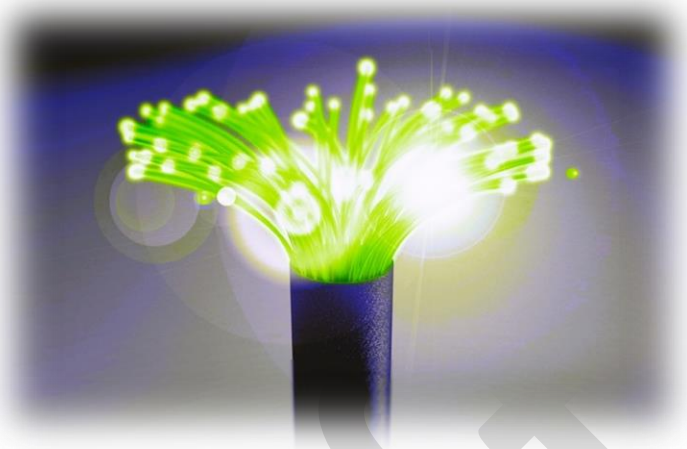

# Fort Bragg Digital Infrastructure Project

***An Approach to Implement High-Speed Internet for The City of Fort Bragg***

FORT BRAGG

CALIFORNIA

**November 2024**

***DRAFT***

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# EXECUTIVE SUMMARY

The purpose of this document is to provide the City of Fort Bragg (CFB) with an overview of a Digital Infrastructure Project and financial information, which includes:

1. the total estimated cost to build the Fiber to the Premise (FTTP) broadband network;
2. a partnership with the State of California Department of Technology (CDT), Middle-Mile Broadband Initiative (MMBI);
3. a path for operating and servicing customers over the network through the acquisition of Mendocino Community Network (MCN); and
4. a Pro-forma of the cost to build and operate the network.

An assessment of the broadband availability from the City's 2021 feasibility study found there are four primary Internet service providers that are providing service over cable TV systems, copper cable DSL, fixed wireless, dial-up, and satellite Internet. The two largest providers of Internet services are AT&T and Comcast, mostly in the more business concentrated areas in the city. Sonic has come into Mendocino County, offering high-speed Internet services using AT&T Unbundled Network Elements (UNE), i.e., using leased aged AT&T copper cable pair infrastructure. In addition to these three providers, several smaller fixed wireless Internet Service Providers, including North Coast Internet, and Mendocino Community Network (MCN) are present; however, all these providers cannot, or will not, scale a robust network to all premises with a fiber optic cable delivered system. It is public knowledge that consumers are unhappy with current high-speed Internet providers, both from speed and service issues, and little can be done to motivate incumbent carriers to address the issues by deploying underground fiber infrastructure to all.

The value of a municipal broadband utility for the City of Fort Bragg cannot be overstressed. As a public utility, the City will offer faster internet speeds, while reducing costs and improving reliability. However, access equitable internet connectivity is not the only benefit. The City's strategic investment today will help foster long-term growth and ensure all residents have the opportunity to participate in the digital age. Forthcoming technologies are expected in the next few years, all of which require greater bandwidth than what traditional service provider technology can generate.

This plan provides the costs of building a fiber-to-the-premise (FTTP) network passing by every home and business within the city limits. The network is designed to offer customers fiber-based technology with speeds from 1-10 Gbps at or near current incumbent pricing. Furthermore, this project positions the City for future digital service offerings such as Digital Signage, Kiosks, Public Wi-Fi, Electric Car Charging Station Smart Displays, and more.

The result of this analysis provides the anticipated cost of owning and operating a fiber network capable of providing much needed affordable broadband services to its residence and business customers.

# INTRODUCTION

## IMPLEMENTATION OF THE DIGITAL INFRASTRUCTURE PROJECT

Recommended stated goal of the ***City of Fort Bragg*** is to:

> "Provide a digital infrastructure for affordable high-speed Internet access for 100% of households and businesses by 2026."
>
> *High-speed Internet, for the purposes of this project is defined as gigabit service (1-10 Gbps or higher). This is an ambitious goal, but critical for the economic future of Fort Bragg and through advancements in technology, it is possible.*

The ***Project*** has three objectives:

1) Construct and **Deploy High Speed Internet over Fiber Optic Cable** in the City of Fort Bragg

2) **Operate a High-Speed Internet** fiber optic infrastructure to support local residence and businesses, as well as local government

3) **Improve Resiliency and Redundancy** in Digital Infrastructure Systems by eliminating prolonged Internet outages. This project will be coordinated with the State of California Department of Technology (CDT) - Middle-Mile Broadband Initiative, which provides a much-needed redundant path for backhaul out of Fort Bragg.

When this project is completed, residents and businesses will have broadband access at 21st century gigabit speeds. There will also be a technologically advanced, robust, and diverse fiber-based infrastructure around the city for regional benefit.

# PART 1 – COST TO BUILD INFRASTRUCTURE

## PROJECT OVERVIEW

**Low-level Design:** Palnies and its partners planned, and performed, a low-level designed project for implementation, as part of this ***City of Fort Bragg Digital Infrastructure Plan 2021.*** The Palnies team collaborated with NetFabric (a Juniper reseller), ADTRAN, Calix, Cisco, Juniper, and Thermobond Shelters on the project.

**Targeted Households/Businesses:** The citywide project is targeted to reach approximately 4017 homes/business addresses. Specifically, residences comprise 3496 locations, while businesses comprise 521 locations. Assumptions include a 63% take rate, serving 2,866 customers.

**Network Architecture:** The approach is to bring between to 1 – 10 Gbps Internet connectivity to all homes, businesses, towers, and anchor institutions via a robust underground last-mile fiber distribution system. The project has seven main infrastructure components – 1) Last-Mile Distribution Systems, including Data Center, PMO, and the CDT-MMBI middle-mile build along Hwy 1, 2) Core Optical Line Termination Electronics (OLT), 3) Optical Network Termination (ONT), 4) Vehicles, 5) Fiber to the Premise Drops, 6) Operating Support Systems, and 7) /IPv4 addresses.

**Estimated Capital Cost:** The estimated cost is **$14,617,010**.

**Deployment Schedules:** The deployment schedule for this project is driven by a tight funding timeline. Federal Funding Account (FFA) grant funds have an 18-month window, with the start date of December 1st, 2024, and a final completion date between July 1st, 2026 (an extension might be available to December 2026). Construction will take an "inside out" approach, working from a centralized Data Center toward outlying areas. Drops will be an ongoing process until targeted premises are connected. Multiple construction crews will be needed to meet funding deadline.

## PROJECT PLANNING ASSUMPTIONS

The following are the key assumptions that guided the team in developing the City's Digital Infrastructure Project 2024-2026:

- One hundred percent (100%) of the households and businesses (4017) are to be passed[1] via underground conduit and fiber. Underground fiber design is to preserve and "future proof" the infrastructure during severe storms, wildfires, and other unforeseen disasters. According to an assessment by Magellan Advisors for Napa

[1] Passed defined as fiber infrastructure in front of each premise; service drops to be placed upon request

County, 30 percent of the telecommunications infrastructure was damaged by the 2017 wildfires. The underground infrastructure was not damaged.[2]

- Project will use low-cost Internet backhaul provided by CDT- MMBI, the statewide Internet Access Network, with a diverse path to AT&T and/or Comcast to connect end-users with the world-wide Internet.
- The fiber optic cable approach in this project is to provide capabilities for 4017 potential customers with an anticipated business model of 63% take rate or 2866 customers up to 10 Gbps Internet connectivity to all households, large and small businesses, and anchor institutions in the city limits. Additionally, this network upon request can provide access to Internet backhaul for WISP's and Cellular providers that desire to utilize CFB last-mile network.
- The host Data Center will be a prefabricated hut located at C.V. Starr, 300 South Lincoln Street, Fort Bragg, and will be equipped with Core Routers, Optical Line Terminal (OLT) XGSPON with 10 Gig line cards, Fiber-Optic patch panels, local splitter modules, backup power with emergency standby generator, HVAC, and fire suppression equipment. The Data Center location will have diverse dual entrance conduits connected to CDT-MMBI and AT&T or Comcast backhaul services.
- Network has been designed to facilitate growth and future technological advancements. This will position the City to grow its network beyond the city limits if desired.

# BROADBAND NETWORK OVERVIEW

## Network Architecture

The approach for City is to provide up to 10 Gbps Internet and voice connectivity to all homes, businesses, towers, and other institutions via a robust underground last-mile fiber distribution system. The city will design & engineer, build, and maintain the entire network infrastructure by providing all the necessary equipment to light the last-mile network.

Through partners (fiber cable manufacturers, electronic equipment providers), the City network utilizes a passive optical network (XGS-PON) design for residential and small business, and some Active Ethernet (dedicated fibers from data center to their location) for larger businesses.

The network will have a centralized data center hut located at the C.V. Starr Center, 300 South Lincoln Street, that will host Internet electronics equipment connecting to 15 Distribution Areas (DA's) equipped with XGS-PON splitter vaults l throughout the city.

[2] http://www.mendocinobroadband.org/wp-content/uploads/Napa-County-Fiber-Infrastructure-Engineering-Assessment-Report.pdf

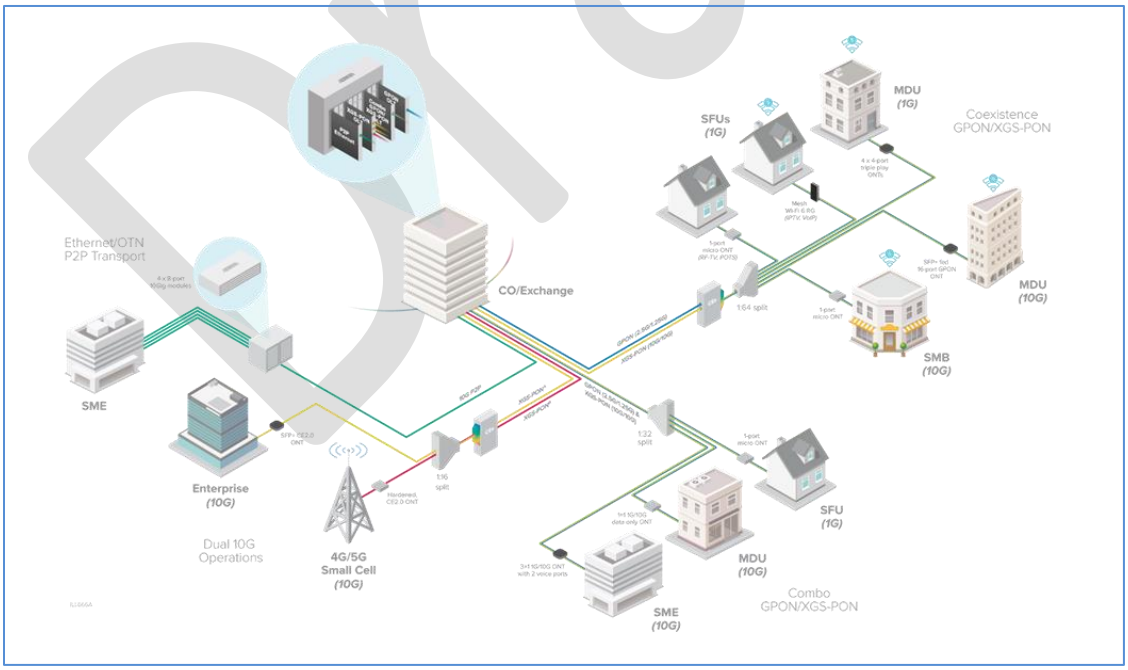
The data center hut will be supplied with Core Routing, Firewall, Maintenance switches, and Optical Line Terminal equipment (OLT). The data center hut will have four-hours of back-up power via batteries and further supported by a 35-kw standby emergency generator and fuel in the event of prolonged power outage.

