



International and Interstate Submarine Connectivity

FOR DISCUSSIONS WITH INDUSTRY
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1. Overview

2021 will see OAE with four high capacity, low latency, international and interstate cable systems. These will connect the four states together and allow onwards connectivity to the rest of the world via Guam. They are being built to high standards and are expected to be able to meet an exponential increase in bandwidth demand well into the next decade.

FSM will have modern international connectivity building upon the connectivity provided by the initial Hantru-1 Cable System. Expansion since the first system is the result of grant funding sought by National FSM Government from the World Bank. Improved interstate and international connectivity is a cornerstone of the 2011 National ICT and Telecommunications Policy.

A key requirement of the World Bank Funding was that the FSM National Government would implement its 2011 policy via the Telecommunications Act 2014, including establishing a market regulator (TRA), an Open Access Entity (FSMTCC) that would provide the international connectivity on an open basis to all providers, and that the telecommunications market would be opened to competition. The Open Access Entity (OAE) was established to own and operate the cable systems on behalf of the FSM Government.

OAE is not required to provide a dividend to the Government and there is no interest, repayment or other commitment to the World Bank. OAE does not need to meet any cost of capital or provide an investment return on the cable.

2. National ICT Policy Objective

The 2011 FSM National ICT and Telecommunications Policy outlined five goals for the sector. Goals one and five are relevant to pricing considerations:

1. **Equitable and Affordable Access.** Pricing should support low prices and fairness across different end customers.
5. **Open the market to New Entry and Regulatory and Legal Framework.** Pricing should support new entrants, non-discriminatory between larger firms and smaller or fixed vs mobile providers.

3. OAE Pricing objectives for Interstate and International Connectivity

The primary pricing objective for OAE is to simply cover its operational costs of maintaining and supporting the submarine cables. Specifically, OAE is not required by its shareholders to fund the capital employed or to fund a replacement cable system.

Secondary it must cover costs and price in a way as to assist the national policy objectives. Pricing should ensure (or at least not hinder) equitable access and low pricing. Pricing must also be non-discriminatory and support new entrants. This relevant as to how the differences in terms of costs and populations of each State.

Thirdly OAE wants to encourage data usage and consumption. The goals of the Digital FSM Project are to change how FSM uses ICT technology and applications to improve society as a whole. Pricing should not add unnecessary and artificial bottlenecks or constraints. This last point is important as pricing sets important signals that will be reflected through the entire communications market in FSM.

4. Proposed Core Pricing

Because OAE has been established in a unique position, needing only to recover its operating costs, it proposes a unique charging model.

No bandwidth-based charging

OAE will not charge based on bandwidth consumed. Bandwidth-based charging only serves to constrain demand and is against the goal of encouraging bandwidth consumption. OAE has many hundreds of times the current capacity demanded by the FSM telecommunications industry and faces minimal incremental costs for bandwidth over at least the next ten years. In line with Government policy, OAE wants to encourage bandwidth consumption and ensure that there are no limits to how consumers, schools, businesses and Government agencies use the internet to connect to the rest of the world.

Avoiding historical cost allocations

The cost structure for each link are a mix of costs based on historical designs and decisions. For example, some systems were not grant funded and the capital cost still needs to met (Hantru-1 link from Pohnpei to Guam). The cables connecting Chuuk and Kosrae were all paid for under grant funding which consequently have much lower operating costs. Yap on the other hand has both grant funding and an ongoing IRU cost to connect to the existing cable systems. OAE does not believe it fair to the different states to charge based on historical decisions. OAE believes that the cable costs should be combined and shared across all states. This is a much fairer outcome for all and is inline with the equitable access requirement of the National Telecommunications Policy.

Pricing based on share of revenue

OAE looked at a number of different options and proposes to charge operators based on their share of Qualifying Market Revenue.

$$\text{Operator A Interstate \& International Connectivity Charges} = \frac{\text{Operator A Qualifying Revenue}}{\text{Total Market Qualifying Revenue}} \times \text{OAE Qualifying Costs}^*$$

- Directly attributable costs to the international and interstate cable business + 50% of OAE general overheads (shared with FTTH business) + 5% contingency allowance to cover unforeseen submarine costs

Allocating the OAE costs by share of revenue is in OAE's belief the fairest way of allocating costs between the different market participants.

This allows entrants to pay based on their success and allows the existing service providers cost reductions from what they currently pay.

Qualifying revenue

OAE proposes that all telecommunications services revenue qualifies. This includes all mobile (including inbound and outbound roaming), PSTN (including inbound and outbound calling), internet (including domain name services), and any other service that uses the connectivity in some shape or form.

OAE is keen to get industry feedback on what revenues should be exempt for the industry. OAE is keen to ensure the market is healthy and does not want to place undue burden on the parts of its customers businesses that face competition from outside the telecommunications industry. An example may be the retail sales of standalone handsets or accessories (i.e. handsets sold without a contract term).

Qualifying OAE costs

OAE's relevant costs are predictable and set. They include the direct O&M charges, lease of Cable Landing Stations from, OAE's share of the Hantru-1 costs and loan payments, Network Operating Center costs for the submarine cables, other direct costs and 50% of OAE general overheads.

Including a 5% contingency charge and the completion of the EMC cable system, the total costs are expected to be approximately \$1.7m per annum¹. A new entrant that achieves 10% market share by revenue should expect to pay \$170,000 per year. The other market participants would have their costs reduce by the same amount.

At the start of each year OAE will publish its forecast Qualifying Costs for the year ahead and make any adjustments to the previous year's cost calculations.

Quarterly calculations timed to match CTA Business Gross Revenue Tax

Revenue is straight forward for OAE customers to provide. Service Providers are already obligated to provide revenue reporting to both the TRA and to CTA for Business Gross Revenue Tax.

