



Traverse City Light and Power (TCLP) Broadband Utility Cost Benefit Analysis

For: **Scott Menhart**

Traverse City Light and Power

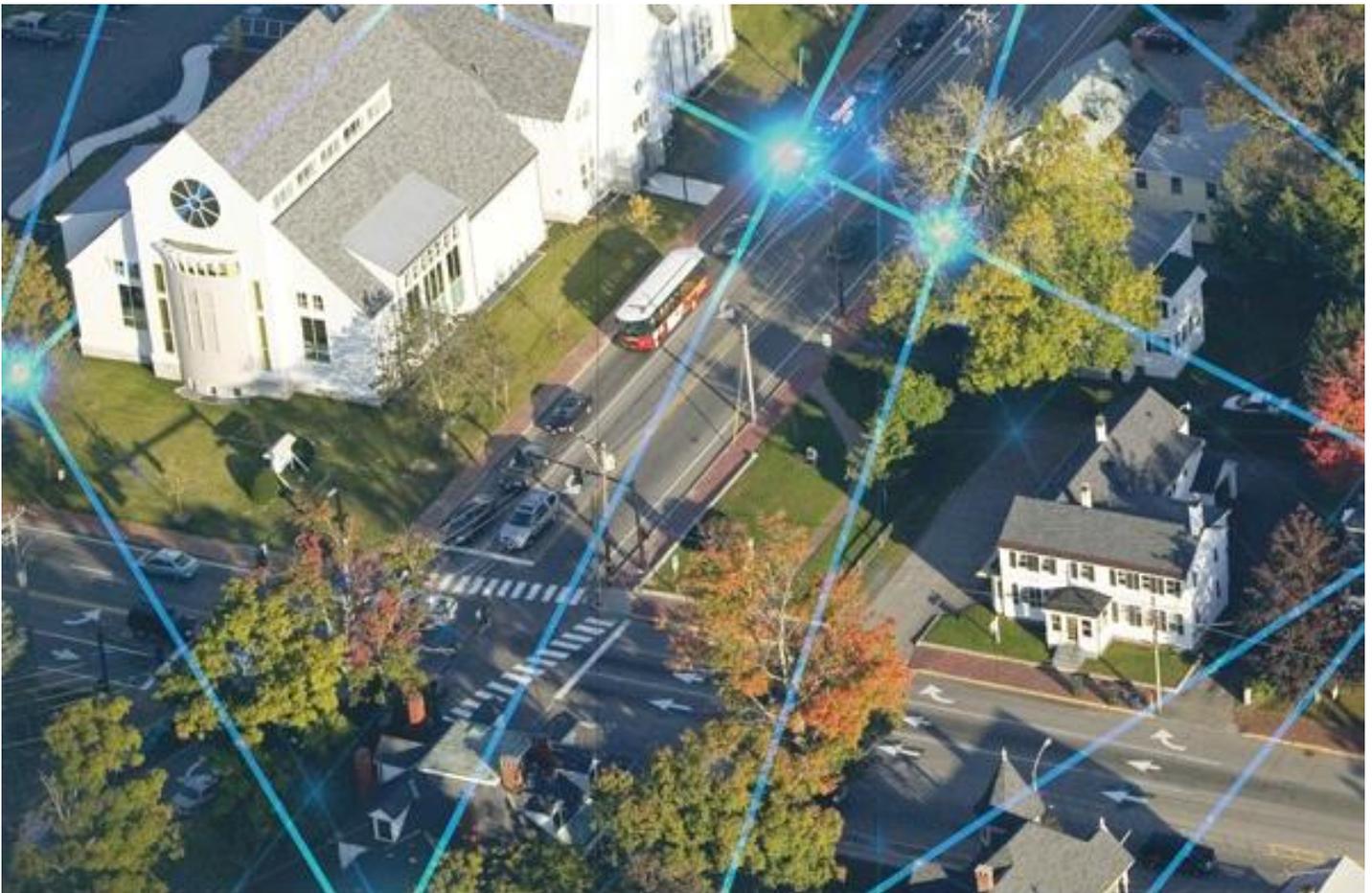
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Fujitsu Network Communications is pleased to submit this Cost Benefit Analysis to TCLP. This document fulfills the agreed upon Objectives and Scope of Services as listed in Service Order, Schedule A, Req. 007873.

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1. Executive Summary

1. Executive Summary

In May of 2018, TCLP Staff issued an RFI at the direction of its Board of Directors to select a Partner to continue the development of a Fiber-to-the-Home Cost Benefit Analysis to enhance broadband connectivity for all City of Traverse City businesses, residents, and Community Anchor Institutions. Fujitsu was selected through a competitive bid process as the Partner best suited to deliver the full scope of services required by TCLP as well as the flexibility to meet the requirements of network ownership, control and the eventual take-over of broadband operations. TCLP Staff engaged Fujitsu to:

- Create a Cost Benefit Analysis
- Provide a View of Community and Utility Benefits of Fiber
- Design the Outside Plant Fiber Network
- Design the Operations Data Center
- Manage and Recommend Electronics Suppliers Through RFP
- Design the Operating Model and Staffing Requirements
- Design the Customer Service Model
- Develop the Marketing and Customer Education Campaign
- Plan for eventual Managed Takeover of the Operation by TCLP

This document, which is referred to as a Cost Benefit Analysis, includes content on all the items listed above. It contains some information that is confidential and unique to Fujitsu's business approach and may reveal competitive insights that might be used against TCLP should the project proceed. With that in mind, Fujitsu is committed to provide TCLP Staff and Directors, and the Board of Directors, with the information necessary to make the most informed decisions about how to meet the strategic goals of the broadband project.

Fujitsu believes strongly that for the analysis of this report to be most effective, TCLP must take steps to operate this fiber business as a competitive enterprise. This means TCLP should consider allowing for competitive information to be shared within TCLP only, remaining agile and highly responsive to competitive market events, and continuously review and align the business to innovations. Businesses change and evolve over time, and this proposed internet service provider is no different, as it requires skilled and continuous improvement to best deliver value to the community and ensure a financially stable and viable entity.

The cost benefit analysis is a culmination of several months of work by an experienced team of business strategist, telecom engineers, and network operations specialists. The Fujitsu team, working closely with TCLP staff, spent countless hours in interviews, field studies, site visits, vendor meetings and lab visits to arrive at the conclusion presented herein. This cost benefit analysis is highly customized and unique to TCLP.

Fujitsu applauds the City of Traverse City and TCLP Staff and Directors in setting timely and visionary goals for providing abundant and affordable broadband service in the region. Fujitsu recognizes that these projects are complex and costly and thorough due diligence is necessary. At the conclusion of this cost benefit analysis, Fujitsu will recommend that Board vote to proceed with the implementation of this plan as it is financially sound, operationally sustainable, risk averse and is designed to have no impact on Electrical service delivery.

Through this analysis it is clear that fiber infrastructure has key benefits to the community and utility, cited by source such as the US Department of Energy, Pew Research Center, and numerous studies with empirical evidence to that fact.

1. Executive Summary

The information shared in this study is backed by Traverse City unique data, direct Fujitsu customer project results, as well as publicly available empirical data showing the similarities of other organizations to TCLP's proposed efforts and the success they have had. As an organization, Fujitsu always takes a healthy view of all projects we are a part of, and base our recommendations on the conservative side of analysis. This report reflects that conservative view point, and recognizes that there are risk and challenges that must be met from all aspects of running an ISP organization, including design, construction, customer take rate, sales, marketing, and operations.

In this report, there are core assumptions that should be known to best put into perspective the results and approach taken. Fujitsu worked with TCLP staff and board of directors to align with these assumptions and approach.

- Fujitsu would perform activities to market, sell, and provider services on behalf of the TCLP ISP organization
- No additional TCLP headcount is being assumed
- This fiber business is considered separate from the TCLP electrical organization and is not designed to impact electric service quality being delivered
- Services proposed are based on technology capability, current competitive market offerings (not promotional offers), and industry standards on quality and service
- Multiple financial scenarios would be shown, that include reasonable expectations for take rate, pricing, construction schedule, operations, and ISP functions, based on TCLP specific market data, Fujitsu experience, and other FTTH project data
- Incorporate the existing dark fiber business into the financial projections

In cooperation with TCLP staff, the Phase 1 project area was determined. This report reflects only Phase 1 data, and was developed with the following assumptions:

- Phase 1 project area is a subset of the entire city, and the data is focused on just Phase 1
- The Phase 1 network build and year 1 of operations is being considered for project funding
- Area selected is based on a holistic view of community benefits, competition, address density, residential and business mixture, data center location, existing fiber footprint, topology, and expected build time
- Phase 1 project footprint allows for cost effective expansion into next phases, should TCLP decide to do so

1.1 Current State of the Network Assets

The network as displayed below is built with several factors that are guiding the deployment. First, it was constructed with monies from the local school district. The fiber itself in most areas is a DRAKA fiber optic cable. Testing and characterization of fiber will need to occur to ensure fiber is suitable for use for the deployment of the new GPON network. The termination of the fiber in these areas where we do not have or will not be able to provide network security will require the fiber cable to be spliced out of these locations and the main termination points need to be in a controlled environment and accessible by field technicians at all times.

The utility poles that the fiber is placed on are mostly in good condition. We don't expect structurally overloading any of the poles with the new fiber attachment.

1. Executive Summary

1.2 Goals and Objectives

Working with TCLP staff and board we have summarized the already stated objectives of the fiber initiative and Cost Benefit Analysis. Fujitsu believes these objectives are clear and achievable with the effort being performed by TCLP.

What are the objectives of this initiative?

- Enhance broadband connectivity for the city and region
- Build a fiber-based network to all residents and business in the TCLP service area
- Promote economic development
- Foster growth and innovation through technology availability

What are the objectives of this Cost Benefit Analysis?