Underground conduit and fiber will extend out to the 15 DA's for distribution to homes and businesses and will be designed with underground passive splitter vaults that will be placed throughout the community; the size of the vaults will be based upon on the number of premises within each distribution area. In each location, there will be an underground passive XGS-PON 32:1 splitter in the vault[3]. These DA locations we will serve as the aggregated fiber locations where conduit, fiber cable, and fiber distribution terminals (splitters) serving each residence/business locations. The vaults will look similar to what incumbent communications providers already have within the city ROW.

At each DA location, construction crews will place underground conduit and fiber cable connected from the DA vault to a Main Fiber Service terminal (MST flowerpot)[4] connection point at or near current premise utilities entrance point. Fiber drops will be direct buried and installed by technicians upon service request.

Extra conduit has been designed to the north, south, east, and west to facilitate future growth opportunities. See Figure 1 – Basic High-Level Network Architecture.

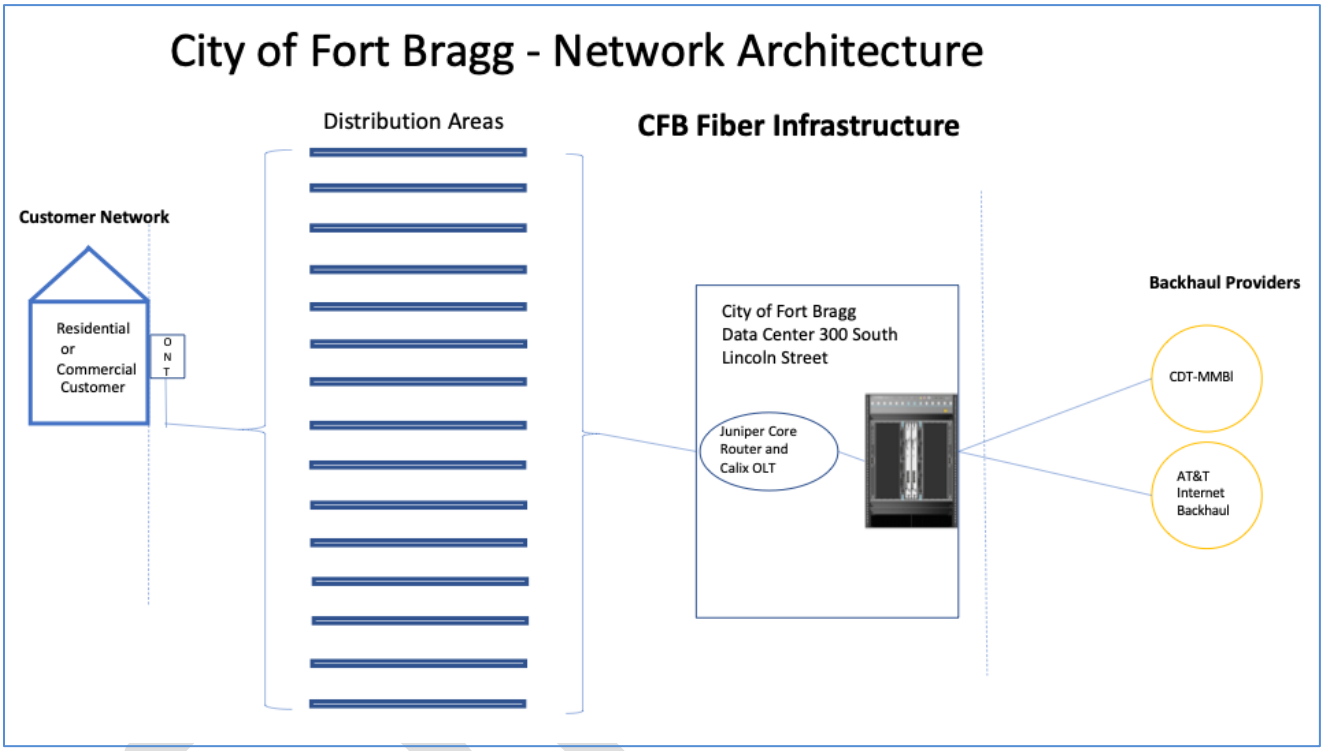
*Figure 1: Basic Industry High-Level Network Architecture (Cite: Walker and Associates)*




[3] The passive splitter vault do not require power as there are no electronics, just fiber splitters.
[4] A flowerpot is where the technicians splices drop wire that runs up to a home or business to bring lightning-fast fiber internet.

The CFB network architecture is based upon the same design concepts found in existing, larger city designs. Below is the proposed network architecture and design for the CFB. This architecture is easily expanded for future growth of the city both in available fiber, conduit, and See Figure 2 City of Fort Bragg Network Architecture.

*Figure 2: City of Fort Bragg Network Architecture*




## OUTSIDE PLANT (OSP) DESIGN RESULTS

### Design and Distribution Areas:

The Outside Pant design describes the total number of passive vaults and their location, and the footage for conduit and fiber, which include an additional 10% of extra conduit and cable to address the unforeseen and provide fiber cable slack for restoration in the event of cable cuts. If a cable is severed, normally through heavy equipment damage, the slack loops allow technicians to pull slack from splice points and then re-splice cable, thus restoring service faster. Additionally, the design includes a list of known passive materials such as, passive vaults (no electronics), splice enclosures, hand-holes, splitters, flowerpots, fiber main service terminals, drop wire and termination. In total the design identified 222,423 linear feet of underground drilling capable of serving 4017 structures. The structures include residences, business, Multi-Dwelling

Units (MDU), and Multi-Tennant Unit (MTU) locations. For the purpose of this document the low-level design amounts should be considered accurate for this phase of the project.

## Construction Method

The anticipated method of construction will be Underground Directional Drilling, or commonly referred to as Horizontal Directional Drilling (HDD). Directional drilling is a trenchless process typically used for underground utilities placement of conduit, and or cables, in a shallow arc or radius along a prescribed underground path using a surface-launched drilling machine. Directional drilling offers significant environmental advantages over traditional cut and cover pipeline/utility installations. The technique is routinely used when conventional trenching is not practical or when minimal surface disturbance is required. Traditional trenching might be required in some areas, or possibly backhoe excavation. The project crosses two major waterways, the Noyo River and Pudding Creek. The design calls for State of California Department of Technology - MMBI to attach conduit on the side of bridges, under guardrails consistent with Caltrans permitting requirements. This effort is currently underway by Caltrans.

## Construction Permits and Traffic Control Plans

The design team has identified construction permits and traffic control plans that are required from Caltrans DOT, Mendocino County DOT, the Railroad, and the City of Fort Bragg. Caltrans DOT permits are required for anything along Hwy 1 including Pudding Creek, and the Noya River bridge crossings, and will be pulled by Caltrans contractor. Once project is approved, funded, then the chosen contractor will use these identified construction permits and traffic control plans to complete construction.

## Infrastructure Cost, and Deployment Schedule

**Infrastructure Cost:** The City's Municipal Broadband Utility project, is estimated to cost **$14,617,010** to implement. The capital expenses are defined in the table below:

*Table 1 – Infrastructure Costs*

| Infrastructure Costs | | |
|---|---|---|
| Item | Description | Cost |
| Last Mile Distribution System | Data Center Hut, Project Management, MMBI joint build with CDT along Main St | $ 10,736,132,000 |
| Core Optical Line Termination (OLT) Electronics | | $ 791,763 |

| | | |
|---|---|---|
| Optical Network Termination (ONT) Electronics * | | $1,278,685 |
| Vehicles | | $290,400 |
| Fiber to the Premise Drops * | 2812 customers | $1,215,327 |
| Operating Support Systems IPv4 | | $304,702 |
| | **Total Estimated Cost** | **$14, 617,010** |

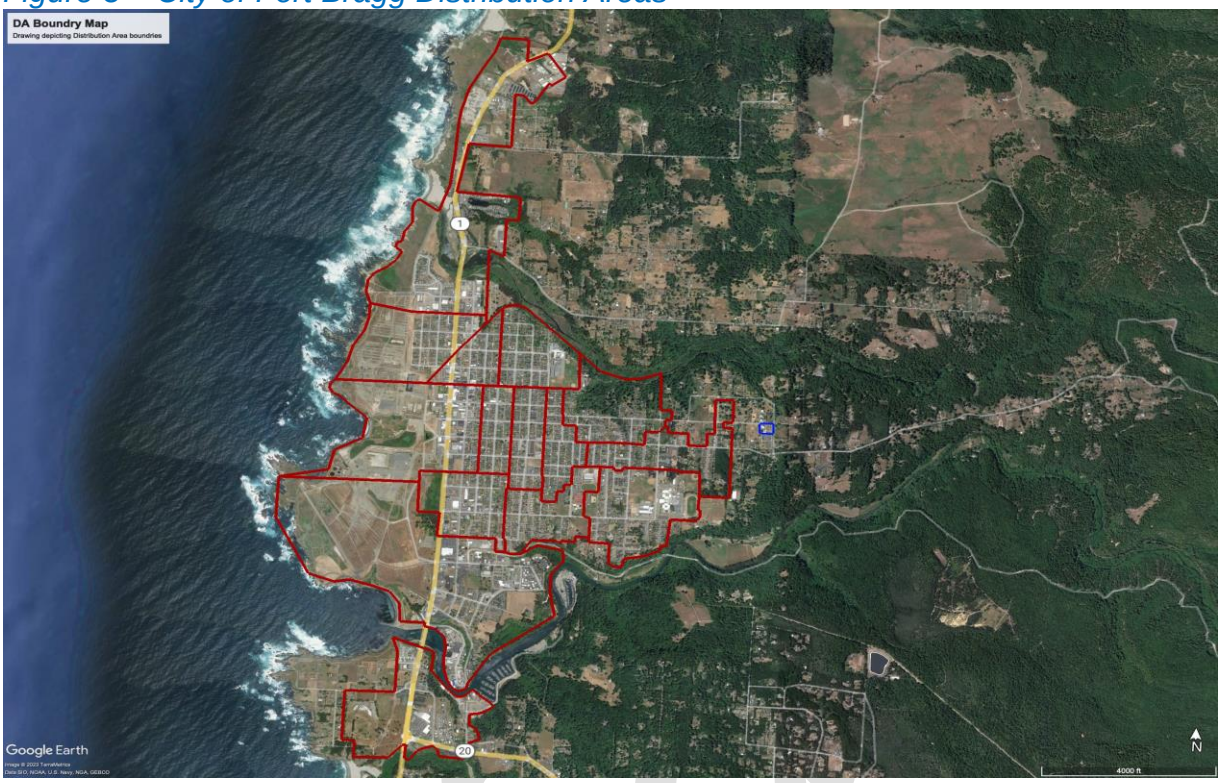
*Note: fiber to the premise drops and ONT electronics will be deployed when request for service activation occurs. .

