Helping OAE to build, connect and maintain the network

FSMTCC

2020

Pieter Bakker - CEO

Background picture is from Kosrae showing the challenge of the coastal road
and good well-maintained aerial power infrastructure.
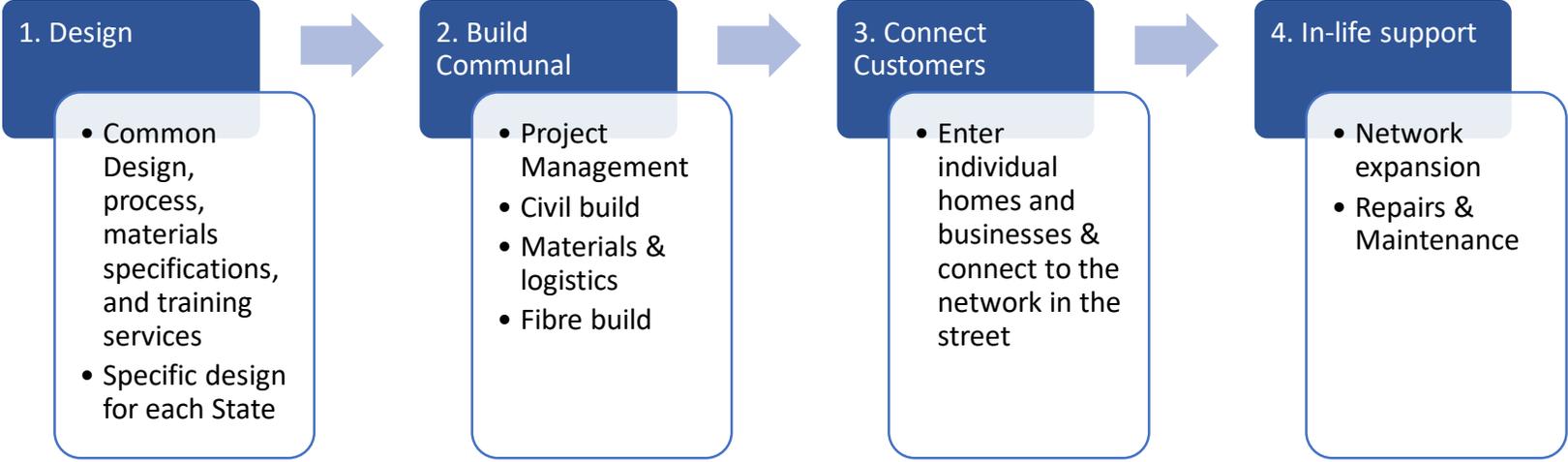
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FTTH in FSM

- OAE has to build approximately 760km of fiber network throughout FSM and connect over 7000 homes and offices to the new network.

- In total, including materials and other costs, OAE expects to spend $12m on building the communal network and connecting individual homes and offices to the network. The bulk of these costs are expected to be spent on the work outlined in this pack.

- This will make a significant change to how the internet is used across the country and enable cloud computing and advanced mobile networks.

- The project has been approved by both World Bank and Congress, funding is ready to go!

- Detailed design is about to start and then OAE will be looking to procure services to help it build and connect end customers to the network.

- The plan is to start with Yap, Pohnpei and Kosrae. Yap is scheduled to start first in early 2021 and then rollout to the remaining states through 2021 and 2022.

- The Chuuk inner lagoon is more complicated because of the different options for connecting the islands back to Weno. High level design will be confirmed in 2020. First build in Chuuk will be Tonowas where new electricity infrastructure has been built.

- More details are available from Mr Peter Garamfel, National FTTH Rollout Manager.