- Understand the functions required to build and operate an ISP
- Inform the community and utility members of the benefits of a network and results of the Cost Benefit Analysis
- Reveal typical risks associated with running an ISP and potential actions to mitigate them
- Evaluate the financial viability of this new ISP organization
- Understand potential future options of network ownership and operations, including the Open Access business model

1.3 Guiding Principles

Fujitsu Network Communications is one of the Fujitsu Group companies who fully embrace "The Fujitsu Way." The Fujitsu Way embodies the philosophy of the Fujitsu Group, our reason for existence, values, and the principals that we follow in our daily activities.

We believe that by conducting our activities in accordance with the Fujitsu Way we maximize our value and better serve our customers and business partners and enhance our contribution to the communities in which we operate and to society as a whole.

1. Executive Summary

Executive Summary

Corporate Vision	Through our constant pursuit of innovation, the Fujitsu Group aims to contribute to the creation of a networked society that is rewarding and secure, bringing about a prosperous future that fulfills the dreams of people throughout the world.	
Corporate Values	What we strive for:	
	Society and Environment In all our actions, we protect the environment and contribute to society.	
	Profit and Growth We strive to meet the expectations of customers, employees and shareholders.	
	Shareholders and Investors We seek to continuously increase our corporate value.	
	Global Perspective We think and act from a global perspective.	
	What we value:	
	Employees We respect diversity and support individual growth.	
	Customers We seek to be their valued and trusted partner.	
	Business Partners We build mutually beneficial relationships.	
	Quality We enhance the reputation of our customers and the reliability of social infrastructure.	
Principles	Global Citizenship We act as good global citizens, attuned to the needs of society and the environment.	
	Customer-Centric Perspective We think from the customer's perspective and act with sincerity.	
	Firsthand Understanding We act based on a firsthand understanding of the actual situation.	
	Spirit of Challenge We strive to achieve our highest goals.	
	Speed and Agility We act flexibly and promptly to achieve our objectives.	
	Teamwork We share common objectives across organizations, work as a team and act as responsible members of the team.	
Code of Conduct	<ul style="list-style-type: none"> ■ We respect human rights. ■ We comply with all laws and regulations. ■ We act with fairness in our business dealings. ■ We protect and respect intellectual property. ■ We maintain confidentiality. ■ We do not use our position in our organization for personal gain. 	
	
	Business Policy	<ul style="list-style-type: none"> ■ We use Field Innovation to find new approaches and the inspiration to improve ourselves, while delivering added value to our customers. ■ We provide global environmental solutions in all our business areas. ■ Fujitsu Group companies work together to accelerate our global business expansion.

1.4 Smart Grid: Electric Utility Benefits from Fiber Infrastructure

Smart Grid technology is enabled by fiber optic networks by allowing for critical new capabilities to be established to reduce cost, improve visibility of information, and increase safety for the electric utility and the consumers of electrical services.

[When power grids were designed in the past, it was based on certain understanding of current requirements that were somewhat simple:

- Localized power generation
- Energy demand of homes were low

1. Executive Summary

- Electric delivery and billing was focused on set cadence and one way interaction

The new demands of an electric grid require two way communication between the customer and electric utility, exchanging electricity and information on a consistent basis. The new grid requires more interaction and visibility to enhance:

- Controls
- Communications
- Security
- Wind and Solar, and other green technology
- Electric vehicle enablement

Fujitsu believes, and the U.S. Department of Energy has said that fiber is a highly valuable addition to an electric utility:

“Utilities accrue additional advantages when they design communications networks that have the bandwidth, latency, and capacity to serve other needs, such as DA and DSM, in addition to metering and billing. Many utilities leveraged high-capacity communications networks to serve a variety of needs, including gas and water metering and to offer internet and file transfer services to customers.”

– U.S. Department of Energy

“Fiber optic cables offer high bandwidth, low latency, and high reliability, but have relatively higher costs and may be better suited to urban deployments that build on legacy fiber networks already in place.”

– U.S. Department of Energy

The Smart Home is an emerging requirement from electric utilities as customers are increasing their management of electricity and wish to manage their electric usage accordingly.^{1]} Smart appliances can be connected to the grid to allow for optimal timing of use to reduce the overall cost of electricity for that use.

Renewable power sources are growing in use and add complexity to the management and effectively utilizing their variable power generation. Solar and wind are two important power sources being increasingly utilized, which benefit from enhanced analytics on the data being produced from those sources and leading to greater automation of the grid.

Fiber Networks

[Smart Metering allows for greater and more frequent communication to be shared between utility and customer to enhance grid management and customer satisfaction to allow for the right relationship to be set. A report by the U.S. Department of Energy related to their Smart Grid Investment Grant Program showed powerful results and significant evidence of the value of AMI technology:

- Reduced costs for metering and billing from fewer truck rolls, labor savings, more accurate and timely billing, fewer customer disputes, and improvements in operational efficiencies.
- More customer control over electricity consumption, costs, and bills from greater use of new customer tools (e.g., web portals and smart thermostats) and techniques (e.g., shifting demand to off-peak periods).

¹ https://www.smartgrid.gov/the_smart_grid/smart_grid.html

1. Executive Summary

- Lower utility capital expenditures and customer bill savings resulting from reduced peak demand and improvements in asset utilization and maintenance.
- Lower outage costs and fewer inconveniences for customers from faster outage restoration and more precise dispatching of repair crews to the locations where they are needed.
- Over a 3-year period, SGIG projects cumulatively:
 - Saved \$316 million in O&M costs—an average of \$16.6 million per project reporting
 - Avoided 13.7 million truck rolls and 68.3 million vehicle-miles traveled
 - Saved an estimated 15,160 tons of CO2 equivalent emissions

It is important to understand utility needs and capability requirements to best select the infrastructure that will meet those needs. Fiber infrastructure provides future ready ability given any innovations that come, as fiber is the fastest medium for transmitting data. These requirements may include:

- Bandwidth
- Latency
- Cost
- Reliability and coverage
- Backup power need
- Cyber security considerations

Case Studies on Fiber with Utilities:

A few communities that have relied on fiber to enhance their electric grid include:

- Centerpoint Energy, Houston TX
 - 2.3M customers
 - \$24M in annual savings related to service orders
- Electric Power Board of Chattanooga, Chattanooga TN
 - 175K customers
 - \$1.6M in annual operations cost savings
- Central Lincoln People's Utility District, Oregon
 - 38K customers
 - 50% reduction in meter operations costs
 - 85% reduction in truck rolls related to billing, and connect/disconnects^{2]}

Energy Management

² *Advanced Metering Infrastructure and Customer Systems: Results from the Smart Grid Investment Grant Program PDF – Smartgrid.gov / U.S. Department of Energy (September 2016)*

1. Executive Summary

Given that energy being produced reaches the end customer within moments, it is critical that electric utilities have visibility into the end user electric requirements to best balance the production to deliver only required energy. Fiber optic networks allow for that information to be made visible and provide a powerful tool to electric utilities to best manage their grids, in real time. This greater insight reduces the chance of outages and lowers the overall need for peak power.

With additional information and capability of the fiber infrastructure, managing outages, and rerouting and restoring services is critical to customer satisfaction and continued success. When information is gathered and analyzed quickly, it can soon be transformed into the ability to predict electric events and act upon those prescriptive recommendations prior to a negative impact to service.

1.5 Community Benefits of Fiber Infrastructure:



Residents telework



Police use data to track & prevent crime



Schools use online resources, and increase safety



Libraries connect residents to online everything



Residents use e-government services



Government tracks traffic patterns to improve road planning



Small businesses in mixed-use developments participate in e-commerce



Public agencies gather & use data to improve transportation (BATA), parking and travel info to users



Community members share and learn about local events & activities



Local governments host virtual town halls & build e-government platforms to share info & alerts



Patients have access to more health care info and options



Utilities use remote technology to monitor & improve performance & efficiency



Businesses relocate to the community, creating jobs

Source : USA Dept. of Commerce and the NTIA

Telework

[According to the Bureau of Labor Statistics, telework is becoming a more important part of the economy and has significant benefits:

- Regular telecommuting grew 115% in the past decade, nearly 10 times faster than the rest of the workforce
- Average income for most telecommuters is \$4,000 higher than that of non-telecommuters
- Half of telecommuters are 45 years of age or older
- Telecommuting grew the most in Chattanooga, TN (325%) from 2005 to 2015
- Employers can save over \$11,000 per half-time telecommuter per year

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- Half-time telecommuters gain back 11 days a year – time they would have otherwise spent community^{3]}

Crime Prevention

Additional access to monitoring technology through a fiber network will enable police to more efficiently use resources to help protect the community. The cost of cameras to monitor high crime areas or highly trafficked areas is reduced significantly when a high speed infrastructure is in place. Community events that expand the population by a large amount will necessitate more flexible police capability without extra cost, which a fiber optic network enables.

School Resources

[The Digital Divide is everywhere and it is most importantly seen in the ability of school children to access resources and complete their homework. 7 in 10 teachers are assigning homework that must be complete online, yet over 15% of US households do not have access to affordable internet at home.

"Roughly one-third of households with children ages 6 to 17 and whose annual income falls below \$30,000 a year do not have a high-speed internet connection at home." – Pew Research^{4]}

Libraries and Institutions

Libraries are a critical part of the community that allow for access to the internet and improve the community by providing opportunities that some individuals may not have available.

["Underserved students with access to only one electronic device in their home – oftentimes only a cell phone – may face challenges that don't exist for their peers in terms of completing schoolwork." – Center for Equity in Learning^{5]}

E-Government Services

E-Government Services allow for greater transparency and engagement for the citizens and community. Fiber optic networks allow for enhancements in accessing information that is provided by government, services that are critical to the daily life of citizens, and building trust with the community.