**Infrastructure Deployment Schedule:** The build out schedule is dependent upon a few factors of which some, but not all, are the results from low-level engineering and include material availability, construction crew availability, permits, and weather. Expect timing to be determined based upon funding availability from the city (grants, debt). Construction work should follow an "inside-out" strategy, working from downtown are (data center hut) towards the outlying areas, and based upon construction crew productivity. Construction is estimated that 82 weeks will be required to complete infrastructure, while drops will be an ongoing process until targeted premises are connected. As DA segments are completed a separate "drops crew" (CFB employees or contracted labor) will follow "construction crew" installing fiber drops and Optical Network Terminal (ONT) with Residential Gateway (RG/Wi-Fi) from distribution cables and Main Service Terminal (MST). A technician will complete required in-premise wiring and place ONT/RG required for service activation; this service activation process is dependent upon and managed through the service activation process.

## Design and Build Methodology

The methodology used by the team was to gather pertinent information through a process called "fielding" for the purpose of determining the number of residence and business location counts, city limit boundary, street maps, location of main electronics hub (data center), and type of network to be designed (XGS-PON with 32:1 split) for the Outside Plant (OSP) portion. This data was manual collected by walking out network in May and June 2023 then placed into Google Earth Pro for low-level design, QGIS for inventory process and parcel conversion, and then AutoCAD for the completion of the low-level design. Design engineers then broke the city into manageable and technically feasible parts, titled Distribution Areas (DA's). See Figure 3– City of Fort Bragg Distribution Areas.

*Figure 3 – City of Fort Bragg Distribution Areas*




In total 15 passive vaults would be placed in DA's, one vault per DA. These 15 DA vaults are sized to facilitate future growth, include a conduit and fiber back to the Data Center, and house a 32:1 splitter tray (e.g., 1 fiber for every 32 customers) that connect individual locations (residence/business). See Figure 4 – Fort Bragg Distribution Areas and Vault Locations.

*Figure 4 – City of Fort Bragg Distribution Areas and Vault Locations*

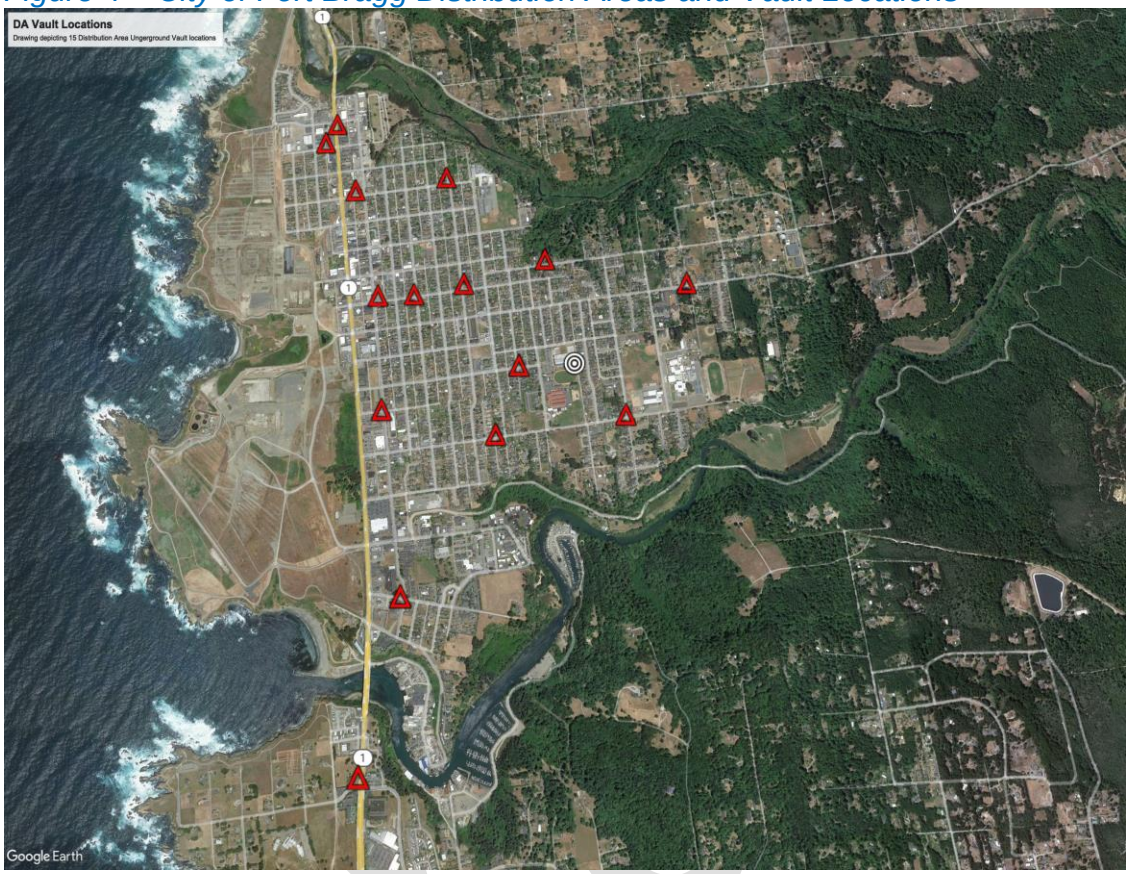



*Figure 5 – Example of Universal Fiber Distribution Hub (UFDH) in vault*

Once the main design criteria was established, the team designed the conduit layout along streets/alleys ensuring the ability to serve structures on both side of the street/alley. Cable sizes and footages were factored into the design for growth, as were the MST subscriber terminals, and splice locations. This effort completes the optical lighted path from the Data Center to the front of each structure (home or business). See Table 2 – Distribution Area Sizing, and Vault Locations.

*Table 2 – Distribution Area Sizing, and Vault Location*

| City of Fort Bragg Distribution Passings and Location Per DA | | |
|---|---|---|
| **Distribution Area** | **Passings** | **Vault Location (V&H Coordinates)** |
| DA001 | 214 | 39.443649, -123.794394 |
| DA002 | 221 | 39.439073, -123.796713 |
| DA003 | 245 | 39.443045, -123.799285 |
| DA004 | 231 | 39.442887, -123.802202 |
| DA005 | 306 | 39.443075, -123.804336 |
| DA006 | 205 | 39.448138, -123.799569 |
| DA007 | 215 | 39.448123, -123.805074 |
| DA008 | 201 | 39.450629, -123.806560 |
| DA009 | 225 | 39.451484, -123.805769 |
| DA010 | 222 | 39.451484, -123.805769 |
| DA011 | 243 | 39.436307, -123.791073 |
| DA012 | 207 | 39.436274, -123.798502 |
| DA013 | 351 | 39.438037, -123.804708 |
| DA014 | 634 | 39.430302, -123.804635 |
| DA015 | 297 | 39.423823, -123.807665 |
| **Totals** | 4017 | |

## Quantities and sizes for Conduit, Fiber, Passive Materials, Data Center Hut, Middle-Mile, and PMO

### Conduit:

Conduit costs include both the materials and labor required to place the base infrastructure. This encompasses both Feeder Cable 1 (F1) conduit and Distribution Cable for DA's conduit down streets/alleys, as well as the crossings necessary to transition from one side of the street/alley to the other. The total conduit needed to complete the design is 222,423 feet. The design calls for HDPE SDR11 type conduit, each conduit at a diameter of 1.25 or 2-inch, for base infrastructure completion of this project, and a third 2.0 - inch conduit for future unknown needs.

Unknown needs for additional conduit could involve future city projects or wholesale revenue opportunities, and although not contemplated in this model, could be considered as a future revenue stream. Another benefit for placing additional conduit during construction provides for the city to preserve surface streets by avoiding disruption to street infrastructure and traffic impacts at a later date. The conduit will be placed at specified depths and will include high strength mule tape to pull fiber, and a separate wire for cable locating.

**Fiber Sizes:**

Once conduit and other passive material is installed, fiber and toneable electrical wire will be pulled into conduit using the high strength mule tape. There are seven different sizes of cable ranging from 24 fiber count to 288 fiber count. All fiber is loose tube (some being connectorized to minimize splicing costs) Single Mode 28 (SMF28). As with conduit, the fiber has a 10% increase in length to facilitate the unforeseen and provide slack loops for future growth and maintenance issues.

**Passive Materials:**

During the placement of conduit and fiber there are four different types of passive material placed that complete the infrastructure, they are: 1) Passive Vaults, 2) Main Service Terminals (MST), 3) Hand-Holes, and 4) Splice Cases. The passive material serves as installation and maintenance connection locations for conduit, fiber cables, and subscriber drops. The passive materials are environmentally safe and protect infrastructure below ground.

**Data Center Hut:**

The Data Center Hut will support the electronics equipment that provide the Internet service. The location identified is on an existing but unused concrete pad at the rear of the CV Starr Center, 300 South Lincoln Street. The Hut will be a 10’ (w) x 16’ (l) x 9’ (h) concrete shelter and is equipped with 4-hour backup batteries, emergency standby generator power, AC/DC rectifiers, and cable/relay racks which will be earthquake zone 4 rated. Additionally, the hut will have site modifications provided by the city (costs estimated in this study), including a 4-ohm or less ground ring around the perimeter of hut, and will be connected to the master ground bar located within the hut. Thermobond is the manufacturer of the Hut and is responsible to place the Hut on the existing concrete pad including supplying the crane to lift and place on the pad.

The hut will come equipped with fire suppression equipment (not water sprinklers). Lastly, there will be a need to install separate conduit entrance paths to facilitate outside fiber conduits/cables, both distribution and backhaul conduits. A 200 Amp electrical panel with breakers will be placed in the hut, supporting two redundant HVAC units, ancillary A/C distribution, and power to the DC rectifiers.

The site will have a 35-kw emergency standby generator with transfer switch sufficient to provide power for a minimum of 8 hours in the event of a prolonged power outage.

The City will be responsible for all Hut site preparation that includes the 4 Ohm ground ring around the concrete pad, existing fence removal if required, and as standard operating procedures and at the direction off the Director of Public Works, a second generator plug will be installed in the event primary generator fails. See Figure 6 – City of Fort Bragg Data Center Hut Location, and Figure 7 – Data Center Hut Example.