Building, connecting and supporting the new network will be done in phases

Focus is on the right answer for the long term operational requirements

1. Design

- Common Design, process, materials specifications, and training services
- Specific design for each State

Formal Procurement Process started April 2020

International Open RFP For Consulting Services

2. Build Communal

- Project Management
- Civil build
- Materials & logistics
- Fibre build

Formal Procurement Process to start late half of 2020

International Open RFB for Build / Plant / Goods

3. Connect Customers

- Enter individual homes and businesses & connect to the network in the street

Formal Procurement Process to start late half of 2020

4. In-life support

- Network expansion
- Repairs & Maintenance

Expected to follow 3

Internally FSM Resourced

Externally FSM resourced

4

OAE is looking for an outsourced model

- An outsourced model is preferred for both building the network and for connecting end-customers' individual premises to the network.

- This has the advantage of working with the World Bank's procurement models, allowing the connections to be paid for through the grant funds.

- This same outsource model is recommended, at least for the initial five years, for maintenance work. OAE believes that the organization that has the workforce for connecting customers will be best placed to perform day to day fault repair. The cost of this work would be funded directly through OAE's ongoing revenues from the FTTH service.

- OAE currently has no operational workforce or resources (operational vehicles / tools / processes). A third party supplier will be better placed to either leverage what they have already or bring in the required skills.

- Our preference is to find a local organization. The civil build and network build may be the same or separate companies, they also could be the same nationwide or separate for each state.

- OAE is happy to work with existing local organizations that are already in the telecommunications or utility fields, and is also keen to talk to any potential new supplier to FSM.

The new FTTH network is conceptually straightforward

Passive network means no need for electronics or network configuration in the field

- OAE is building a passive network only. It is designed to be low cost to maintain and build, with only a few key building blocks to provide fiber between the end-customer's premises and the service provider's equipment in the Central Office (commonly known as a Telephone Exchange Building).
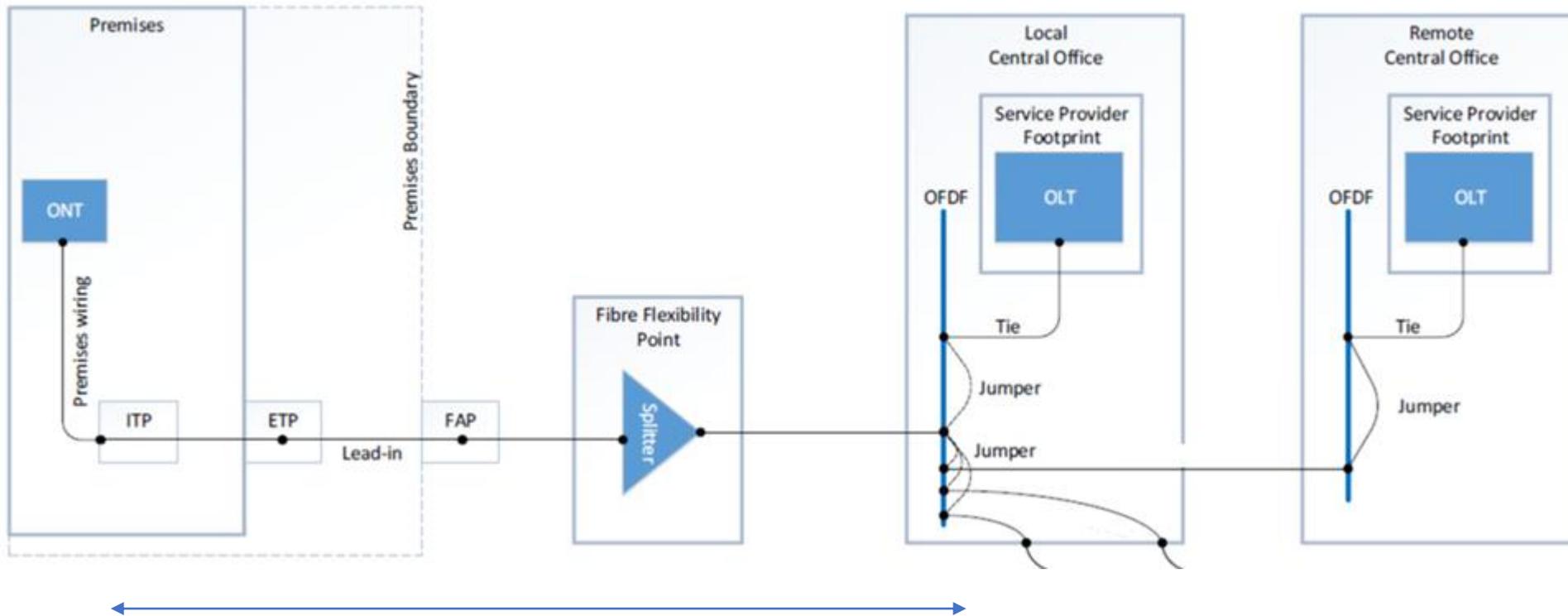
Only the items between the arrows are expected to be in the scope of OAEs business.
Retail service providers will provide equipment in the home (Optical Network Terminal - ONT) and at the telephone exchange (central office) – (Optical Line Terminal –OLT)