Traffic and Road Planning

Managing traffic and congestion is an important aspect of any size city, especially when cities see a swell of population during certain months of the year. Many cities across the nation have implemented traffic management plans. [One example is Pittsburgh PA, reducing travel time by 25%, and car emissions by 20% using smart traffic lights.^{6]}

E-Commerce and Efficiency

With greater connectivity to businesses, both large and small, e-commerce is enhanced and made available. Selling products online and allowing employees to be more productive with higher speed internet can improve revenue and reduce costs.

³ 2017 State of Telecommuting in the U.S Employee Workforce PDF – Presented by Global Workforce Analytics + Flexjobs

⁴ <https://www.pewresearch.org/fact-tank/2018/10/26/nearly-one-in-five-teens-cant-always-finish-their-homework-because-of-the-digital-divide/>

⁵ <https://equityinlearning.act.org/wp-content/themes/voltron/img/tech-briefs/how-many-devices.pdf>

⁶ https://apolitical.co/solution_article/pittsburgh-cuts-travel-time-25-smart-traffic-lights/

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["The existing broadband infrastructures (cable modem, wireless, and DSL, respectively) have significant limitations when compared to fiber-to-the-premises (FTTP), which reaches only a small fraction of the United States. The cable, wireless, and DSL networks will require extensive upgrades, such as the construction of fiber optics closer to the premises, in order to provide businesses the capacity many currently need and most will eventually need." – The Impact of Broadband Speeds and Price on Small Business, For Small Business Administration, Office of Advocacy⁷]

Healthcare Information and Options

High speed internet that is of high quality can directly impact the ability and desire of people to seek out important healthcare information.

["Despite IT support, participants still experienced internet connectivity issues that negatively impacted their health information seeking. Frustration in their search to find information may serve as an additional barrier to those who have medical issues...After initial internet access, a second-level digital divide emerged due to connectivity issues..." – JAMIA, Journal of Informatics in Health and Biomedicine⁸]

Business and Employment

[Business and employment is tied to internet connection and speeds:

"...for every one percentage point increase in broadband penetration in a state, employment is projected to increase by 0.2 to 0.3 percent per year." – The Brookings Institute

"Part time business who rely on the Internet employ 6.6M employees and pay \$797M in wages the vast majority of which is spent and re-invested in their local economies." – Internet Enabled Part Time Small Businesses Bolster U.S. Economy, The Internet Association

"The Internet helps these kinds of part time businesses by increasing efficiency for 86%, productivity for 82% and by helping business owners to save money for 78%." – Internet Enabled Part Time Small Businesses Bolster U.S. Economy, The Internet Association⁹]

What Many Experts Say

Numerous studies and sources have shown significant reliance on high speed internet, and how it benefits the community and citizens themselves:

⁷ The Impact of Broadband Speed and Price on Small Business PDF – Columbia Telecommunications Corporation prepared for SBA Office of Advocacy (November 2010 pg. 10)

⁸ <https://academic.oup.com/jamia/article/23/6/1053/2399232>

⁹ <http://internetassociation.org/wp-content/uploads/2013/10/InternetAssociationExecutiveSummary-InternetEnabledPartTimeSmallBusinessesBolsterEconomy.pdf>
https://www.brookings.edu/wp-content/uploads/2016/06/06labor_crandall.pdf

1. Executive Summary

450+

US Communities that
Invested Public
Broadband Infrastructure

Source: Muninetworks.org

84%

Job Seekers
Completing
Applications Online

Source: Pew Research

23%

Economic value from
fiber is business
efficiency improvement

Source: University of Tennessee at Chattanooga

4%

Increase in Household
Income Due to Broadband

Source: Arthur D. Little and Chalmers University of
Technology, "Socioeconomic effects of broadband speed,"
September 2013

1.1%

Growth in Per Capita
GDP Due to Broadband

Source: Fiber to the Home Council, Washington, D.C.

3.1%

Rise in Home Values Due
to Broadband Access

Source: US Dept. of Commerce, NTIA,
National Study

2. Competitive Analysis

2. Competitive Analysis

The market assessment summarizes the competition in terms of competitor presence, technology, and speed tiers offered, as well as target customers based on population demographics and customer types (end consumer, property management, businesses) with additional layers of geographic detail included. In addition to providing a current state snapshot of the market, these insights uncover broadband availability and adoption gaps that spell opportunity for a new broadband provider.

2.1 Summary

- TCLP's broadband marketing and offering will have to focus on converting customers from Local Competitors and creating new broadband subscribers in the Traverse City area in order to build a substantial customer base. Both will be equally important.
- Local Competitors are the most significant players in Traverse City and have the most to lose to a new broadband competitor.
- Fujitsu expects competitors to also challenge, to the extent possible, with anti-competition tactics to slow or stall the project.

2.2 Recommendations

- TCLP should enter the broadband and voice services markets. Fiber-powered broadband should be the core focus of its service with respect to the current competition.
 - TCLP should emphasize the technology benefits of fiber-powered broadband versus Local Competitors offerings in consumer messaging.
 - TCLP should consider reducing customer switching costs and hassle as much as they can to make the offer all the more compelling to current Local Competitors customers.
- Local Area Overview

Traverse City exhibits a relatively high broadband adoption rate as reported by the FCC. These adoption rates were measured at a census tract level for at least 10/1 Mbps speeds and are reported in terms of a range (e.g. 60-80%, 80-100%, etc.). When considering all census tracts that Traverse City occupies, approximately 90% of households have a broadband connection. A more recent update from the 2017 American Community Survey measures broadband adoption for Cable/Fiber/DSL. This approach shows that broadband adoption rates are still high, but range from 60-90% depending on the census tract. The fact of 90% at 10/1 demonstrates consumers rely on broadband and is a much needed service. Data also shows that speeds are well below 25/3 which is a strong indication that consumers will change service providers for much higher speeds as long as price remains competitive.

2. Competitive Analysis

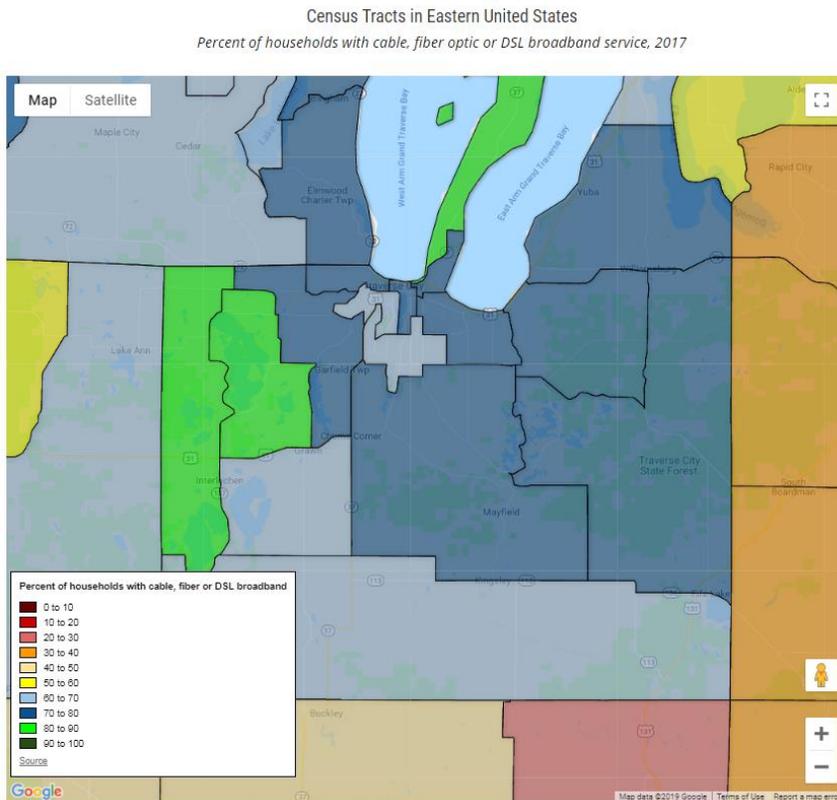


Figure 1: Measured in 2017, Traverse City exhibits a range of broadband adoption rates between 60% and 90%. Source: US Census, National Digital Inclusion Alliance (NDIA).

Fujitsu used TCLP’s service area as a proxy for its targeted broadband network deployment area. The FCC collects detailed census block level information regarding every broadband provider’s service presence across the country. This includes technology and advertised download and upload speeds by geography. By these measures, Fujitsu can conclude that no fiber-based competitor is currently deployed in TCLP’s service area. Local Competitors represent the primary wired broadband competitors (Figure 2).

These findings generally correlate with advertised available speeds offered on Local Competitors respective consumer websites. However, Local Competitor does advertise 100 Mbps speeds in the central and northeastern sections of the city. More recently, Local Competitor has begun to offer near gigabit speeds with its DOCSIS 3.1 technology. However, Fujitsu believes that this is deployed to very limited areas. When comparing fiber to

DOCSIS 3.1, fiber offers symmetrical speeds for downloading and uploading whereas DOCSIS 3.1 is asymmetrical, focused on only delivering increased download speeds.