*Figure 6 – City of Fort Bragg Data Center Hut Location*

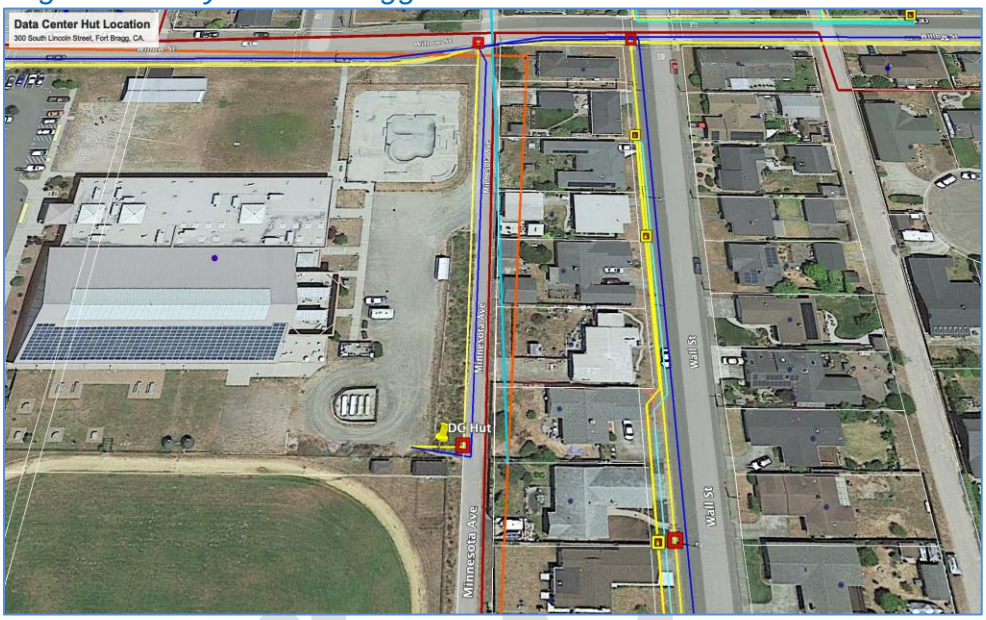



*Figure 7 – Data Center Hut Example*

## MMBI Middle Mile

Conduit placement performed by Caltrans on behalf of MMBI is estimated at 21,120 feet at a contract price of **$1,395,000**. This is an estimate of footage. At this stage, a true up will be undertaken once work is completed per final agreement. The route CDT will install CBT conduit is from the intersection of Hwy 20/Hwy 1 and will run 4 miles to the northern City Limit boundary. CFB will be responsible to pay CDT annual fees for maintenance and other operational functions, such as cable locates and emergency restoration.

## Project Management Office (PMO)

A project of this size will require a Project Management Office (PMO) to manage the undertaking. For the purpose of this analysis, we are including the cost of a separate PMO entity. The roles within this entity are Project Construction Managers, Construction Inspectors, and Accounting; typically, there is a legal component to this project, but for the purpose of this project we are assuming all contracts involved would be administered by current city outsourced legal staff.

Assumptions – Project Manager, Inspectors, and Accountant to be hired for the project full-time for the duration of project. The plan is to outsource the hiring of the PMO staff employees during the construction phase to manage the construction service provider contract. PM would be single point of contact within the city and will assist in PUC progress reporting necessary for grant reimbursement. See Table 3 - OSP Construction Deployment Schedule below.

*Table 3 - Outside Plant Construction Schedule*

| OSP Construction Deployment Schedule | | | | | |
|---|---|---|---|---|---|
| Total Feet of Construction | Allowed Workdays Per Week | UG Production Per Crew Week (ft.) | Quantity of UG Crews | Overall Weekly Production | Estimated Construction Weeks |
| 222,423 | 5 | 900 | 3 | 2700 | 82 |

## Total Outside Plant Infrastructure

The total cost for the Outside Plant Infrastructure, construction material, and labor cost total **$10,736,142**; this figure equates to $48.27 per foot/$2673 per 4017 passing's. Total does not include low-level engineering costs which were paid through the State PUC Local Agency Technology Assistance (LATA), program. There are two sections along Hwy 1 the city will jointly build with the California Department of Technology - MMBI project, which was, among other things, formulated to work with cities in an effort to extend high-speed Internet connections to rural areas of California. The breakdown of labor and material cost is below

*Table 4 - Outside Plant Construction Costs*

| Total Outside Plant Last-Mile Infrastructure Costs | | | |
|---|---|---|---|
| **Fort Bragg Last-Mile FTTP Infrastructure Costs** | **Material Cost (Conduit, Fiber, Hut, MMBI Material)** | **Labor Cost (Conduit, Fiber, Hut, MMBI, and PMO Labor)** | **Total Outside Plant Last-Mile Infrastructure Costs** |
| Total | $ 1,451,723 | $ 9,284,409 | $ 10,736,132 |
| Total Feet | 222,423 | | |
| Total Passings | 4017 | | |
| Avg. Cost/Foot | $ 6.53 | $ 41.74 | $ 48.27 |
| Avg. Cost/Passing | $ 361 | $ 2,311 | $ 2,673 |

## ELECTRONICS DESIGN FOR DATA CENTER

The electronics design incorporates two functions: 1) Core Routing and associated devices, and 2) Optical Line Termination (OLT), both to be installed in the Data Center Hut. Optical Network Termination (ONT), to be discussed later. Each of these functions provide the lighted path from the end-user to the Internet.

### Core Routing and Associated Devices:

For this design, the team solicited pricing for the Core Routers, High-Speed Switching Devices, Firewall/Security, and a Maintenance Switch from Juniper and Cisco. The Juniper platform is chosen due to pricing, functionality, and scalability.

The function of the Core Router and associated equipment is to take the aggregated signals from the OLT, provide security/firewall, Carrier Grade NAT (CGNAT), IP addresses, and Border Gateway Protocol (BGP), which allows for signals to be divided between one or more backhaul providers or peering with cloud-based service providers such as Netflix, Amazon, Google. Additionally, the Core Router and associated equipment will provide maintenance access ports for local and out of area network support centers.

**Juniper Networks MX304** - Universal Routing Platform is a cloud-era platform that cost effectively addresses the evolutionary edge and metro Ethernet needs of service providers, mobile operators, web-scale operators, and multiple-service operators (MSOs). Offering ultra-high-density 10GbE, 25GbE, 40GbE, 50GbE, 100GbE, and 400GbE connectivity in a space- and power-optimized package, the MX304 delivers 4.8 Tbps of throughput in just two rack units (RU), providing unmatched edge router density and performance while consuming just 0.3 W/Gb of throughput.

*Figure 8 - Juniper MX 304*

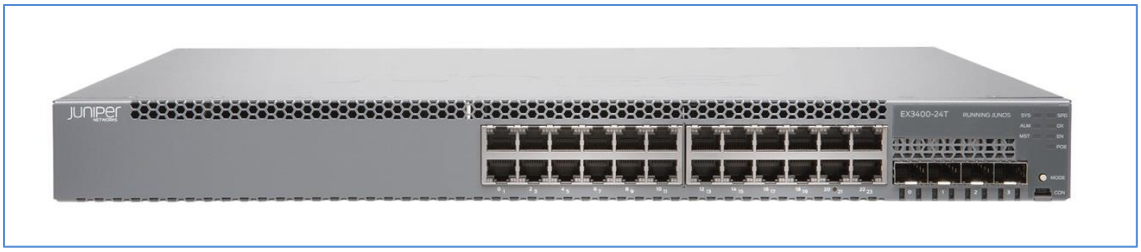
**Juniper SRX2300 -** Provides cost-effective firewall and security in a small 1 RU form factor. Purpose built to protect network environments and provide Internet Mix (IMIX) firewall throughput of up to 400 Gbps, the SRX2300 incorporates multiple security services and networking functions on top of Junos OS. Best-in-class security and advanced threat mitigation capabilities on the SRX2300 are offered as 33 Gbps of next-generation firewall, 45.4 Gbps of intrusion prevention system (IPS), and up to 44 Gbps of IPsec VPN in the data center, enterprise campus, and regional headquarters deployments with IMIX traffic patterns.

*Figure 9 - Juniper SRX2300-DC Maintenance Router 24 Port*

**Juniper Networks EX3400 -** Ethernet Switch delivers a high-performance, flexible, and cost-effective solution for today's most demanding converged data, voice, and video enterprise access environments. The EX3400 supports Juniper Networks Virtual Chassis technology, allowing up to 10 switches to be interconnected over uplink ports and managed as a single device, delivering a scalable, pay-as-you-grow solution for expand.

It is anticipated the city will need to obtain their own Internet Protocol Addresses (IPv4 and IPv6 addresses) from ARIN's, the US administrator of IP addresses, or via acquisition of local Internet provider. This is an additional cost to the city; however, having the addresses positions the city to always owns the customer.

*Figure 10 - Juniper Networks EX3400*




## OPTICAL LINE TERMINATION:

The team solicited pricing from Calix and ADTRAN equipment manufacturers for Optical Line Termination (OLT) equipment. The Calix E9 Intelligent Edge System chosen due to their industry leading CALIX E9 OLT product. The OLT is the electronics that serve end-user by providing light from Data Center through the distributed fiber infrastructure to the end-user premise. The OLT provides XGS-PON functionality at a 32:1 split ratio, one fiber for every 32 customers with speeds ranging from 1 to 10 Gbps speed per customer. The OLT also provides the service activation and port assignment for customer records and information systems. The Calix E9 is comprised of two hardware devices, the Intelligent Edge, and the Intelligent Edge Line Card.

**The Calix E9-2 Intelligent EDGE System -** Consists of one or more E9-2 shelves. The E9-2 is an unconstrained, disaggregated system that utilizes the latest in data center high bandwidth interconnect technology to enable it to scale to very high density, non-blocking capacity. The E9-2 is aggregated into a single system when utilizing the System Aggregation and Control cards (CLX3001). The architecture of the E9-2 enables line cards to support nonblocking uplink capacity and as new technologies are incorporated the system easily integrates new uplink options. The E9-2 Intelligent EDGE System enables full carrier grade redundancy for network and equipment connections. The E9-2 enables convergence of residential, business and mobile services into a unified access network. E9-2 delivers scalable residential IPTV, high-speed internet (HSI), voice and business services. In addition, the E9-2 supports high value business class services allowing operators to use a common access network to deliver higher revenue generating opportunities.

The E9 Intelligent Edge System is equipped with has 4x100GE optic ports and 100GE Single Mode optical Transceivers.

*Figure 11 - Calix E9 Intelligent Edge Equipment (CLX3001)*

**The Calix E9-2 XG3201 line card -** Supports high-density XGS-PON. Service providers looking to maximize deployment footprint, increase bandwidth, and reduce the power per port can deploy the line card utilizing Double Density (SFP-DD) XGS-PON optics providing support for 32 XGS-PON networks in a one rack unit (RU) footprint. To assist with migration from GPON, the XG3201 line card offers flexibility by supporting standard single density GPON OIM optics as well as Multi-PON Module (MPM) optics. The E9-2 XG3201line card is part of the Intelligent Access EDGE systems portfolio and supports the ability to simplify and automate the network by enabling the consolidation of service enabling network functions, including subscriber management, aggregation, and OLT onto a single system, reducing the number of systems to deploy, provision, and manage. See Figure 7 for CALIX E9 Intelligent Edge Line Card Equipment.

