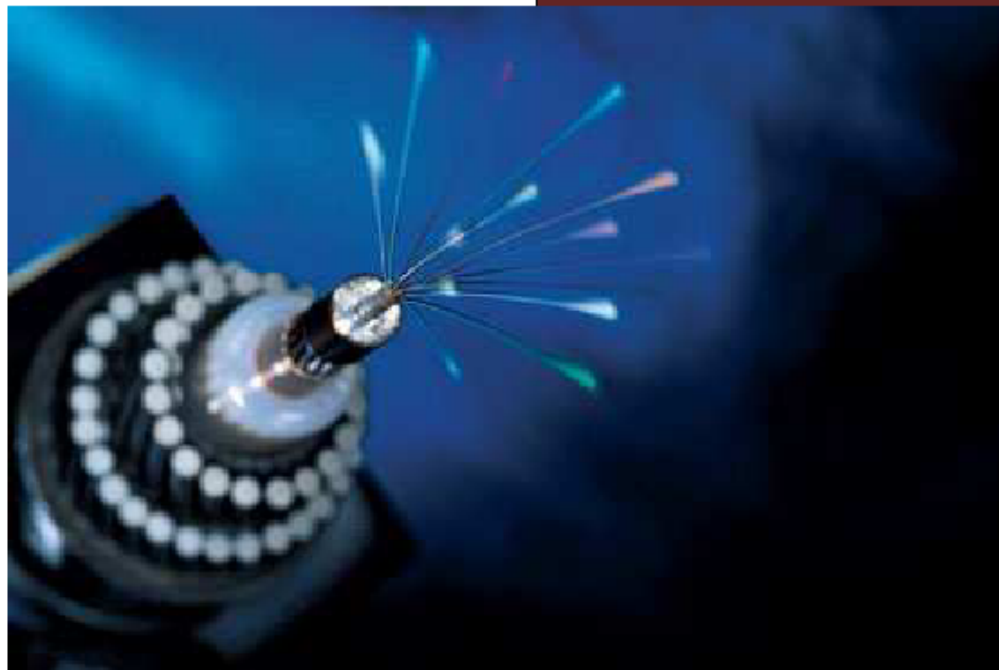


Polyconseil

Technical, Economic and Financial Connectivity
Study for Palau and Yap (F.S.M.)



Draft Report

November
2011

Draft Report

| Palau / Yap Connectivity

Report – October 2011 | Polyconseil Executive Summary

Choosing the right scenario to improve Palau and Yap Connectivity:

Considering that Guam is the closest interconnection point for both Palau and Yap, and backhaul prices are the most attractive in the region (there are 7 submarine cables landing in Guam), the best route for a potential sub-sea cable is clearly to Guam.

The potential options for Palau and Yap are summarized in the following table

Three demand scenarios have been considered (low, medium, high demand). None of cable projects are viable with low or medium demand. We therefore consider the high

demand scenario.1

1

With a 6% discount rate

2

Connectivity:

for both Palau and Yap, and that submarine cables landing in following table.

1 New cable : Palau
– Guam \$46M \$1,270k >25
years

New cable : Palau

– Guam

\$53M \$1,450k >25 >25 years years + + spur spur to to Yap Yap

3 Re-used used cable cable : :

Palau – Guam \$26M \$1,270k 15-20

20 years

Re-used used cable cable : : Palau Palau

– Guam

\$32M \$1,450k 15-20

20 years + + spur spur to to Yap Yap

, high demand). None of the
refore consider the high

1 New cable : Palau

able : Palau – Guam -\$3.5M 5.4%

New cable cable : : Palau Palau

– Guam \$4.4M 6.6% + spur to Yap

3 Re-used ed cable cable : : Palau Palau

– Guam \$16.6M 9.9% -\$0.3M

\$0.3M 2.2%

Re-used ed cable cable : : Palau Palau – Guam \$25.9M 10.9% + spur to Yap

\$3.6M

7.1%

For re-used cable options, options, we we calculate calculate NP

NPV for 25 years, and 15 years (in case the cable lifetime was only 15 years) with with a a 6% 6% discount rate.

Conclusion 1: Whether either we we consider consider a a new new cable or a re-used cable, adding Yap to the network increases the value of of the the project project.

Assuming that the remaining remaining lifetime lifetime expectancy

of the GP cable is beyond 1 Present Value of the he project project with with the

the re-used cable is higher than the project with a cable.

Net Present Value (@6%)

20,0 M\$

Option Option 2 2 : : New

New Cable + Yap spur

15,0 M\$

Option Option 4 4 : : Re

Re-used cable + Yap spur

10,0 M\$

5,0 M\$

0,0 M\$

New cable is the best -5,0 M\$

option

-10,0 M\$

2022 2023 2024

2025 2026 2027 2028 2029 2030 2031

Sources : Polyconseil Palau/Yap ap Business Business Plan Plan 2011. 2011.