2. Competitive Analysis

Competitive Analysis

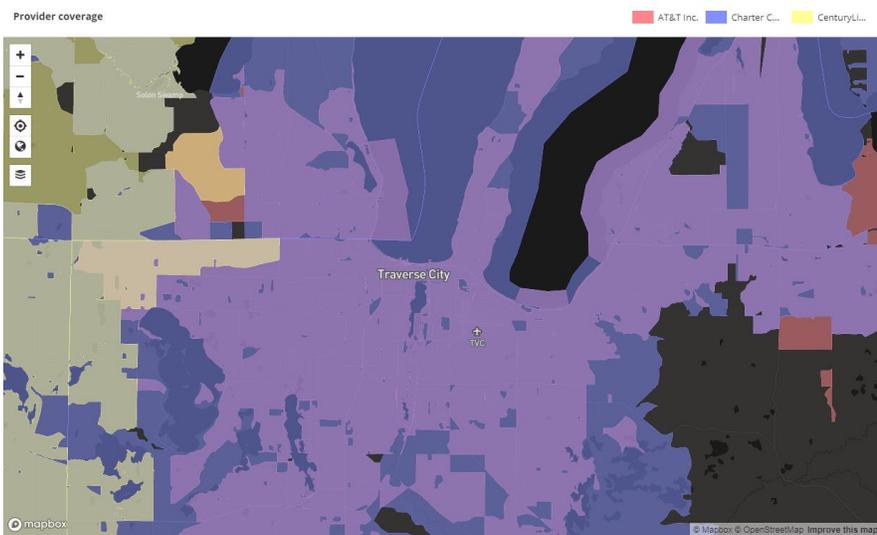


Figure 2: Source: FCC as of June 2017. The lighter purple shade indicates presence of Local Competitors. CenturyLink does have presence in the general area, but does not intersect with TCLP's service area.

Current Broadband Providers and Availability			
Provider	Technology	Availability	Max Advertised Speed
Spectrum*	Cable	99%	100 Mbps
AT&T	DSL	75%	24 Mbps
CenturyLink	DSL	4.5%	30 Mbps
Acentek	DSL	4%	10 Mbps
Windstream	DSL	2.8%	10 Mbps
CynergyComm	DSL	1.2%	1.5 Mbps

Source: Broadband Now for Traverse City, Michigan, March 2019

Note: Figures reported by Broadband Now tend to be over-reported. The maximum advertised speed does not necessarily correlate with the percentage availability within the city.

*As noted earlier, Spectrum has begun to offer near gigabit speeds with its DOCSIS 3.1 technology. However, Fujitsu believes that this is deployed to very limited areas.

2. Competitive Analysis

2.3 Competitor count by technology & advertised speeds

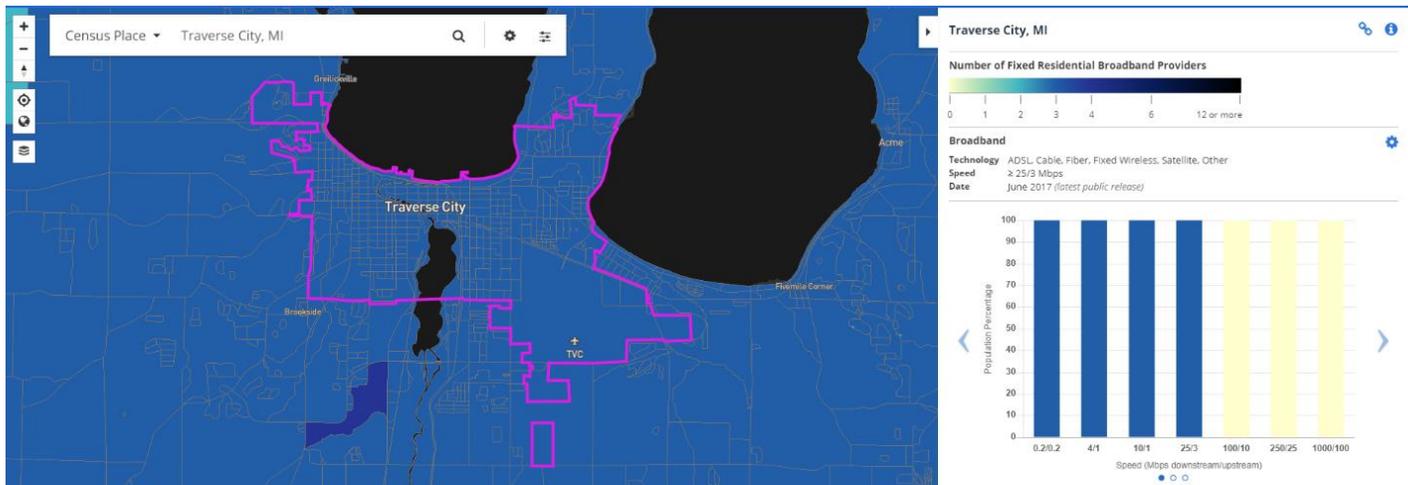


Figure 3: Source: FCC as of June 2017. 3 to 4 broadband providers have presence in this market across all technologies including fixed wireless and satellite. No competitor advertised more than 25/3 Mbps at the time of this dataset.

2.4 Current Customer Satisfaction

Fujitsu identified over 100 customer Google reviews for Local Competitor services tied to its local customer service location in Traverse City. Below is a sample set of ad verbatim commentary relevant to customer experience with Local Competitor services. The reviews have been anonymized and date from the last 2 years. The average customer satisfaction rating per Google reviews is 2.8 out of 5. Dissatisfaction stems from price increases, service reliability and scheduling installation.

“Still don't like their business model of valuing new customers over current ones.”

“Terrible customer service, bad communication between representatives, late to hook up service, charged for extra months after I had asked for service to be removed and moved out of state. No help from them after moving. Have been a good paying customer of them my whole life and never had a good experience with them. Never again.”

“Just spoke to Jennifer there today at TC location. Poor customer service/ in fact none at all. Very disappointed after being a loyal customer for many, many years. My high speed internet started at \$49.99 and I was aware it was promotional for only a year and would increase by \$10 but now it is up to \$70.99 for just internet! They don't notify you, they sign you up for auto billing and try to steal from you unless you read every detail on the billing statement. They are unethically monopolizing people. Charter said originally it would only go up \$10. But here we are 3 years later and it's \$70.99. Bad business charter, as usual.”

“The customer service is trash and the service in general is spotty at best. Go with your local provider. I gave them every opportunity to work with me. Only word I can use for this company is trash.”

“Way too many problems for their high costs.”

2. Competitive Analysis

"I wish my internet worked full speed all the time not just on and off.... obviously I'm posting late; therefore that shows when it's not working. Not only does it quit during the night but also in the early evening. It is frustrating when I can't get things like Netflix or Hulu to work, let alone connect to the internet."

"Total rip off! Prices always going up!"

"Monopoly on the market, I must have had at least 20 visits out at my house in a year's time .. \$140.00 for Cable just think of how many people have this besides me ...? Do the math ..."

"Like the service. Cost was just to[o] much"

"Customer service is nonexistent.....I moved my office and they gave me a date they could install cable, two weeks later they want to reschedule for another week. R[i]diculous! I'm losing business because of their incompetence."

"Not pleased with the pricing. They lie about the intro offer and the price going up after two years. We have no competition to push them lower in pricing. The northern experience, little choices and they're all to[o] expensive. "

"Hate charter. Always a pain to deal with. Wish there was an alternative. 2 years later still the same"

2.5 Competitor Pricing Research Approach - Disclaimer

Fujitsu researched competitor pricing for new residential and business broadband, video, and voice services as of March 2019. Fujitsu researched provider websites to learn the pricing, speeds, and financial incentives offered by competitors to sign up for services on their website. New customer pricing is subject to change based on the marketing campaigns competitors engage in. Current customer pricing will also vary from new customer pricing based on current residential/business agreements from a previous price agreement/contract, marketing campaign, promotional pricing, or customer satisfaction-induced pricing incentives to prevent the customer from switching providers.

2.5.1 Current Competitor Pricing – New Residential Customers

Broadband-only: With respect to broadband-only services, Local Competitors offer varying speeds across Traverse City neighborhoods. Speeds are given in terms of download.

2. Competitive Analysis

Current Competitor Pricing – Residential -Advertised New Customer Pricing as of March 2019-		
Broadband Service Attributes	Local Competitor	Local Competitor
Advertised speeds	5-18 Mbps (varies by address)	30-100 Mbps (varies by address) Central and Northeast area have access up to 100 Mbps, Southwest area only 30 Mbps
Pricing	\$40-\$50/month	\$14.99-\$44.99/month. Modem included
Contract Agreement	Yes. 12 months. Early termination fee applies.	No, but pricing valid 12 months
Installation fees	\$35 self, \$99 technician	Yes, but amount unknown
Data cap	1 TB/month. \$30/month unlimited data plan available	None.

Voice: Voice services are typically only offered if the customer bundles with broadband and/or cable services.

- Local Competitor: Bundling voice services with broadband adds approximately \$20/month to the broadband service for the first year of service. This price can be effective for 2 years with a 1 year contract.
- Local Competitor: Bundling voice services with broadband adds approximately \$10/month to the broadband service for the first year of service.

Broadband, Video and Voice:

- Local Competitor: \$85-\$170/month. Offers mostly vary based on channels included rather than broadband speed. Other installation fees and contract agreements are still required.
- Local Competitor: \$99-\$139/month. Prices are valid for 12 months as a bundle.

2.5.2 Current Competitor Pricing – New Business Customers

Local Competitors have similar business models between their residential and business customers. One Local Competitor offers higher speeds and clearly positions themselves as a no-contract alternative to another Local Competitor. The other Local Competitor charges a significant premium for voice services versus the other Local Competitor.