*Figure 12 - CALIX E9 Intelligent Edge E9 Line Card*

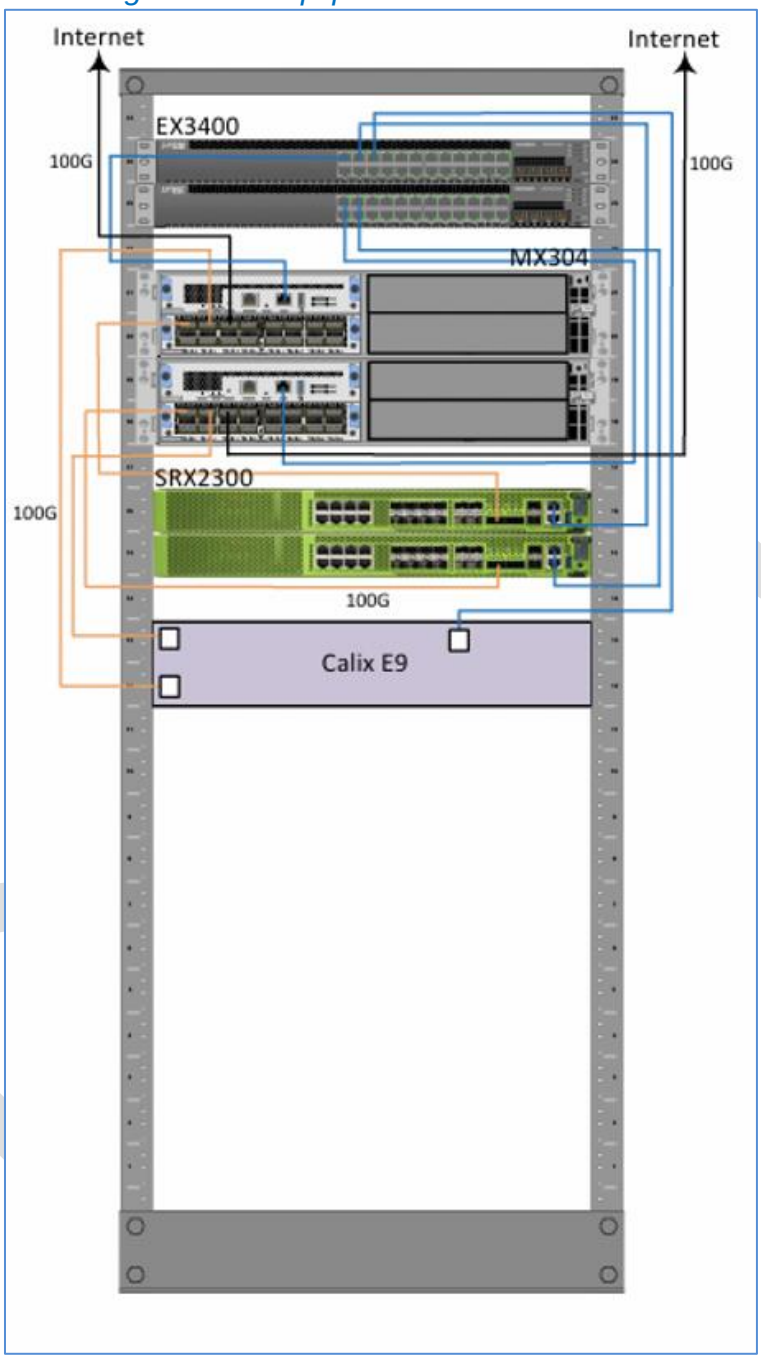
The total estimate for material and labor for the Core Router, Optical Line Termination electronics is **$791,763**, and is depicted below.

*Table 4 – Core Electronics*

| Core Electronics and Optical Line Termination Equipment | | | | | |
|---|---|---|---|---|---|
| **Fort Bragg Core Router Netwrok and OLT XGS-PON Network** | **Core Router Material** | **Core Router Labor** | **ISP OLT XGS - PON Ports and Lasers Material** | **ISP OLT Labor** | **Overall ISP** |
| Total | $ 556,945.13 | $ 16,940.00 | $ 205,475.79 | $ 12,402.50 | $ 791,763.42 |
| Total Customers | 2866 | | | | |
| Avg. cost per passing | $ 194.33 | $ 5.91 | $ 71.69 | $ 4.33 | $ 276.26 |

All Juniper Core Routing and Calix OLT equipment will be located in a single relay rack. There will be four, seven foot tall relay racks located within the Hut with Relay Rack 1 housing the rectifiers, backup batteries, and fuse panel, Relay Rack 2 will be housing Juniper Core Routing and Calix OLT equipment, Relay Rack 3 will support fiber management panels, and Relay Rack 4 will be reserved for future use. See Figure 13 below drawing for front Equipment relay rack layout.

*Figure 13 – Equipment Rack*




## SUBSCRIBER ACQUISITION (FIBER DROPS):

Material and labor costs for placement of a locatable double ended armored connectorized drop cable from Main Service Terminal to the premise via direct buried underground placement at depth greater than or equal to 12 inches and install 4ft outdoor conduit to clamshell termination on side of premise; conduit is used to protect fiber from yard tools. Drop costs includes 2 ft slack coil at each end, restoration of route

path to at least previous condition will be maintained during installation. The average drop placement length is 150 feet. Drop placement assumed to be under driveway, sidewalk, or other landscaping surfaces as needed. The model contemplates an install time of three hours for technician to complete drop placement, and one hour to complete in-home wiring, place and test & turnup ONT/RG, and if necessary, placement of Wi-Fi extenders. Wi-Fi Extenders are not part of the model but will be available at an extra charge if required. See below the total cost for material and labor which is **$1,215,327.**

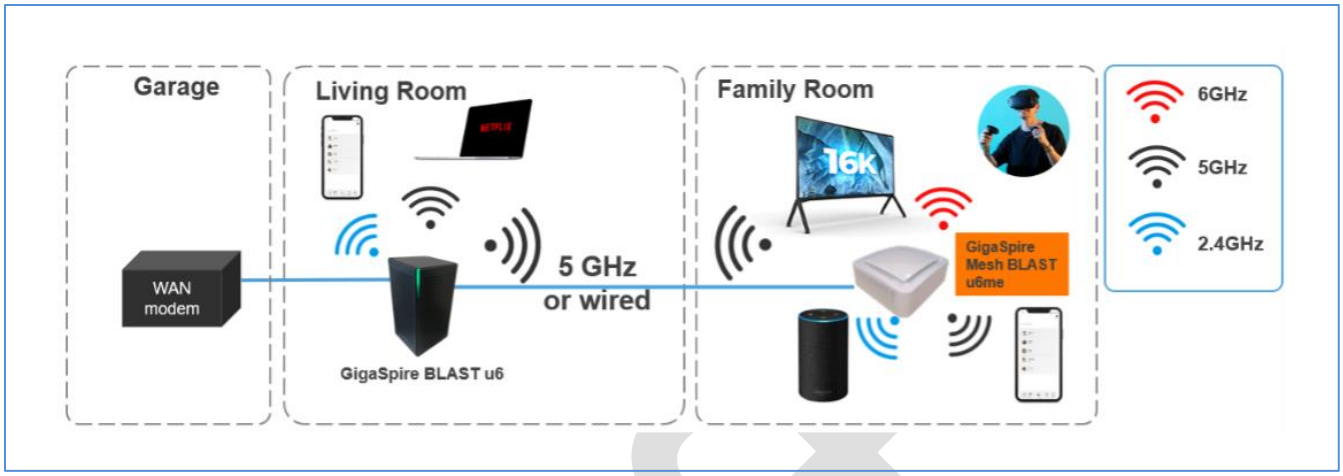
*Table 5 – Fiber Drops*

| Subscriber Acquisition - Fiber Drops | | | |
|---|---|---|---|
| **Subscriber Acquisition - Fiber Drop Costs** | **Drop Fiber Material Cost** | **Drop Fiber Labor Cost** | **Total Costs** |
| Total | $ 625,823 | $ 589,505 | $1,215,327 |
| Total Feet | 429,900 | | |
| Total Customers | 2866 | | |
| Avg. Cost/Foot | $ 1.46 | $ 1.37 | $ 2.83 |
| Avg. Cost/Passing | $ 218 | $ 206 | $ 424.05 |

## OPTICAL NETWORK TERMINATION:

Because the team chose Calix E9 OLT as our OLT equipment manufacture, we will use the CALIX E9 GigaSpire ONT product line. The GigaSpire ONT is the industry leading product, offers the best price and feature functionality, as well as future revenue stream capability. These devices convert the light received from the OLT into electrical signals to be used in the home for data and voice services. The ONT's come in various styles and types; the ONT will be a harden case located on the inside of the home. The city will place the ONT on the inside of premise and connect the drop, completing lighted fiber path all the way into the home. The installer will have responsibility to install inside wire and Residential Gateway (RG) at customer location. The RG, which provides Wi-Fi 7, the latest in-home wireless specification. Most homes use Wi-Fi exclusively to reach all their devices (TV's, handheld devices, etc.…).

*Figure 14 -*




Included below is the description for indoor versions of the CALIX GigaSpire BLAST u10xe ONT with RG (Wi-Fi) and 2 voice service ports, and the GigaSpire Mesh BLAST u6me satellite extender or Wi-Fi 6E throughout larger homes/businesses.

**GigaSpire GS7 XGS Tri Gateway, GS5239XG, Triband Wi-Fi 7 RG/Mesh, XGS WAN, AM PA –** The GigaSpire 7u10 is a Wi-Fi 7 standards-based tri-band system that brings 10 Gbps of throughput to residential, small business, and MDU applications. The GigaSpire 7u10 Wi-Fi system delivers over 4 times the performance of Wi-Fi 6/6E and a huge improvement in response time and capacity.

Capacity is handled by 16 simultaneous streams, connecting a larger number and broader range of devices and users. Each system is equipped with a 10GE and 4 multi-gig LAN ports and two POTS ports to connect with the growing number of attached devices in use today. Installation is incredibly flexible, offering desktop, wall mount or enclosure based mounting due to its slim design attributes.

The GigaSpire 7u10 Wi-Fi system is equipped with ten strategically located antennas distributed expertly around the system to prevent interference across the three spectrums.

The GigaSpire 7u10 family of Wi-Fi 7 systems expand revenue opportunities to applications demanding increased performance, reduced latency, and greater coverage. With the additional 6 GHz band, push the limits for your residential, business, and community markets by unleashing the full power of multi-gig SmartLife™ managed services to your subscribers.

*Figure 15 – GigiSpire Mesh BLAST satellite*


**The GigaSpire Mesh BLAST® u6me -** A high- performance wireless satellite that delivers the latest Wi-Fi 7 in a consumer- friendly design. Subscribers want their Wi-Fi to work with any device in any location throughout their home. In response to the rapid adoption of Wi-Fi IoT devices – like door locks, IP cameras, and thermostats – Service Providers must now provide ubiquitous Wi-Fi coverage. In addition, the demand for video content continues to grow, and subscribers expect to watch anywhere on any device. The city will determine which RG is used to ensure full operability at time of install. See Table 6below for Subscriber Acquisition ONT Cost.