There are two jobs to be done

Building the Communal Network

- This is the building of the fiber network alongside the roads and on the utility poles around each state of FSM. This will be the core network that will be used to connect to each home and office.

- The communal network is to be built like a civil project. It is similar in concept to constructing a water main or an electricity network.

- OAE expects to release discrete, specified jobs for building sections of the network in each state. They will have detailed drawings and requirements.

Connecting end customers to the communal network

- This involves entering the homes and businesses of the end customer. For many end-customers they will be the face of OAE and fiber.

- Over time the work will transition from connecting customers for the first time to managing transfers and fixing faults. However the initial connection work will require considerably more time and resource than is expected for later faults, transfers and reconnections.

- Technicians will require vehicles, specialist tools and training. The skills and basic tools sets are for layer 1 fiber are similar, but not exactly the same, as skills used for copper telephony, electricity and water.

- Peak demand is expected to require a total of 12 crews of 2 people across FSM for 18 months of the busiest period, falling to 4 by 2025 to provide long term maintenance and support (2 for Pohnpei, 1 crew each for Yap and Kosrae).

Building the Communal Network

Abstract view of the FTTH Network

The Communal Network

Building the communal network involves placing the network alongside the roads and on the utility poles around each state of FSM. The network consists cables, ducts and break out points.

The network may be above ground using existing utility poles or underground using microducts or traditional conduit. Both methods are robust and provide rapid deployment.
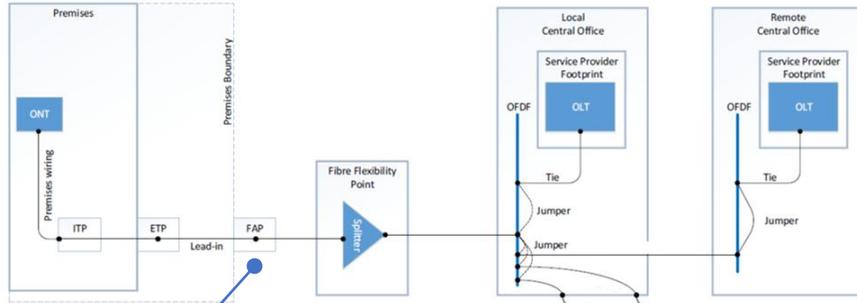
Underground using microducts, rapid trenching and leaving a tube by each boundary for connection later.

Aerial using utility poles, non-metallic fiber and a connectorized terminal box on each pole for where connection is required later.

Underground

Aerial

Fiber Access Terminal
One every km or 48 premises
Below ground

Fiber Flexibility Point – one for every 288 premises
Above ground

Main Optical Fiber Distribution Frame at Central Office (Telephone Exchange). One every 20kms

The Communal Network is more like a civil project

Building the Communal Network

- The work is required in roads or on utility poles and so should require little private property engagement or process.

- Assumption is that permissions are granted at the State and Municipal Level. OAE anticipates a significant community education program to create awareness of the construction work.

- The communal program is assumed to be more like a normal civil works project.

- OAE will supply the key materials and detailed designs. It is looking for civil contractors who can build and deploy the underground network / aerial network based on its designs.