2. Competitive Analysis

Current Competitor Pricing – Business

-Advertised New Customer Pricing as of March 2019-

Broadband Service Attributes	Local Competitor	Local Competitor
Advertised speeds	Up to 12 Mbps	100 Mbps, 400 Mbps
Pricing for Broadband + Voice	\$70-\$85/month (higher price includes tech support)	\$65/month (100 Mbps) \$110/month (400 Mbps)
Pricing for Broadband Only	\$40/month	\$60/month (100 Mbps)
Contract Agreement	12 month agreement	None, but prices are only effective for 1-2 years.
Installation fees	Not specified	Not specified

2. Competitive Analysis

2.6 Market Trends for Voice Services

Competitive Analysis

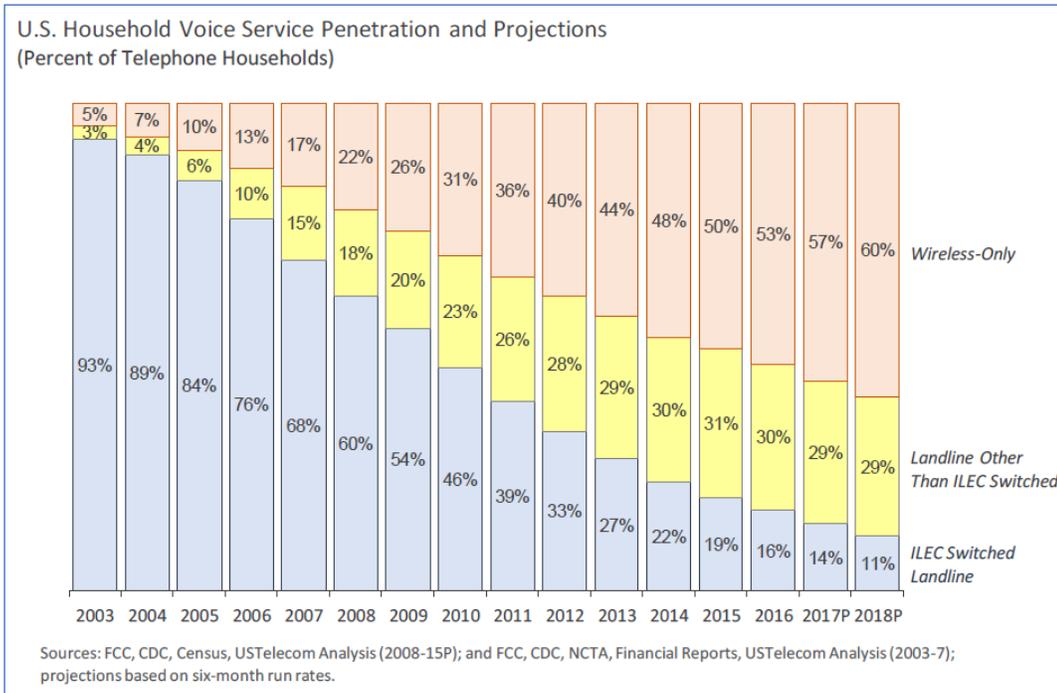


Figure 4: US Households Have Shifted to Wireless and IP Voice
 Source: US Telecom | The Broadband Association 2018

Data suggests that the American consumer has trended towards reliance on mobile devices for all voice services. Based on insights found by US Telecom / The Broadband Association, 93% of American households had a landline voice service in 2003. That figure has plummeted to 16% in 2016 and is projected to continue its decline, ceding share to wireless-only voice connections and IP voice. Wireless-only voice connections are expected to grow market share to the tune of 60% in 2018.

This pattern is evident from Grand Traverse county fixed voice subscriptions with respect to FCC’s Form 477. In June 2015, 19,000 out of 35,000 residential households had a voice subscription. That figure has declined by approximately 1,000 subscriptions annually through June 2017, where it now stands at 17,000 subscriptions. This is an 11% decline over the past two years. The voice market size continues to decline. Despite the overall decline, voice service is a traditional service offered by the current competition and the lack of one may be an impediment to current Local Competitor customers switching to TCLP. Insights from Fujitsu’s customer have shown that they were able to achieve a 28% take rate on voice services. Business customers would be more attractive from a voice services standpoint because cell phones may be insufficient to support their operational needs. These factors should be kept in mind in the rollout of a voice offering.

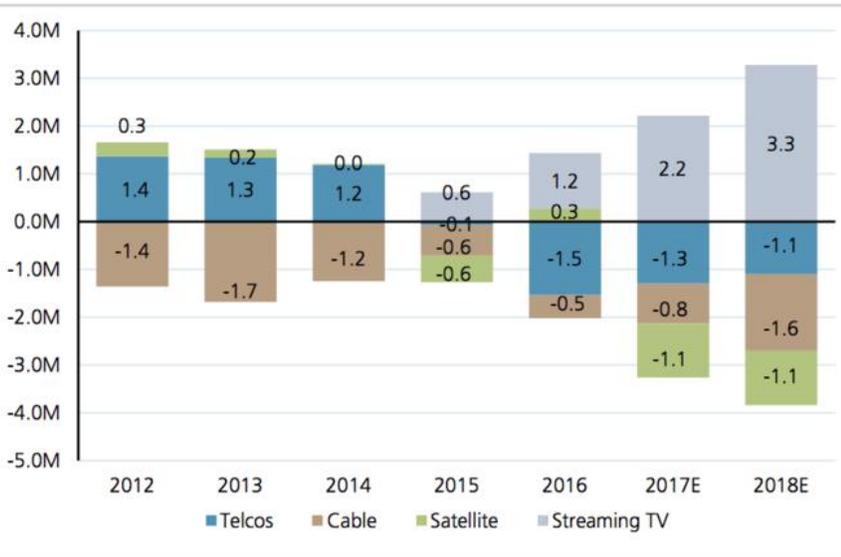
2.7 Market Trends for Video Services

As noted in several news outlets, including FierceVideo (“Cord Cutting Almost Doubled in 2018”), the decline in linear video services (traditional cable) has been well documented. Many subscribers are taking advantage of the various streaming services available. Cable companies are rushing to add streaming services to their own portfolio as they

2. Competitive Analysis

continue to hemorrhage customers of traditional services like cable and satellite. The below chart from UBS illustrates this trend for video providers themselves.

Competitive Analysis



Source: Company data, UBS estimates

Figure 5: Pay TV Net Additions by Provider. Streaming services are cannibalizing cable provider traditional offerings

In addition, according to an article from FierceVideo (“Cord Cutting Almost Doubled in 2018”):

“The pay TV market saw net losses increase in 2018. Overall, the top pay TV providers lost 3.1% of subscribers in 2018 compared to a loss of 1.6% in 2017,” said Bruce Leichtman, president and principal analyst for Leichtman Research Group, in a statement”.

While overall customer preferences are trending towards streaming at the expense of traditional video, that trend is not uniform with respect to age demographics. A Pew Research study conducted in 2017 indicates that the older the age group, the increasing likelihood they still rely on traditional video relative to streaming as the primary means to watch video content. The majority of younger adults, 18-29 years old, are already firmly in the streaming camp at 61% versus cable at 31%. That trend is beginning to show in adults 30-49 years old where streaming at 37% is catching up to cable at 52%.

Based on the American Community Survey age population distribution recorded in 2017, Traverse City’s profile has slightly higher representation for older age groups than the nation overall (Figure 6). Traverse City’s median age is 40.6 years old whereas the United States median age is 37.8 years old. This emphasizes the importance of converting customers in older age groups with respect to their affinity with traditional video services.

2. Competitive Analysis

Competitive Analysis

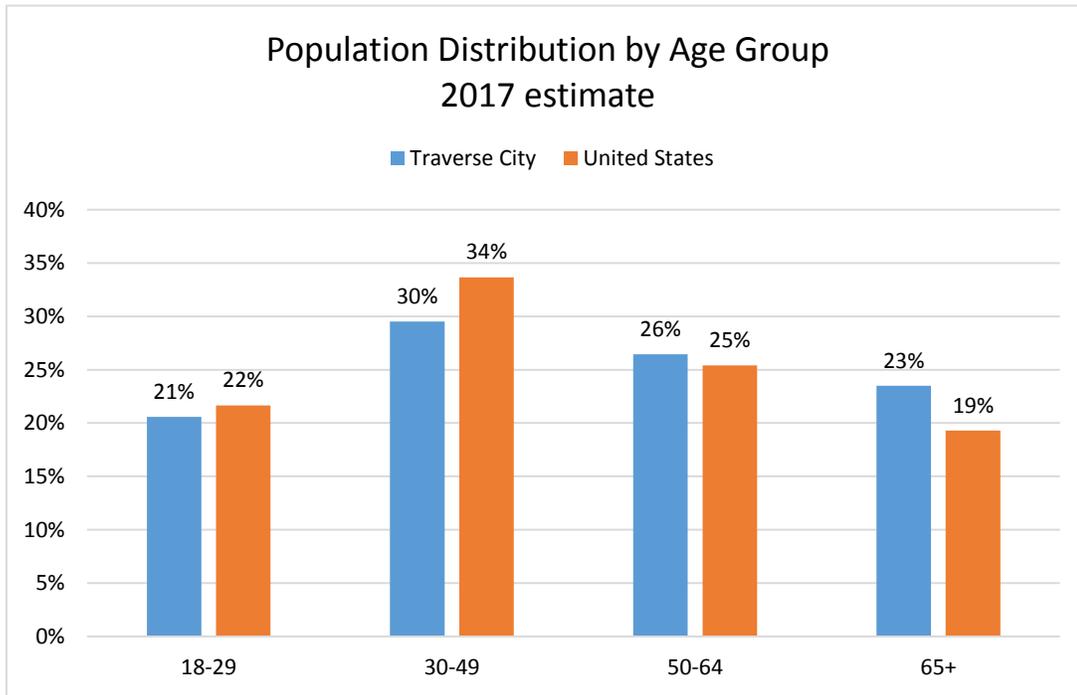


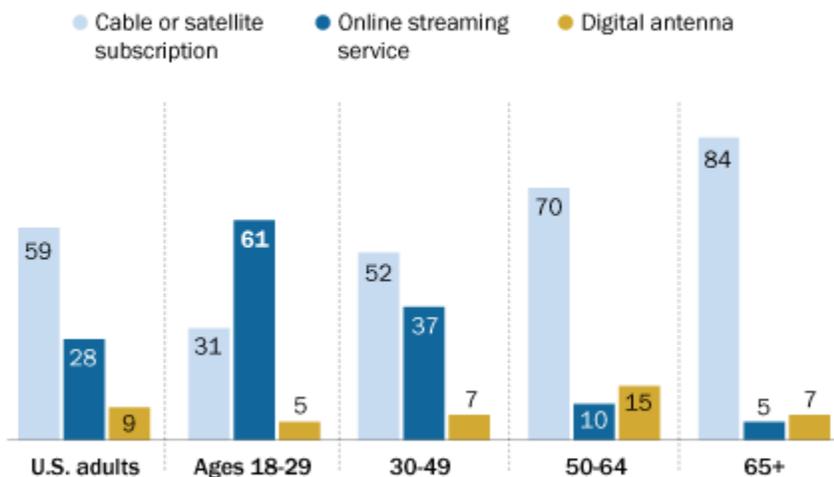
Figure 6: Traverse City population profile is slightly older than the nation. TCLP's successful entry into the market depends partly on converting customers from traditional video packages who are in older age groups. Source: American Community Survey 2017.