*Figure 16*

*Table 6 Subscriber Acquisition*

| Subscriber Acquisition ONT Costs | | | |
|---|---|---|---|
| **Subscriber Acquisition Cost** | **Material Cost (ONT)** | **Labor Cost (ONT)** | **Total Costs** |
| Total | $ 1,069,018 | $ 209,667 | $ 1,278,685 |
| Total Customers | 2866 | | |
| Avg. Cost/Passing | $ 373.00 | $ 73.16 | $ 446.16 |

## OPERATING AND BUSINESS SUPPORT SYSTEMS (OSS/BSS), AND IPV4

As with all service providers an investment in operating and business support systems is required. Operating and business support systems provide service providers with software tools that enable provider to efficiently manage the network with reduced staff and with greater efficiency. Support tools functionality:

- Customer records and billing information – provides customer name, service address, electronic equipment port and fiber assignment, subscribed services, billing history, customer credits, and the ability for customer to see their services via web enabled access. Additionally, these systems establish appointment times based upon next available date, or customer desired service due date.
- Automated customer provisioning – provides customers ability to activate their own services without need to call into or visit nearest retail office. Service activation is auto generated for initial service installation which requires a truck roll. After initial service, customer can activate offered services/features anytime from anywhere via the portal.
- Repair – provides customer the ability to report necessary repairs if desired via on-line portal, or they can call into an 800 number for live customer contact; either way repair functionality is a vital part of the support system.
- Fiber records and management – provides service provider the ability to manage all assets including fiber cable assignments, location mapping, underground service alerts, and all fiber counts and quantities.

For this project we are recommending two separate systems, 1) software for customer records and billing, and 2) software for managing the fiber infrastructure.

**Customer Records and Billing –** COS Business Engine is based in Sweden, is the recommended cloud-based provider for the main OSS/BSS system. COS is the one of the leading U.S. software providers for ISP's.

A critical function of managing a broadband network is entering all customer information necessary into the operating system that allows you to manage the business. System data
input is to ensure consistency and integrity of the information that enters the system and is used in a variety of other applications.

Billing, a vital part of the business can be one of the most common challenges for service providers. Correct billing is also crucial to ensure reliable cash flow and profit margins. Since COS Business Engine is a common platform for all of the involved parties, accurate billing and disputes about billing can easily be avoided with COS Business Engine.

The subscriber purchases their services by logging in to their “My Pages” at any time to view an updated list of which services available and what services they purchased and when. COS Business supports most, if not all billing scenarios. COS Business Engine delivers accurate billing every time and will eliminate disputes about billing and provides reports for operations and finance staff.

**Fiber Management -** Vetro, based in Portland, Maine. Vetro provides cloud based Outside Plant infrastructure management software. The software provides visibility into fiber infrastructure, asset and capacity management, and provides a complete view of all connectivity. During the build final drawings, assets, and connection points will be synchronized with COS Business Engin to provide necessary information for customer assignment.

The decision to launch a new broadband (ISP) service is a major decision. It requires the operator to make a number of decisions that require you to continually place and update data into cloud based geo-spatial systems. Decisions regarding site location design, construction specifics, service to customer location, and resolving customer service issues.

Total combined cost for OSS/BSS software is **$84,702.**

## VEHICLES

All service providers require fleet vehicles for technicians to dispatch to customer locations to facilitate new service requests, as well as repair services. Fleet vehicles for the purpose of CFB include four mini vans. These mini vans will be stocked with electronics, fiber drop wire, ONT’s, RG’s, and misc. tools (ladders, shovels, hand tools). This business model contemplates purchasing these four mini vans at total cost of **$290,400**. Fuel, maintenance, registration, and insurance are in the model expense category.

## IPV6 AND IPV4 ADDRESSES

An IP address, or Internet Protocol address, is a unique number that identifies a device on a service providers network or the internet. IP addresses are made up of four numbers separated by periods, such as 192.168.123.132. IP addresses are used to identify a device's location, network interface, and allow data to be transferred between two connected devices. In order for a service provider to provide service you must have IPv6 and IPv4 addresses. Your public IP address plays a crucial role in your online experience. It is essential for:

- **Online Communication:** It allows you to access websites, send emails, and connect to various online services by directing the data you request back to your device.
- **Security and Privacy:** Understanding your public IP can help you take measures to protect your online privacy and security, as it can be used to determine your general IP location and potentially other personal information.
- **Remote Access and Online Gaming:** A public IP address enables you to set up remote access to your home network, participate in online gaming, and use VoIP services more efficiently.
- **Website Hosting:** If you're hosting a website or server, your public IP address allows users from around the globe to find and connect to your site or service.

The cost of the IP addresses is in the business model at a cost of **$220,000 for 4,000 addresses** and can be acquired through American Registry of Internet Numbers (ARIN's), or via on-line brokers, which will most likely be needed as ARIN's is out of assignable addresses. It is anticipated the acquisition of MCN will have enough IPv4/IPv6 addresses to launch new network.

## CONSTRUCTION SCHEDULE

The construction schedule at this juncture should remain open until a final decision has been made to proceed, and the type of gap financing city will pursue. For the purpose of providing a timeline to the city on the amount of time it will take to build the base infrastructure (premises passed, this study indicates 82 weeks using a minimum of a three-crew approach; this approach is standard for most contractors. The timeline is based upon the number of available workdays in a week, number of crews, and the production footage per day in terms of feet of conduit/cable placed (900 ft.).

Other factors that impact the schedule are weather conditions, traffic control, material, and labor availability. As a note to consider, under current economic conditions, material and labor are less of a concern than post pandemic and supply chain issues. Material and labor shortages are impacting telecommunications industry as a result of coming out of pandemic plus the number of projects around the country created from State and Federal grant programs. The recommendation is for the city to decide approach and timeline and then get into material/labor ques as soon as possible. The industry faced this challenge back in 2010 during the ARRA Projects, but quickly increased factory

output and ended up being managed with slight project delays. See Table 7 below Construction Schedule (estimated).

*Table 7 – Estimated Outside Plant Construction Schedule*

| OSP Construction Schedule | | | | | |
|---|---|---|---|---|---|
| Total Feet of Construction | Allowed Workdays Per Week | UG Production Per Crew Week (ft.) | Quantity of UG Crews | Overall Weekly Production | Estimated Construction Weeks |
| 222,423 | 5 | 900 | 3 | 2700 | 82 |

# PART 2 - OPERATIONS AND SERVICE DELIVERY

## OPTIONS FOR ISP SERVICE PROVIDER

The 2021 feasibility study identified MCN as the best service provider option, either through a service contract or acquisition, this was based upon many factors, such as the city requirements to stand-up an ISP may not be in their best interest and considered a monumental risk. This consideration positioned the city to pursue MCN as they have service provider experience that has been operational for over 20 years, have brand awareness and recognition, and provide superior local/regional customer service. For the purpose of this plan, no further discussion is needed regarding the city becoming an ISP. Furthermore, if the city decided to wholesale the network, there would be insufficient revenues for any provider to be profitable and would certainly make it difficult for the city to acquire debt because of requirement to cover debt service ratios. This is because the grants require low price service to customers.

Since 2021 MCN has tried to sell the business; unfortunately, only a few offers, all of which were valued below what MCN wanted for the business. This left MCN with operating the business with little to no capital infusion, while trying to maintain current revenues. Unfortunately, MCN's primary revenue source is now an eroding revenue environment. MCN's primary revenue source is provided by Sonic via a wholesale service agreement, which is now no longer available for MCN because Sonic notified MCN they plan to stop this service (believe there are two years remaining but need to verify during due diligence). Therefore, customer and revenue growth will end without an infusion of cash. In other words, this revenue stream is subject to monthly erosion of customers. Additionally, this Sonic offering is provided over aged copper cable pairs insufficient to bring high-speed Internet to CFB.  Currently MCN is losing 15 customers

a month to the competition who continues to place pressure on MCN through speed and price reduction tactics.

If the city continues to build the FTTP network and begins to offer services (self perform), then the eroding revenues at MCN will only become worse, and ultimately has the potential for MCN to adjust their business model or potentially go out of business. It is in the community's best interest to find a way to acquire MCN and then utilize their knowledge and experience in launching the CFB new high-speed network. Launching a new fiber-based network is not easy, in fact very challenging. The employees that will come over with acquisition will make for an easy launch, all the while providing the city with new and existing revenue from the start.

The greatest asset value for the city in acquiring MCN is the fact they have a block of IPv4 addresses (4,000 addresses) that typically is a commodity; unfortunately, the industry has exhausted IPv4 addresses, which the city would need to pay a premium to an IP address broker; current price ranges between $50-$70 per address. The need for addresses is increasing rapidly due to the number of new providers who have received grant funds. During desk top due diligence we valued MCN's IP addresses between $200,000 and $280,000. Without IPv4 addresses the value of a customer is significantly reduced if and when you decide to sell the asset.

Because of ultimate migration of MCN's equipment to the new undetermined location, we will have the need to retain existing MCN office location that hosts network assets that have an estimated value of $150K. There is miscellaneous office equipment, tools, office furniture that have not been through due diligence yet and I would assume this process would take place once decision to purchase has been approved. Another way to value MCN is taking a look at EBITDA and applying a x times value.

After several meetings with city staff and Mendocino Unified School District, the decision for the City to pursue an acquisition of MCN surfaced as the best approach. On November 14, 2024 the Mendocino Unified School District Board held a special meeting to discuss the sale of MCN. The School Board unanimously agreed in principle to transition MCN asserts to the City. The proposed terms include a purchase price of $500,000, paid in equal annual installments of $50,000 over ten years. These payments are reflected in the pro-forma and will be paid from proceeds from the business, i.e. cash flow. After the due diligence period,

## MCN BACKGROUND

MCN has a long relationship with the City of Fort Bragg and surrounding areas. The Mendocino Community Network (MCN) is a business owned and operated by the Mendocino Unified School District. MCN mission is to provide high-quality Internet services to the school district, customers, and the communities they serve. MCN has been providing internet in the community for over 25 years. In the early days MCN provided dialup to over 8000 customers in Mendocino County and across the country.

Currently MCN offers DSL internet and POTS (plain old telephone service) service to over 1100 customers in Fort Bragg as well as Fixed Wireless and VOIP telephone services. MCN registers and hosts over 1,000 domains, websites and more than 4,000 email accounts. MCN currently has eight full time employees and one part time employee.

MCN was created from the school district to provide much needed Internet service to students. Since its beginning, MCN has significantly expanded service locations, and offers a wide range of services beyond basic Internet connectivity. MCN offers affordable speed and pricing tiers for Internet, and voice services.