Conclusion 2: The best option

option is a re-used cable, provided that:

1. Remaining lifetime expectancy

expectancy is more than 15 years (beyond 2027) 2. landing station

ation owner owner of of the the GP GP ca

cable in Guam (AT&T) gives access to competit
interconnection ction prices prices in in Guam Guam

Conclusion: the best est option option is is a a re

re-used cable from Palau to Guam with a spur to Ya High
demand is needed eeded for for the the project project to to b

be viable, by reducing wholesale and retail p
investing in domestic stic infrastructures, infrastructures, and and d
defining local interconnection agreements

15 years (in case the cable

cable, adding Yap to the

ble is beyond 15 years, the Net the project with a new

Re-used used cable cable is is the the best best option option

2031 2032

Lifetime expectancy of GP cable

beyond 2027)

gives access to competitive

uam with a spur to Yap. g wholesale and retail prices, onnection agreements

3

Connectivity Palau / Yap Connectivity

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Financing scenarios:

For the project of a re-used used cable cable

from Palau to Guam with a spur to Yap, we compared several financing scenarios.

\$ \$ 0 0 M M

\$ \$ 15 15 M M

7.4 % %

Sources : Polyconseil Palau Business Plan 2011 1. Including debt over 25 years

4

Loan (WB+ADB)

\$ 7 M

\$ 8 M

Equity

\$ 10M

\$ 8 M

Additional loan

\$ \$ 30M 30M

\$ 24.6M

Total investment

\$45 \$45 M M

\$ 41.6M

IRR for investors1

13.9 %

19.3%

NPV (6%)

\$ 1.6 M M

\$ 6.8M

NPV (10%)

\$ -2.4M M

\$ 2.6M

\$27 M

\$43 M

\$ 7.3M

\$ 3.9M

Opportunity

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, we compared

\$ 15

\$ 6M

\$ 16.2M

\$ 37.2M

24.3%

\$ 12.8M

\$ 8M

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Introduction

has been requested by several of its member Governments in the advisory/technical assistance, and possibly financial support, in the ns and information & communication technologies development.

areas for this assistance is international connectivity/bandwidth, inc optic cable deployment. The intention of the World Bank cal options for reducing bandwidth costs and increasing the capa

as completed in February 2009 and has been disseminated to World ents and to the telecommunications industry through the Pacific ons Association (PITA). As a follow-up, stakeholders in the region c advice regarding submarine cable connections for Palau and Yap

of Micronesia).

depth technical, economic and financial analysis of co . It includes a financial modeling of the most relevant scena

main sections.

Palau and Yap demand scenarios are presented; , all relevant cable projects are described;

business plan of each cable project are presented and compar es applied in this report to the cable projects are presented and

6

1. Introduction

The World Bank has been requested by s region to provide advisory/technical assist telecommunications and information & co

One of the focus areas for this assistance submarine fibre-optic cable deployment implement practical options for reducing international connectivity.

An initial study was completed in Februar member Governments and to the telecom Telecommunications Association (PITA). requested specific advice regarding subm (Federated States of Micronesia)

This report is a more in-depth technical options for Palau and Yap. It includes a fin

This report is divided in four main

- In chapter 2, Palau and Yap - In chapter 3, all relevant cable proj - In chapter 4, the business plan

The methodologies applied in this report in the annexes.

er Governments in the Pacific financial support, in the area of ologies development.

nectivity/bandwidth, including f the World Bank is to help and increasing the capacity of

n disseminated to World Bank try through the Pacific Islands keholders in the region
have Palau and Yap Island

ancial analysis of connectivity

relevant scenario.

e presented and compared.

ts are presented and explained

Palau / Yap Connectivity

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International bandwidth demand in

bandwidth demand forecasts were done by Polyconseil with , and data provided by the World Bank on Yap.

discussed International demand with:

, CEO of the office of the regulator;

CEO of PNCC; riong, CFO of PNCC;

of Palau Mobile Corporation; Palau Telecom; Managing Director of Palau Visitors Authority;

Executive Director of Palau Chamber of Commerce ipps, Surangel; s, Bank of Hawaii;

*

* *

International bandwidth demand in Palau and Yap is based on:

the telecommunications market; willingness of stakeholders in the countries to aim at the highest de

reducing wholesale and retail prices, invest ures, and defining local interconnection agreements.

Current situation in Palau and Yap:

ation of fixed lines has been decreasing; obile penetration is increasing very quickly; is slowly increasing.