2.8 Competition Scenarios

Without investing into fiber-to-the-home (FTTH) technology themselves, Local Competitors do not have the physical network infrastructure to substantively compete with TCLP's FTTH offering. TCLP's entry into the competitive landscape will undoubtedly give Local Competitors cause for concern and they will be compelled to respond by less expensive means than investing into FTTH. While Fujitsu was able to collect insights from how Local Competitors are currently positioning themselves to prospective customers online, we also have access to Fujitsu's customer's experience competing with Local Competitors. As Local Competitors already compete with each other, it is likely they will have to extend these strategies to TCLP to reduce their own customer churn and convert from others.

2. Competitive Analysis

% of U.S. adults who say ___ is the primary way they watch television



Source: Survey conducted Aug. 15-21, 2017.

PEW RESEARCH CENTER

Figure 7: Young Adults Use Streaming Services Most to Watch TV

2.9 General competitor activities – Early Stages

- **Public Relations:** Local Competitors would be motivated to scale up advertising and overstate technology coverage saying that their network can offer higher connection speeds. Per feedback from another Fujitsu customer, residents were receiving mass mailings from providers. It is unlikely that Local Competitors will prioritize Traverse City among their other markets for fiber upgrades given its relatively small population.
- **Pricing/Incentives:** Local Competitors would reduce initial 1st year prices (bundles and a la carte services) and waive installation fees. This was observed by Fujitsu customers.

2.10 General competitor activities – Later Stages

- **Switching Hassle and Cost:** A previous FCC study (“Broadband Decisions - What Drives Consumers to Switch”, 2010) indicates that the switching hassle and cost for consumers is a major impediment to switching to a new broadband connection. Approximately 23% of consumers switch their provider within 3 years of signing up for the service. In addition, just 21% of consumers said they would seriously consider switching providers if they had a choice of other providers. A summary of switching costs and hassles for current Local Competitor customers is shown in the below table.

2. Competitive Analysis

Switching Costs and Hassles - Local Competitor		
Account Switching Item	Local Competitor	Local Competitor
Customer hassle for transition scheduling	Yes	Yes
Setup costs	Installation (self or technician), Modem	Installation (self or technician)
Contract agreements	Yes, with early termination fee	No
Switching incentives	\$50 gift card for signing up	\$500 applied to contract termination with competitor
Account transferrable if moving	Yes	Yes

- Many providers require new customers to schedule their day around the provider’s technician availability. Some give a 2-hour window or an unpredictable all-day window. With a new provider, the customer is also typically hit with activation and installation fees, having to purchase a new modem and possibly a new router if it is incompatible. During the switch, the customer also has to be conscious of the transition. The customer may either have to overlap services (pay twice for a broadband connection) to avoid being without broadband or go for a few days without broadband. Neither is an attractive proposition for the typical customer.
 - Local Competitors find ways to financially incentivize customers to switch or stay. Because Local Competitor requires customers to sign a 1 year agreement, Local Competitor competes by offering Local Competitor customers up to \$500 to terminate their contract and switch to Local Competitor service offering. Other switching incentives includes gift cards provided the customer orders the service online (Local Competitor: \$50) or the customer retains the provider for some stated period such as 6 months. The early termination fee as mentioned previously that Local Competitor customers would be subject to is another reason for a customer to remain with Local Competitor or delay their switch to someone else. Customers moving to the area have the opportunity to transfer their service if they already have a Local Competitors account from their previous residence.
- **Take Rate Results for Municipal/Utility Broadband:** Below is a listing of municipalities and utilities resulting take rates for residential broadband. Many exceed a 50% take rate. With an effective marketing campaign, these successful examples below illustrate the potential for TCLP to achieve these levels of take rates for its broadband offering. This list is not intended to be exhaustive, but does show a strong representation of empirical data to base recommended realistic scenarios for TCLP’s ISP business.

2. Competitive Analysis

- Longmont, CO: 54%¹⁰
- Oregon MINET: 85%¹¹
- Kit Carson Electric, NM: 70%¹²
- Rio Blanco County, CO: 75-80%¹³
- Cedar Falls, IA: 90%¹⁴
- LightTUBe, TN: 39-50%¹⁵
- Spanish Fork, UT: 60-80%¹⁶
- Fairlawn, OH: 50%¹⁷

¹⁰ Longmont - <https://muninetworks.org/content/more-half-longmonters-choose-nextlight-fiber-because-nextlight-fiber>

¹¹ Oregon MINET - <https://muninetworks.org/content/oregons-minet-new-approach-new-expansion-community-broadband-bits-podcast-340>

¹² Kit Carson - <https://muninetworks.org/content/transcript-community-broadband-bits-episode-277>

¹³ Rio Blanco County - <http://www.theheraldtimes.com/county-agrees-on-plan-to-finish-broadband-project/rio-blanco-county/>

¹⁴ Cedar Falls Utility - <https://muninetworks.org/content/transcript-community-broadband-bits-episode-75>

¹⁵ LightTUBe - Broadband Communities Magazine "Fall 2016 - Community Success Stories" - <https://bbcmag.epubxp.com/i/766692-2016-fiber-to-the-home-primer/24?m4=>

¹⁶ Spanish Fork - <https://muninetworks.org/content/utahs-spanish-fork-city-network-incredible-success>

¹⁷ Fairlawn - <https://efficientgov.com/blog/2018/04/20/fairlawn-proves-small-town-municipal-broadband-is-possible/>

3. Financial and Business Models

3. Financial and Business Models

The Financial and Business Models will detail the business strategy, planning, and analysis that is crucial for budgeting, forecasting, and analysis of major operations and network build activities that can be used to evaluate the viability of the network project.

For detailed financial information related to each scenario, please see **Appendix A**