- OAE expects the contract commercials to be based on volume driven factors.
  - For example the distance, the number of poles, number of breakouts (poles where terminal boxes need to be affixed for customer connections for aerial, or the number of times a microduct needs to be allowed for access to a property), the surface type (for underground), the number of FFPs that need to be built.

- There may be specialist skills / machinery that need to be brought in (example Microtrenching or Bucket trucks). OAE is interested in discussing how this could be supported where required.

Connecting end customers to the network

Abstract view of the FTTH Network

Connecting end customers

This is the work of getting the network into each individual home or office. Either underground or aerial. The work tasks are not high skilled but do require training and the right equipment.
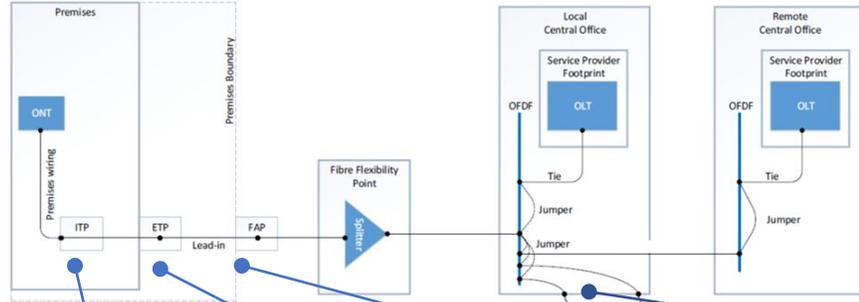
Fiber Access Terminal
One every km or 48 premises
Below ground

Internal building fiber to connect from external termination point to an internal termination point. This is where the service providers ONT plugs into the fiber.

External termination point. Provides a weather tight seal between the internal and external cabling.

Underground Boundary Market for airblown fiber. This is connected to a microduct to the home.

Connecting the individual fiber to the correct splitter for the correct service provider. At the Fiber Flexibility Point. This allows the customer to choose different service providers.

Fiber will need to be jointed at the Fiber Access Terminal

Underground

Aerial

Aerial Terminal for connectorized fiber to connect to the home from the pole.

Assumption is that fusion splices will be required at the ITP, ETP and FAT. Technicians will need fusion splicing equipment and if underground is used, then airblowing equipment and training.

Connecting customers is about managing supply to meet demand

Demand is expected to build quickly

- Demand will ramp up as people start to experience the new network and recommend it to their friends. Demand will go from zero to being unable to keep up in as quick as six months.

- Connecting customers to the network is expected to take a crew of 2 people about half a day per premise. The challenge is that OAE will need trained crews ready to connect customers, while service providers still are setting up their operational processes and offers. Ideally service providers and crews are ready at the same time, but this is difficult to guarantee. Often service providers need confidence everything will work before they start which means a lag in supply and demand.