## City Acquire MCN Assets and Resources

Acquiring MCN provides the city with the opportunity to acquire existing assets and customers for a price of $500,000. The city will relocate MCN to a suitable facility in Fort Bragg where a retail office would be established. The relocation would include retaining not just the current office space located in Mendocino for a period of time (transition), but relocate the entire operation, this is due to the proximity of the majority of the customers anticipated in the city. The transition could take place over time, as the new CFB network launch will take time.

The city would fund, build, operate and maintain the network using resources already in place plus the newly acquired MCN resources to serve the customers. The city will pay for marketing, and branding for the products and services. The newly acquired MCN resources would utilize new network, vehicles, and operating systems purchased through funds acquired via grants and/or debt.

Acquiring MCN eliminates the need for the city to stand-up an ISP, which comes with the challenge of obtaining knowledgeable/experienced talent due to the remote location of Fort Bragg. MCN resources come with the talent and knowledge/experience. The city obtains the MCN experience and knowledge providing service over a much larger network at a competitive price for servicing customers on the network. Additionally, the city would continue to maintain the current MCN customers outside of the city, alleviating customers being abandoned, a positive step that the school district is concerned about.

The city acquires the current revenue and expense streams, brand recognition and awareness from MCN. Additionally, the city will be able to charge market rates for all services thus creating greater margins. These margins will enable CFB to grow and expand network while paying down the debt.

An item of note, CFB will serve existing MCN customers in and out of the city limits with the same employees, equipment, and level of service they receive today. There will be no degradation of service. Furthermore, as time and capital warrants, the CFB network has been designed for growth beyond the city limits. This provides an opportunity to serve customers with

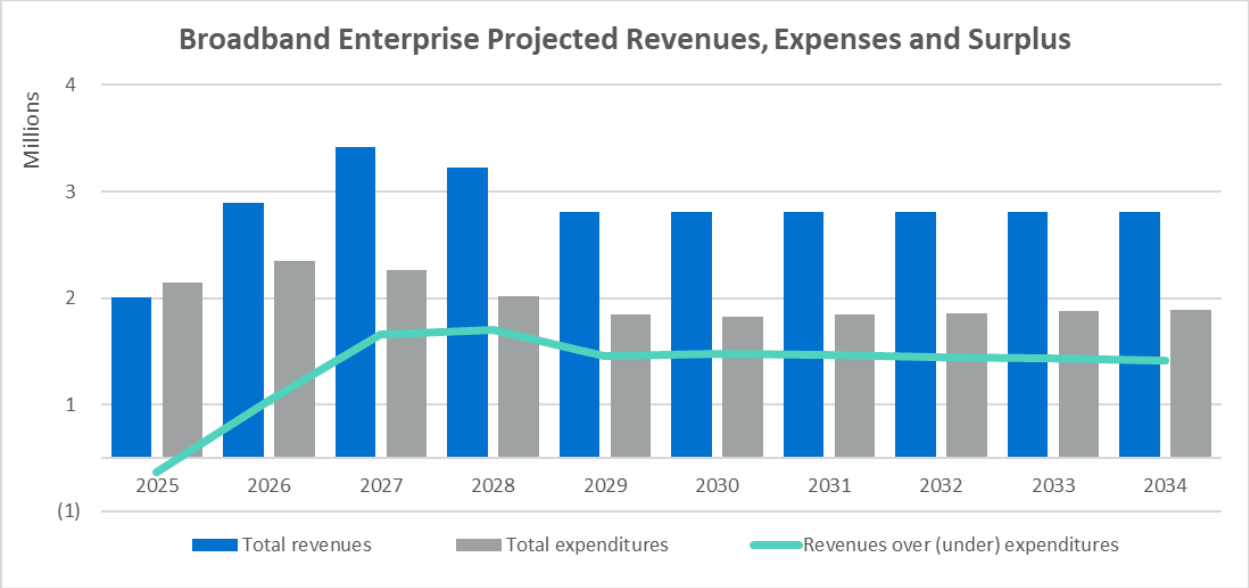
a fiber based service without the need to add additional Core electronics and fiber infrastructure back to the Hut. It will be less costly to construct to edge-out opportunities.

Existing MCN customers should be excited about the opportunity to have a new fiber based infrastructure and services within the city. And for the customers outside the city limits, they now have a path to get fiber to their remote location at some point. Until then, service to outside city limit customers will be equal to or greater than they have today.

# PART 3 - PRO-FORMA *DRAFT*

The pro-forma provides Income Statement, Cash Flow Statement, and Balance Sheet. Pro-forma is inclusive of acquiring the MCN business, and the capital spend required or the project ($14.6M). The pro-forma below was used to successfully receive the grant award of $10.3M. Now NHA Advisors have now been retained to review project pro-forma and are now creating a finance grade pro-forma that will be used to seek gap funding required for the balance of the grant, estimated at $3.3M. See Figure xx for the Pro-Forma Need to input slides and writeups from NHA as they are responsible for financial.

| | | | | | |
|---|---|---|---|---|---|
| **MCN Fusion Customer Count (FYE)** | 858 | 632 | 482 | 371 | - |
| **MCN Open Air Customer Count (FYE)** | 417 | 322 | 250 | 178 | - |
| **MCN Total** | 1,275 | 954 | 732 | 549 | - |
| **FB-BB Customer Count (FYE)** | 484 | 1,532 | 2,540 | 2,877 | 2,877 |
| | **Transition Period** | | | | **Stabilized** |
| | **2025** | **2026** | **2027** | **2028** | **2029** |
| **Revenues** | | | | | |
| FB-BB: 1-10 Gbps Service Offering | $ 186,683 | $ 788,058 | $ 1,431,447 | $ 1,737,328 | $ 1,737,228 |
| FB-BB: Voice Services (w/911) | $ 3,732 | $ 15,319 | $ 27,138 | $ 38,452 | $ 41,368 |
| FB-BB: Low Income Service Offering 500 Mbps | $ 22,458 | $ 93,433 | $ 148,043 | $ 151,162 | $ 151,162 |
| Email Hosting | $ 148,374 | $ 204,660 | $ 212,916 | $ 219,756 | $ 221,496 |
| WebHost Domain | $ 111,426 | $ 149,880 | $ 151,800 | $ 153,720 | $ 153,720 |
| MCN Revenues | $ - | $ - | $ - | $ - | $ - |
| MCN: Fusion (Blended view of Res and Bus) | $ 635,447 | $ 640,346 | $ 478,605 | $ 196,377 | $ - |
| MCN: Fusion Equipment | $ 22,680 | $ 28,296 | $ 27,192 | $ 13,536 | $ - |
| MCN: Open Air | $ 185,378 | $ 194,781 | $ 147,758 | $ 56,883 | $ - |
| MCN: Digital Voice | $ 195,066 | $ 276,468 | $ 295,188 | $ 154,614 | $ - |
| **Total revenues** | **1,511,244** | **2,391,241** | **2,920,087** | **2,721,828** | **2,304,975** |
| **Expenditures** | | | | | |
| Telecom and IT Services | 550,914 | 627,435 | 515,902 | 275,210 | 94,896 |
| Operations and Maintenance | 80,436 | 120,912 | 149,500 | 166,372 | 177,346 |
| Personnel and Benefits | 610,997 | 736,259 | 754,666 | 773,532 | 792,871 |
| General and Administrative | 352,345 | 317,531 | 287,810 | 253,707 | 235,979 |
| MCN Acquisition Payment | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 |
| **Total expenditures** | **1,644,693** | **1,852,137** | **1,757,878** | **1,518,821** | **1,351,091** |
| **Revenues over (under) expenditures** | **(133,448)** | **539,103** | **1,162,209** | **1,203,007** | **953,883** |
| Estimated debt service payment | 360,000 | 360,000 | 360,000 | 360,000 | 360,000 |
| **Revenues over (under) expenditures less DS** | **(493,448)** | **179,103** | **802,209** | **843,007** | **593,883** |
| **Coverage** | **(0.37)** | **1.50** | **3.23** | **3.34** | **2.65** |




The Pro-forma was put together from a conservative standpoint. We expect to gain early sales success because the price and speeds offered will be far superior to what the competition can deliver over their aged technology systems. As this project evolves, there will be other forms of revenue such as CFB providing services to Cell Providers, and other WISP's; as of now we have excluded these future opportunities. It is important to point out that PUC rules require grantee to fix subscriber pricing for five years.

In addition to the revenue, there will be Cost of Goods Sold (COG's) and Expense line items for network operations which have also been conservatively estimated, as an example, market rates were used for this line item because MMBI has not provided the wholesale price amount we will be using; it's expected to be far below market rate (a PIUC requirement for them), and we will not require a lot of bandwidth early in the service roll out.

## FINANCING

**RESERVE FOR NHA**

It is up to the City to determine how to fund this network, this can be accomplished with cash, or debt through the use of bonds or some other instrument, or preferably other available grant funds (State and or Federal), or combination of all three. City staff is pursuing additional available grants at this time, as well as determining the best path to financing the gap. The model shows an example of debt for your analysis. When the City decides to move forward, financing structure will need to be determined by the city, NHA will bring forth a recommendation.

## REVENUE ASSUMPTIONS

Revenue from the newly created CFB network will have six revenue line items, they are: 1Gbps, 2Gbps, 5Gbps, 10Gbps, and a low income 500Mbps service. Additionally, a voice service will be offered. These services equate to a 63% take rate. The acquisition of MCN will provide immediate revenue from a variety of existing services such as Fusion (DSL), Open Air (Wireless), Digital Voice, Email Histing, and WebHost Domain. The largest revenue service is Fusion, a DSL service provided via contract with Sonic within the city limits. The pro-forma shows this line item and some of the Open-Air revenues eroding over the first 3 years as the assumption is customers will opt for the new CFB fiber-based offerings as speed and price will be far superior to what MCN offers today.

*Table 8 – City and MCN Revenue*

| CFB Revenue | |
|---|---|
| Offering | Price |
| 1- Gbps | $ 50.00 |
| 2 - Gbps | $ 70.00 |
| 5 - Gbps | $ 90.00 |
| 10 - Gbps | $ 110.00 |
| 500 - Mbps | $ 40.00 |
| Voice Service | $ 14.40 |

| MCN Revenue | |
|---|---|
| Offering | Price |
| Fusion DSL | $ 61.25 |
| Open Air | $ 72.68 |
| Digital Voice | $ 14.40 |
| Email Hosting | $ 25.50 |
| WebHost Domain | $ 8.74 |

**Total Annual revenue at steady state in year four (4) - $2 Million**

## COG'S AND EXPENSE ASSUMPTIONS

### COG's

The pro-forma model provides COG's and Operating Expenses. There are several categories in COG's, the below table provides the line-item expense and assumptions in detail. See Table 9COG's Expense and Assumptions.