3.1 Financial pro-forma

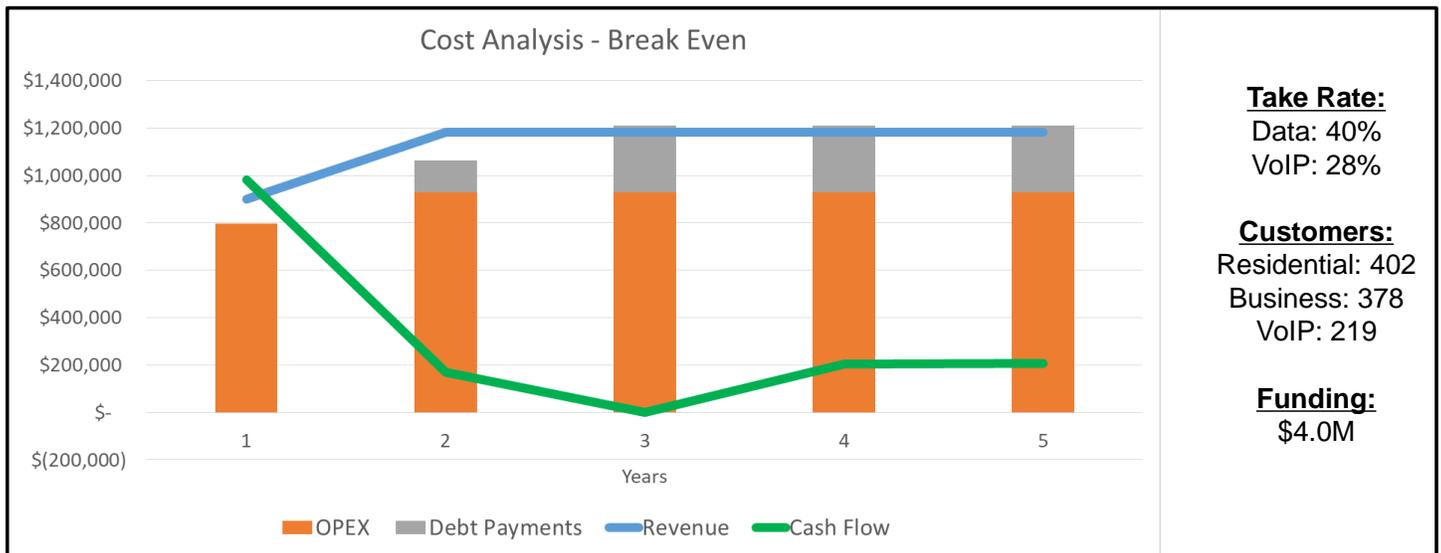


Figure 8: Break Even Scenario Summary

3. Financial and Business Models

Financial and Business Models

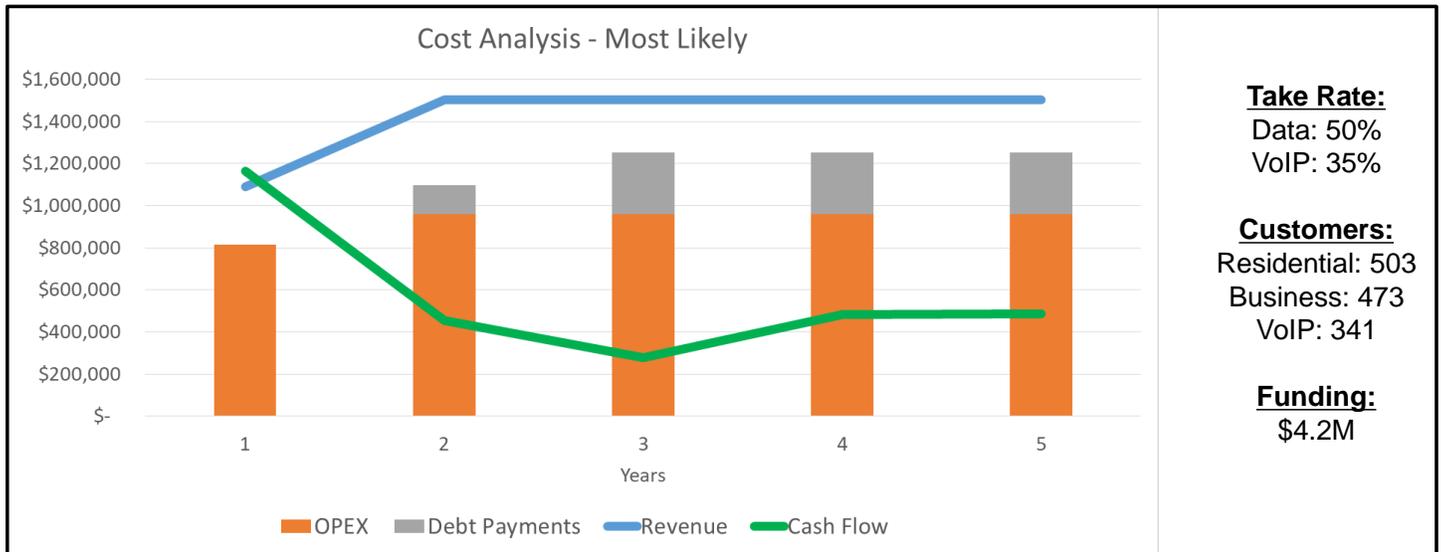


Figure 9: Most Likely Scenario Summary

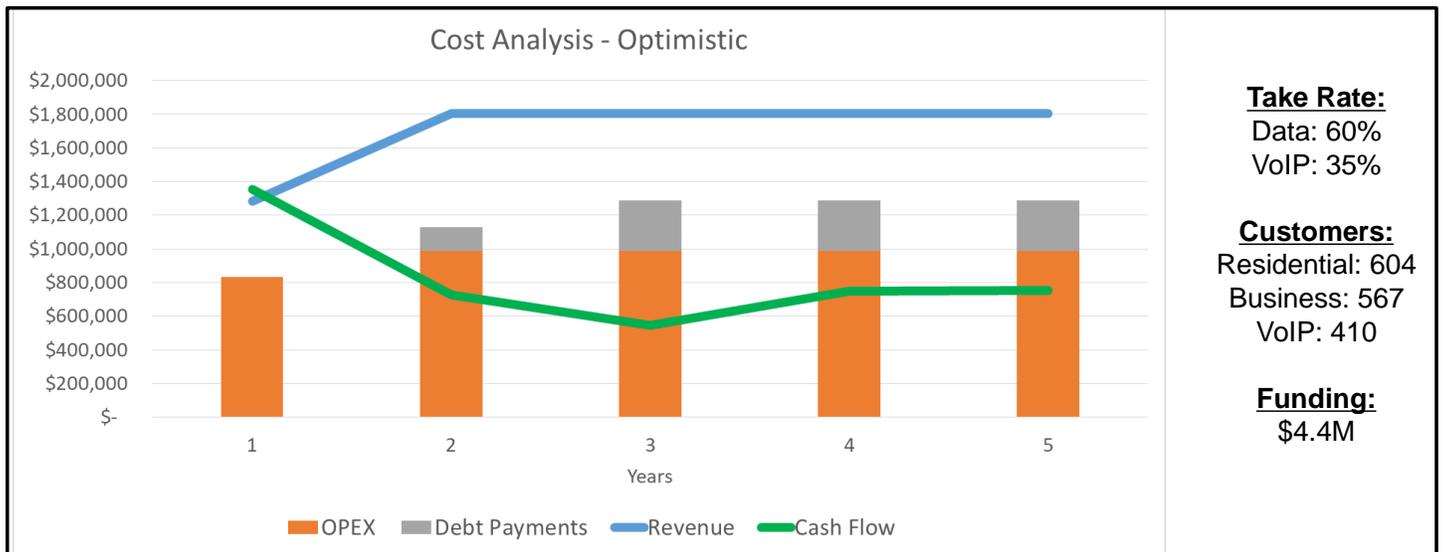


Figure 10: Optimistic Scenario Summary

3.2 Core Assumptions

In this report, there are core assumptions that should be known to best put into perspective the results and approach taken. Fujitsu worked with TCLP staff and board of directors to align with these assumptions and approach.

- Fujitsu would perform activities to market, sell, and provider services on behalf of the TCLP ISP organization
- No additional TCLP headcount is being assumed

3. Financial and Business Models

- This fiber business is considered separate from the TCLP electrical organization and does not impact electric service quality being delivered
- Services proposed are based on technology capability, current competitive market offerings (not promotional offers), and industry standards on quality and service
- Multiple financial scenarios would be shown, that include reasonable expectations for take rate, pricing, construction schedule, operations, and ISP functions, based on TCLP specific market data, Fujitsu experience, and other FTTH project data
- Incorporate the existing dark fiber business into the financial projections

In cooperation with TCLP staff, the Phase 1 project area was determined. This report reflects only Phase 1 data, and was developed with the following assumptions:

- Phase 1 project area is a subset of the entire city, and the data is focused on just Phase 1
- The Phase 1 network build and year 1 of operations is being considered for project funding
- Area selected is based on a holistic view of community benefits, competition, address density, residential and business mixture, data center location, existing fiber footprint, topology, and expected build time
- Phase 1 project footprint allows for cost effective expansion into next phases, should TCLP decide to do so

4. Functional Requirements, Analysis and Recommendations

4. Functional Requirements, Analysis and Recommendations

Fujitsu Solution Architect team followed a comprehensive comparative analysis based on the TCLP FTTx Project requirements based on the project objectives. Fujitsu further analyzed vendor data, equipment specifications, roadmap, product features and operational capabilities to form unbiased recommendations. These recommendations are discussed in detail in the following sections.

4.1 Core Network

The TCLP FTTx Core Network will be comprised of the essential components and infrastructure which houses the main active electronics for connectivity to the Internet cloud. The Core Network has three main components:

- Data Center
- Core WAN Gateway
- Core FTTx Electronics

Selection and design of the Core Network is highly dependent upon the technology selected, in this case namely Gigabit Passive Optical Network and its variants. Detailed analysis and recommendation are discussed in the following sections.

4.1.1 Data Center

Data Center (DC) also known as Point of Presence (PoP) is the main convergence and gateway location for the active electronics. The DC acts as the starting point for the optical fiber path to the subscriber and houses the active equipment racks (e.g. core routers, switches, IT infrastructure, FTTx Optical Line Termination (OLT)). The DC also has supporting inside plant infrastructure hosting optical distribution frame, racks, power, backup power, and splitters to name few.

Data Center primarily performs 2 functions in the FTTx context:

- Acts as WAN edge to connect to the Internet
- Acts as FTTx Core Point of Entry.

The physical size of the DC depends on the size of home served and varies based on the service provider and demography, from a few hundred to in excess of several thousand homes.

The Data Center can be built in an existing building or can be collocated in new building or shelter structure. Generally passive and active equipment bays/racks along with IT infrastructure are located in the same place, however if the number of homes exceeds tens of thousands, separate rooms and/or racks maybe required.

The Data Center should be classified as a secure area. Provision of fire and intrusion alarms, managed secure access, and protection against vandalism are paramount. Additionally uninterrupted power supply system (UPS) or backup rectifiers and essential climate control system need to be suitable and must be based on the equipment specification and environmental requirements.

4. Functional Requirements, Analysis and Recommendations

The below Figure 12 shows the logical connectivity between the Outside plant and the Data center Inside plant infrastructure.