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2. International

demand in Palau

International bandwidth demand forecas

with the support of

stakeholders from Palau, and data provide

In particular, we discussed International de

- Takkon Chin, CEO of the office of th - Richard Misech, CEO of - Leo Ben Teriong,

CFO of PNCC; - Luc Huang, Chairman of Palau Mob - Daniel Fontanar, Palau Telecom

- Darin de Leon, Managing Director of - Jennifer Gibbons, Executive Director
of Commerce; - Mason Whipps,
Surangel; - Brian Glass, Bank of Hawaii; - Palau Hospital
Future international bandwidth demand in - Current situation of the telecommu - The
shared willingness of stakehold
s to aim at the highest demand
scenario by reducing
investing in domestic
infrastructures, and defining local i

In short, regarding the current situation in

- the penetration of fixed lines has b - whereas mobile penetration is - Internet
penetration is

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In short, regarding demand scenarios: scenarios:

- we established three demand forecasts for

by considering three options (low, m and high); - definitely, if a cable project is

launched, stakeholders should see the high scenario as a common goal and the low scenario

as the scenario to avoid; - in the high scenario, scenario, international

bandwidth demand is almost only driven by use of broadband and Internet and mobile

Internet; - In the high scenario, Palau total demand stays below 1Gbps after 25 years.

This is why, in the technical section of

this document, we will only consider with a single fiber pair (up to 960 Gbps)

for cable systems connecting the Internet.

2.1. Current situation of demand in Palau

The current penetration rates

of the main communication services in Palau table below:

International bandwidth was calculated with

the following assumptions:

- Voice (fixed and mobile):

we assume that international voice usage is per person (incoming calls + outgoing

calls); - Dial-up: we assume that the average

bandwidth for dial-up is 5.6 kbps per sub (56 kbps with a 10% contention ratio);

rat - Residential Broadband

(BB): we assume that the average bandwidth is 64 kbps with a 5% contention ratio.

Users of Wi-Fi prepaid cards are considered broadband subscribers (and not mobile mo

Internet subscribers). - Corporate BB: approximately,

Palau has 30 Mbps of downward bandwidth demand for corporate broadband (either DSL or leased lines).

8

options (low, medium

should see the high scenario as

is almost only driven by the

Gbps after 25 years.

will only consider new systems connecting Palau and Yap to

Palau

Palau are stated in the

% 83% 4.2% 1.0%

0%

Sources : PNCC, NCC, Palau Mobile Corporation, Corp

Palau Telecom, Polyconseil estimates –

– 2011 figures

l voice usage is 2 hour per year

up is 5.6 kbps per subscriber

average bandwidth is 64 to 256 are considered to be

bandwidth demand

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2.2. Demand Demand forecasts forecasts for Palau

In this section, we e give give the the main main drivers drivers of o Low and High demand nd scenarios scenarios for for Pala

Palau. The

Medium scenario is is a a combination combination of of those those two scenarios.

Low demand scenario

Political and economic omic context context

Palau's population n growth growth is is moderate, moderate, with w an average of +0.7% p.a.

(based on UN low

demand projection for 2010-2050). 2050).

Tourism traffic remains mains flat flat at at 2011 2011 level level (100k tourists per year, , average average stay stay of of 5

5 days),

because of competition tition from from new new tourism tourism destinations.

Regulation and competition mpetition in in telecoms telecoms

In this scenario, we e assume assume that that the the mobile m operators cannot annot find find an an agreeme

agreement on

interconnection, which high strongly strongly limits limits usage usag growth.

The 3 operators all have access access to to Internet Internet connectivity through the Palau

Palau-Guam but none of

them decides to drop rop prices prices on on the the retail retail market.

m

Infrastructure and equipment equipment

The Palau-Guam Cable remains the the only only alternative al
to satellite and and wholesale wholesale price. price.

While mobile coverage erage is is good, good, wireless wireless Internet I
only covers the the main main urban urban areas

networks are only y upgraded upgraded to to Generation Generatio
2.5 (GPRS), with a a maximum maximum bandwidth bandwidth o

areas. Mobile

50 kbps per user.

of only

Palau / Yap Connectivity

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Assumptions

While fixed lines penetration stays flat at 35% of population, mobile penetration continues

to grow until 90% of the population. Dial-up users switch to broadband, but the average

maximum bandwidth is only 192 kbps per user because of high prices on the international

gateway. Fixed broadband accounts for only 10% of total population, and mobile broadband

accounts for 20% of population because of limited coverage of DSL, 3G and Wi-Fi.

International Bandwidth

Bandwidth - Low scenario Palau

100 90 80 70 60 50 40 30 20 10 0

2011 2013

2015 2017 2019

2019 2021

Fixed lines Mobile

Dial up Residential BB Mobile Internet

Corporate BB

Sources : Polyconseil Palau/Yap Business usiness Plan Plan 2011. 2011.