OAE believes that the easiest process is to align reporting to determine shares with the CTA Gross Revenue Tax quarterly periods. Service providers already have to meet CTA requirements, and matching the timings provides the least additional burden.

Payments made monthly with quarterly adjustments

Service providers are to pay their expected share monthly, with adjustments made at the end of each quarter following calculation of actual qualifying revenue for each operator and actual total market revenue. Each quarter, a new monthly payment would be recalculated for each service provider based on any applicable adjustments and their new monthly forecast.

New service providers to provide forecast and pay six months expected costs up front

Before initial connectivity is provided, new service providers are to provide an 18-month revenue forecast to OAE. OAE will calculate a minimum charge based on the forecast which must be paid to OAE before connection. The minimum charge will not be refunded after six months if the forecast is not met. If the service provider exceeds the forecast amount then they will be liable for their additional share.

All forecast information received by OAE is kept strictly confidential.

¹ This is higher than OAE has reported for the past 2 years. This figure includes all costs forecast to be charged to OAE by Telecom. In previous years Telecom elected not to pass these costs onto OAE because as the sole customer it would have incurred a 5% uplift as OAE rebilled them to Telecom.

TRA supervision of the market to prevent any abuse

The qualifying revenue model relies on a functioning and competitive market as governed by the Telecommunications Act. OAE expects fair dealings by all Service Providers in reporting qualifying revenue and that they comply with all aspects of the Telecommunications Act.

OAE reserves the right to propose changes to the pricing structure to improve market fairness should issues develop. These would only be undertaken with consultation with TRA and the industry.

5. High Level Service Description

Core bandwidth services

Initially, OAE will provide 10Gbps interfaces on demand to any service provider who has signed to OAE's inter-state and international connectivity service. This may be expanded to 100Gbps services as demand builds.

Licensed service providers who;

- have signed the interstate and international connectivity agreement;
- had their 18 month forecast accepted;
- paid their forecast costs for the first six months; and
- completed their OAE onboarding processes

will be able to place orders for links to be provisioned on any of the OAE cable systems listed in table 1.

OAE will provision the links as soon as practicable. From time to time there may be delays associated with upgrading capacity and providing additional links, OAE will use best endeavors to respond as quickly as possible and on a non-discriminatory basis.

Route	Capacity
Yap – Guam	10 Gbps
Chuuk – Pohnpei	10 Gbps
Kosrae – Pohnpei*	10 Gbps
Pohnpei – Guam*	10 Gbps

* Capacity will be available once EMC cable system is commissioned 2021

Table 1 - OAE Interstate and international links

Ancillary services

Each service provider will individually be charged to configure or establish any given link. Any colocation (and associated power) charges would equally be charged on a "space" used basis. These will all be based on attributable cost + a 5% margin.

These will be covered in more detail in the future service description and service provider operations manual.

6. Future capacity constraints past 2030 and beyond

OAE expects raw internet (i.e. demand before any network-based equipment like content caches) demand to grow to a 40% per year once the new FTTH network is established and unconstrained end user demand grows.

Extrapolating this growth out based on network topology² generates the following forecast:

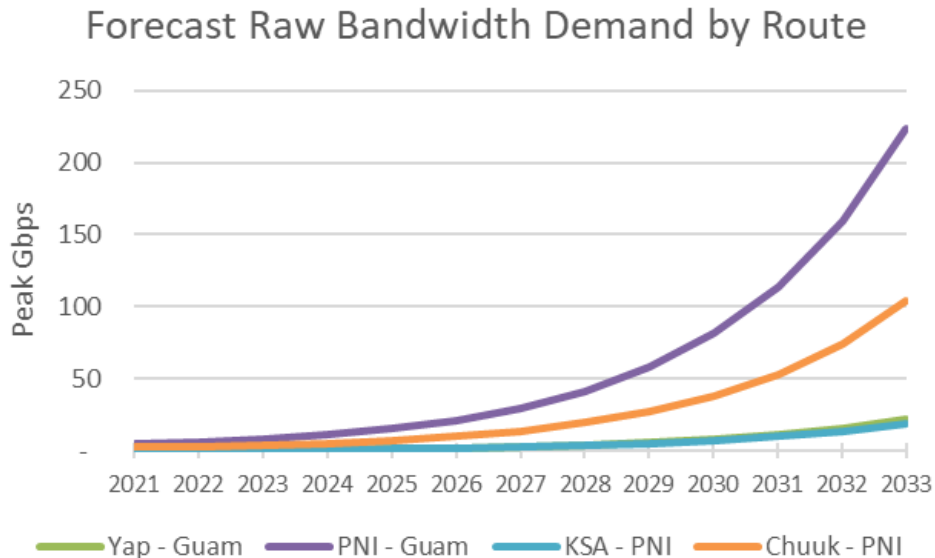


Figure 1 - FSM Raw Bandwidth Forecast

All cable systems managed / built by OAE have sufficient installed capacity to meet this forecast and as a consequence are not expected to expire for many years to come.

As the cables grow towards capacity post 2030 changes may need to be made to ensure the model is still efficient. To minimize industry costs OAE will retain a use it or lose it policy, where it can require service providers to give back circuits that are not utilized or require service providers to combine or aggregate partially used circuits. As the cable systems move towards capacity OAE will publish options and engage in customer discussions about the best way forward for the industry.

At this point in the future OAE may either request further investment from its customers, National Government or international donors to upgrade the capacity. Other viable future alternatives may include OAE moving into caching, IP transit and peering to more efficiently share the resources across the industry.

² Yap traffic goes direct to Guam directly; Pohnpei to Guam traffic includes not just Pohnpei demand but also the traffic from Chuuk and Kosrae. Graph includes all traffic generated in FSM not just what is to be carried over OAE cable systems.