- Graphs below show*, how for each state, the number of crews (represented by the red dashed line) have to be increased, and eventually decreased to match demand with supply. The maximum number of crews expected across the three states modelled is 12; a peak of 8 crews in Pohnpei, and a peak of 2 each in Yap and Kosrae.
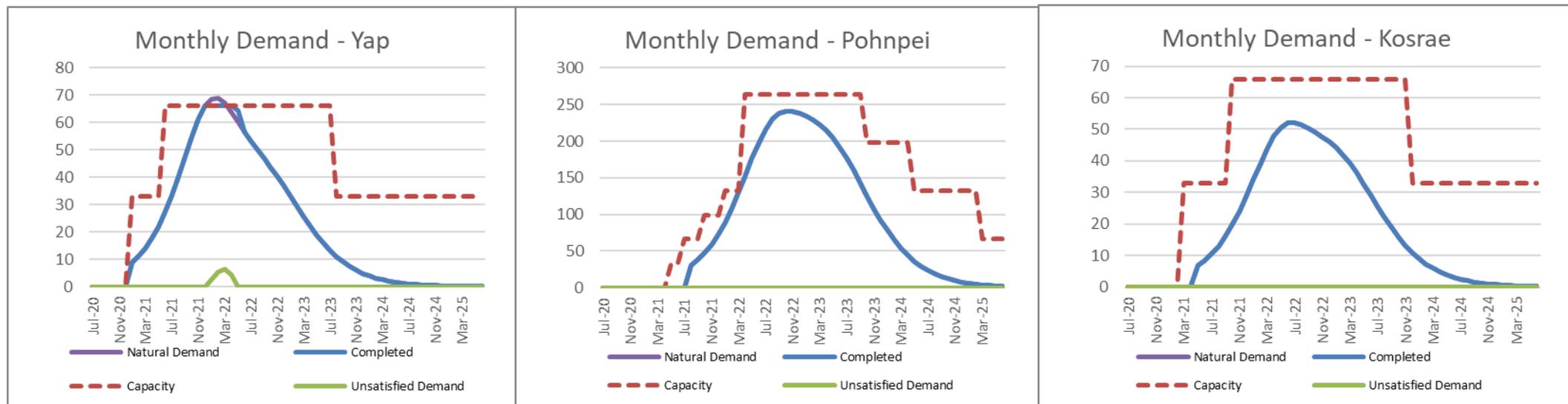
*Note dates assume December 2020 commencement in Yap, and service providers ready to go at the start.

# Over the longer term, a more reliable network will need less crews

Less field crews are needed in the long term

- Demand for connecting to the network means a growth in the number of field crews needed, but the expected reliability of the fiber network means that less staff are required in the long term.

- Long term modelling suggests that all that will be required is a minimum crew of two in each of Kosrae and Yap. Pohnpei may require two crews largely just to cover the larger area. These small teams would cover any other ancillary work such as customer moves adds and changes work.

However fault rates for fiber in FSM are still unknown

- Global experience is that FTTH networks have significantly less fault issues than copper networks.

- Actual fault experience will be a factor of the underlying technology (fiber is not affected by water in the same way that copper is) and a factor of how the network is constructed and how it is used.

- OAE expects that the network should perform close to global experience.

Forecast New Connection Volumes vs Forecast Fault Volumes
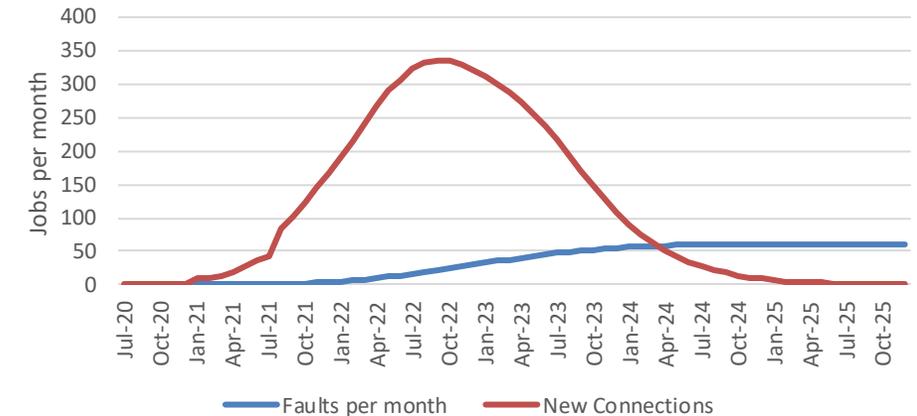
With a crew of two being able to fix 3 faults per day, one or two crews could cover all of the FSM.

However a minimum staffing level will be required in each State to retain capability and deal with unexpected events.

Getting this balance right in the long term will be a key risk to manage.

Timeline

- Currently OAE is contracting for design work. This will help OAE make the wider trade-offs between how much overhead vs underground and start the contracting for material supply (cables, enclosures etc).

- The design company will provide process documentations, specifics on tools and how-to guides that will form a key component of the bidding documents.

- Expect to be ready with high level designs and details in early 2021 for work to commence in the new year.