*Table 9*

| Cost of Goods Sold | | Monthly COG's Assumptions |
|---|---|---|
| Telecommunications Backhaul | 4,500 | Provides for connectivity to Internet, will be provided by MMBI at wholesale price |
| Colocation facility in Sacramento | 3,408 | Necessary to reduce backhaul costs for access to Netflix, Amazon etc... |
| Fusion (Blended Res/Bus) | 43,495 | Amount paid to Sonic for leased copper pairs |
| Fusion Equipment | 1,170 | Equipment purchase for Sonic customers |
| OpenAir Backhaul (AT&T) | 3,500 | Backhaul paid to AT&T for wireless customers |
| OpenAir Equipment | 300 | Equipment purchase for new wireless customers |
| OpenAIr AP Cost | - | N/A |
| Digital Voice License (VOIP PBX License) | 5,002 | Monthly license cost for voice services |
| Digital Voice Usage (Bandwidth/Inteliquent | 1,648 | Monthly usage for voice services |
| Email Hosting | 7,260 | Monthly expense paid to hosting service provider |
| WebHost Domain iDotz (Domain Registrar) | 1,840 | Monthly expense paid to hosting service provider |
| Bandwidth/Inteliquent – VOIP Usage | - | N/A |
| Sumofiber (VOIP PBX License) | - | N/A |
| iDotz (Domain Registrar) | - | N/A |
| ATT (Fiber Backhaul for Open Air) | - | N/A |
| Electricity at Hut | 750 | Monthly expense paid to electrical utility |
| Cable Locates | 600 | Monthly expense to locate underground city fiber assets |
| OSP Maintenance | 2,000 | Monthly expense to maintain infrastructure, and includes unwanted damage |
| MMBI Annual Maintenance Fee | 1,150 | Annual fee paid to MMBI to maintain 4 miles of fiber along hwy 1 |
| General Mgr. (Salary) | 10,417 | Salary |
| Senior Network Admin. | 9,905 | Salary |
| Junior Network Admin | - | Salary |
| Inside Operations Mgr. (Billing Dept.) | 4,974 | Salary |
| Outside Operations Mgr. (Head Installer) | 4,212 | Salary |
| Operation Technician (Installer) | 4,640 | Salary |
| Operation Technician | 3,816 | Salary |
| Operation Technician | 3,816 | Salary |
| Operations Agent (Billing) | 4,265 | Salary |
| Voice Services | 29 | CFB voice service paid to external wholesale provider |
| Vehicle Expense (Fuel, Maint., Insurance) | 2,200 | Maintenance for four vehicles |
| Benefits at Salary Times 30% | 13,813 | Self explanatory |
| COS Customer Records and Billing System | 1,840 | Monthly expense based upon number of subscribers in billing |
| Calix AXOS Subscriptions | 1,650 | Annual RTU software expense for the number of subscribers in billing |

**Note some COG's are annual, some monthly and vary by time period. For actual timing and cost see Pro-Forma**

**Annual Gross Profit at steady state in year five (5): $1 Million**

## OPERATING EXPENSES

Operating expenses include both acquired MCN Expenses and CFB expenses for the new startup. Some MCN Expenses will erode over time as the Sonic wholesale customers migrate to the new CFB fiber-based network. See Table 10 for Operating Expense Costs and Assumptions.

*Table 10*

| Operating Expenses | | Assumptions |
|---|---|---|
| Advertising and Promotion | 2,000 | Monthly expense for marketing and advertising campaigns, collateral |
| Auto Expenses (Mileage) | 600 | Used for employees using their personal vehicles for work, and travel to conferences |
| Bank Fees | 3,847 | Monthly fees paid to financial institutions |
| Meetings, Conference & Travel | 400 | Monthly budgeted amount for employees to attend conferences to further education |
| City Indirect Cost Allocation | 5,000 | Monthly allocated expense for current city employees who spend time on CFB network |
| Rent at New Facility in Fort Bragg | 2,278 | Monthly rent for new retail office space |
| Utilities - Electricity | 900 | Monthly electrical utility expense |
| Utilities - Water & Sewer | 125 | Monthly water and sewer utility expense |
| Postage | 332 | Self Explanatory |
| Domain Account | - | |
| PGE, Legal, Insurance | - | |
| DV/DSL EQ | - | |
| Promotion and Advertising | - | |
| New Rent in Fort Bragg | - | |
| Utilities - Electric | - | |
| Utilities - Water & Sewer | - | |
| Cell and Local Telephone | 630 | Monthly expense for employees requiring a cell phone, based upon $70 month service per employee |
| Internet (City gets free services) | (1,333) | Monthly internet backhaul savings for the current CFB network |
| Office Supplies | 200 | Self Explanatory |
| Professional Fees (consulting services monthly audits) | 2,000 | Monthly fees paid to consultants/legal fees |
| MCN Acquisition Payment TBD | 75,000 | Annual payment to MUSD |
| Fusion Taxes | 10,969 | Taxes from certain MCN products/services |

**RESERVE FOR SLIDES FROM NHA**

## 10-Year Income Statement:

## 10-Year Cash Flow Statement:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **MCN Fusion Customer Count (FYE)** | 858 | 632 | 482 | 371 | - | - | - | - | - | - |
| **MCN Open Air Customer Count (FYE)** | 417 | 322 | 250 | 178 | - | - | - | - | - | - |
| **MCN Total** | 1,275 | 954 | 732 | 549 | - | - | - | - | - | - |
| **FB-BB Customer Count (FYE)** | 484 | 1,532 | 2,540 | 2,877 | 2,877 | 2,877 | 2,877 | 2,877 | 2,877 | 2,877 |
| | **Transition Period** | | | | **Stabilized** | | | | | |
| | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **2031** | **2032** | **2033** | **2034** |
| **Revenues** | | | | | | | | | | |
| FB-BB: 1-10 Gbps Service Offering | $ 186,683 | $ 788,058 | $ 1,431,447 | $ 1,737,328 | $ 1,737,228 | $ 1,737,228 | $ 1,737,228 | $ 1,737,228 | $ 1,737,228 | $ 1,737,228 |
| FB-BB: Voice Services (w/911) | $ 3,732 | $ 15,319 | $ 27,138 | $ 38,452 | $ 41,368 | $ 41,368 | $ 41,368 | $ 41,368 | $ 41,368 | $ 41,368 |
| FB-BB: Low Income Service Offering 500 Mbps | $ 22,458 | $ 93,433 | $ 148,043 | $ 151,162 | $ 151,162 | $ 151,162 | $ 151,162 | $ 151,162 | $ 151,162 | $ 151,162 |
| Email Hosting | $ 148,374 | $ 204,660 | $ 212,916 | $ 219,756 | $ 221,496 | $ 221,496 | $ 221,496 | $ 221,496 | $ 221,496 | $ 221,496 |
| WebHost Domain | $ 111,426 | $ 149,880 | $ 151,800 | $ 153,720 | $ 153,720 | $ 153,720 | $ 153,720 | $ 153,720 | $ 153,720 | $ 153,720 |
| MCN Revenues | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| MCN: Fusion (Blended view of Res and Bus) | $ 635,447 | $ 640,346 | $ 478,605 | $ 196,377 | $ - | $ - | $ - | $ - | $ - | $ - |
| MCN: Fusion Equipment | $ 22,680 | $ 28,296 | $ 27,192 | $ 13,536 | $ - | $ - | $ - | $ - | $ - | $ - |
| MCN: Open Air | $ 185,378 | $ 194,781 | $ 147,758 | $ 56,883 | $ - | $ - | $ - | $ - | $ - | $ - |
| MCN: Digital Voice | $ 195,066 | $ 276,468 | $ 295,188 | $ 154,614 | $ - | $ - | $ - | $ - | $ - | $ - |
| **Total revenues** | **1,511,244** | **2,391,241** | **2,920,087** | **2,721,828** | **2,304,975** | **2,304,975** | **2,304,975** | **2,304,975** | **2,304,975** | **2,304,975** |
| **Expenditures** | | | | | | | | | | |
| Telecom and IT Services | 550,914 | 627,435 | 515,902 | 275,210 | 94,896 | 94,896 | 94,896 | 94,896 | 94,896 | 94,896 |
| Operations and Maintenance | 80,436 | 120,912 | 149,500 | 166,372 | 177,346 | 167,891 | 167,928 | 167,967 | 168,007 | 168,048 |
| Personnel and Benefits | 610,997 | 736,259 | 754,666 | 773,532 | 792,871 | 809,204 | 825,231 | 841,287 | 857,745 | 874,614 |
| General and Administrative | 352,345 | 317,531 | 287,810 | 253,707 | 235,979 | 203,748 | 203,748 | 203,748 | 203,748 | 203,748 |
| MCN Acquisition Payment | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 |
| **Total expenditures** | **1,644,693** | **1,852,137** | **1,757,878** | **1,518,821** | **1,351,091** | **1,325,738** | **1,341,802** | **1,357,898** | **1,374,396** | **1,391,306** |
| **Revenues over (under) expenditures** | **(133,448)** | **539,103** | **1,162,209** | **1,203,007** | **953,883** | **979,236** | **963,172** | **947,077** | **930,579** | **913,668** |
| Estimated debt service payment | 360,000 | 360,000 | 360,000 | 360,000 | 360,000 | 360,000 | 360,000 | 360,000 | 360,000 | 360,000 |
| **Revenues over (under) expenditures less DS** | **(493,448)** | **179,103** | **802,209** | **843,007** | **593,883** | **619,236** | **603,172** | **587,077** | **570,579** | **553,668** |
| **Coverage** | **(0.37)** | **1.50** | **3.23** | **3.34** | **2.65** | **2.72** | **2.68** | **2.63** | **2.58** | **2.54** |

**10-Year Balance Sheet Statement**

Thank You

Palnies values the support and assistance we have received from a wide range of individuals and entities across Fort Bragg in developing this project to further implement ***City of Fort Bragg Digital Infrastructure Plan: 2024-2026.***

# APPENDIX – UNDER DEVELOPMENT

## FUTURE TECHNOLOGIES

There are several new technologies available now to allow you to better serve Fort Bragg; this analysis provides the cost of the infrastructure to place underground fiber throughout the city, as well as the electronics needed to provide service. When city proceeds with this project, it is recommended city to look at some of these technologies in the initial deployment; they include the following:

New light pole technologies that allow for multiple uses, such as 5G/LTE, security cameras, digital signage, and several sensers (air quality, motion, soil)

Electrical vehicle charging stations will be required by government between now and 2035 per federal mandates. Vehicle charging stations offer more than just a battery recharge, they are now SMART devices that enable credit card usage, marketing signage boards, wayfinding maps, entertainment services and more.

Public Wi-Fi is another technology you should consider at throughout the city, public gathering points (parks, sports fields, beaches, marinas). The Calix product line provides public Wi-Fi as part of their service. There are a number of manufactures for higher quality Wi-Fi designed for public parks, gymnasiums, and other large public gathering locations.

Venue Applications allows for the city or Chamber to better represent their members. A typical venue app is great for tourism as app allows for wayfinding, on-line access to stores and restaurants, purchase theater tickets, and more.

Digital signage or smart boards are the latest in technology for historical downtown areas, parks, hiking trails, etc.… these digital signage boards not only provide vital information, but also serve as a revenue stream by selling marketing and marketing data collected from the public. Typical digital signage boards are QR Code driven, meaning users can scan the board and take whatever information they obtained with them as they tour the area.