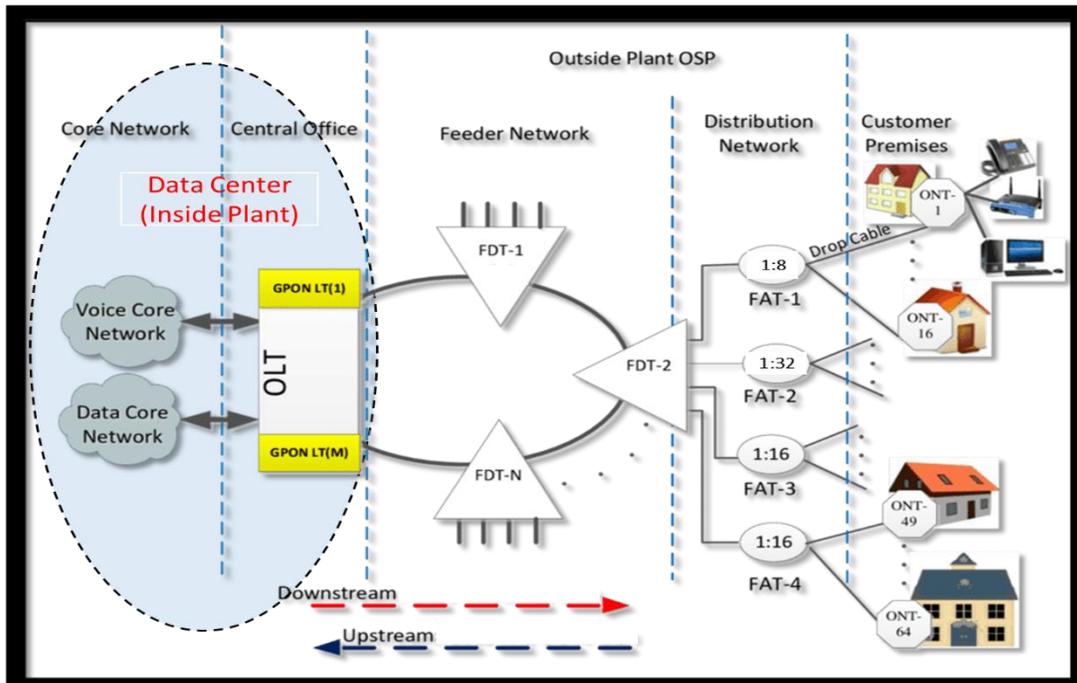


Figure 11: Logical connectivity between the Outside plant and the Data Center Inside Plant Infrastructure

The Data Center needs to make efficient connection of Outside Plant Infrastructure (OSP) to the Inside Plant Data Center Infrastructure (ISP) via Optical Distribution Frame (ODF). ODF patch panel connects Feeder Fiber to the OLT and WAN edge demarcation devices e.g. WAN routers and switches.

The connection method to ODF can be:

- Interconnection Method: Connects active OLT ports to the ODF ports (that terminates the feeder cable), using a simple patch cord.
- Cross-connection method: Mirrors the port of the active equipment in an additional ODF bay, essentially using 2 ODF bays to simplify visual complexity and operation. First ODF terminates Feeder cable just as in Interconnection Method. Both ODF are connected through fiber patch cables.

4.1.1.1 Requirements

- Phased out approach:
- DC Power Supply for the active electronic equipment
- Redundant Power supply, battery backups and rectifiers as per active electronics
- Secure Access to the site 24x7
- 2 redundant and separate Core and Feeder Fiber entries
- Preferred controlled access to the site
- Environmentally Controlled HVAC
- Closely located within broadband serving area

4. Functional Requirements, Analysis and Recommendations

- WAN Internet Connection Point

4.1.1.2 Analysis

Please see **Appendix B** for detailed analysis information regarding the Data Center site selection criteria and how Fujitsu developed the following recommendation.

4.1.1.3 Recommendation

After considering the Requirements and analyzing the data, Fujitsu recommends to [REDACTED] Data Center Core sites to arrange full coverage of the TCLP boundaries and extended serving areas for adjacent neighborhoods. Furthermore additional benefits will be

- Redundant core connectivity
- No single point of site failure for the WAN Core
- Distributed architecture with extended reach
- Fewer number of Distribution Fiber

This architecture will require [REDACTED] of fibers at minimum to provide Data Center level redundancy.

4.1.2 Core Wan Gateway Electronics Requirements

Fujitsu has evaluated multiple vendors for the CORE WAN gateway Routers and Switches that are to be deployed at TCLP.

4.1.2.1 Analysis

Fujitsu compared various electronic vendors based on product availability, features, roadmap market reputation and deployment in the similar role in FTTx broadband markets.

The detailed product analysis is outlined in **Appendix C** regarding the Core Wan Gateway electronics and how Fujitsu developed the following recommendation.

4.1.2.2 Recommendation

After considering the Requirements and analyzing the data, Fujitsu recommends [REDACTED]

4.1.3 CORE FTTx ELECTRONICS REQUIREMENTS

The Core FTTx electronics comprise mainly of the Optical Line Terminals (OLT's) which serve as the heart of any FTTx network.

OLT is a device which serves as the service provider endpoint of a passive optical network. As shown in section 1.1, OLT is a GPON aggregation device that is usually located at the Inside Plant end within the data center. An OLT converts the optical signals transmitting over fiber to the electrical signals and presents them to a core Ethernet switch. The OLT replaces multiple layer 2 switches at distribution points. OLT distributing signal is connected with backbone cabling or horizontal cabling through optical splitters, which are connected to the optical network terminal (ONT) at each work area outlet.

4. Functional Requirements, Analysis and Recommendations

Functional Requirements, Analysis and Recommendations

As shown in Figure 14, A GPON network consists of OLT (Optical Line Terminals), ONT (Optical Network Terminal), and a splitter. The splitter will divide the signal when needed. The OLT takes in all of the optical signals in the form of beams of light from ONUs and will convert it to an electrical signal.

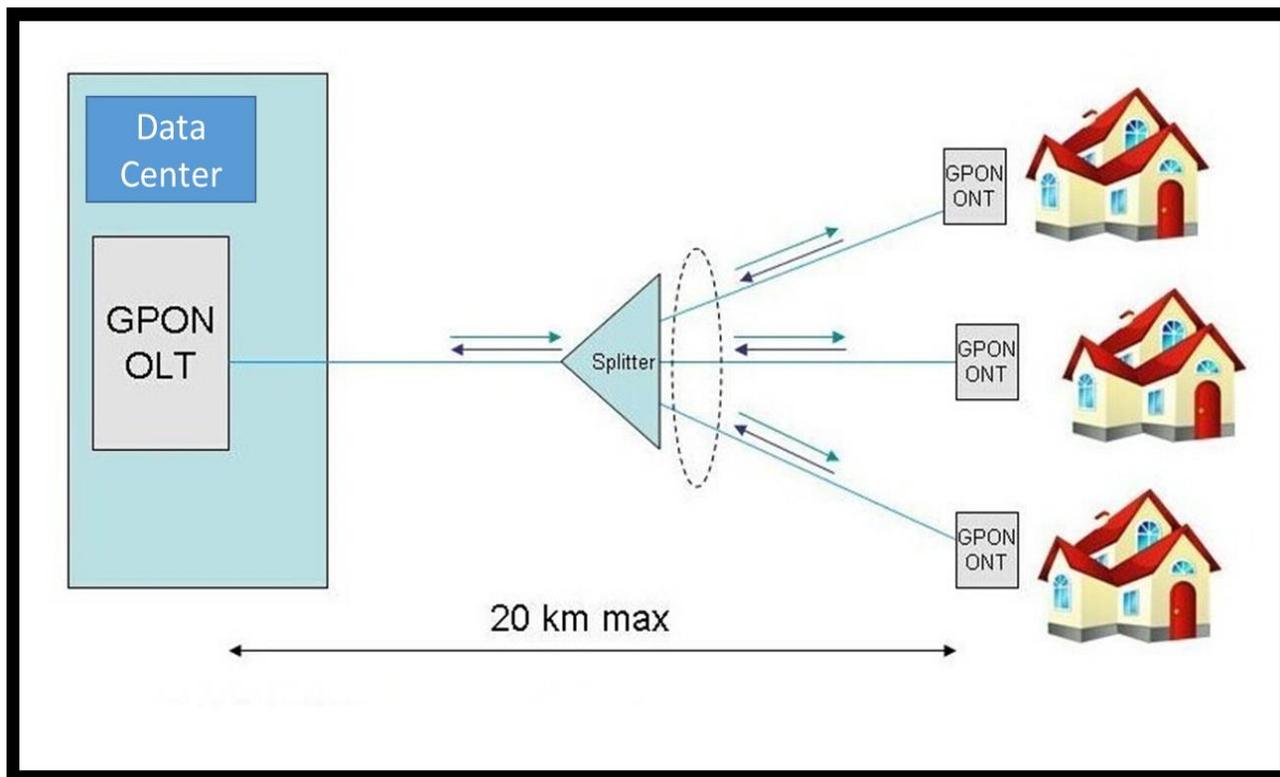


Figure 12: GPON Network with OLT, ONT, and Splitter

4.1.3.1 Analysis

See Appendix D for detailed analysis information regarding the FTTx Electronic and how Fujitsu developed the following recommendation.

4.1.3.2 Recommendation

Based on Fujitsu’s analysis and comparison of the vendor products, we noted some products are modular in nature but provisioning system and operation system need to operate independently.

A holistic approach needs to take ONT selection and EMS/NMS ease of operation and provisioning into account. One vendor is still a standalone instance and less intuitive when compared to its competition.

With respect to hardened OLT options which may need to be deployed at TCLP remote locations; say for the MDU based requirements or for any kind of distance limitations, [REDACTED] OLT’s offers much more robust portfolio with respect to hardened OLT options as compared with the other vendors that have been evaluated. These portfolios of hardened [REDACTED] OLT’s can be deployed at such locations and can be integrated back to the Core WAN gateways at the Data centers.

After considering the Requirements and analyzing the data, Fujitsu recommends [REDACTED] OLT’s to be deployed at the TCLP Data Centers.

4. Functional Requirements, Analysis and Recommendations

4.2 Home Network Electronics

Since Fujitsu is recommending an architecture based on the distance and density of serving areas, there is no need to create an active Access Network. Data Center can connect direct to the home network electronics through LCP cabinets in the field, hence saving cost and eliminating the need of extra distributed electronic system. It is important to not only analyze OLT but also compare features and availability of various options for home electronics. Industry standards still use closed options for OLT/ONT, therefore both OLT and ONT need to be from the same vendor and be part of the same product line to function gracefully. In previous sections Fujitsu has recommended [REDACTED] OLT system, therefore we will carefully analyze ONT to make sure ONT recommendation is aligned with overall strategy of TCLP.

Home Network or Subscriber Network consists of primarily 2 pieces of equipment: the optical network terminal (ONT), where the fiber is terminated, and the subscriber premise equipment (CPE) providing the necessary networking and service support. As shown in Figure 15, this equipment may be integrated or separated depending on the demarcation point between service provider and the end user.

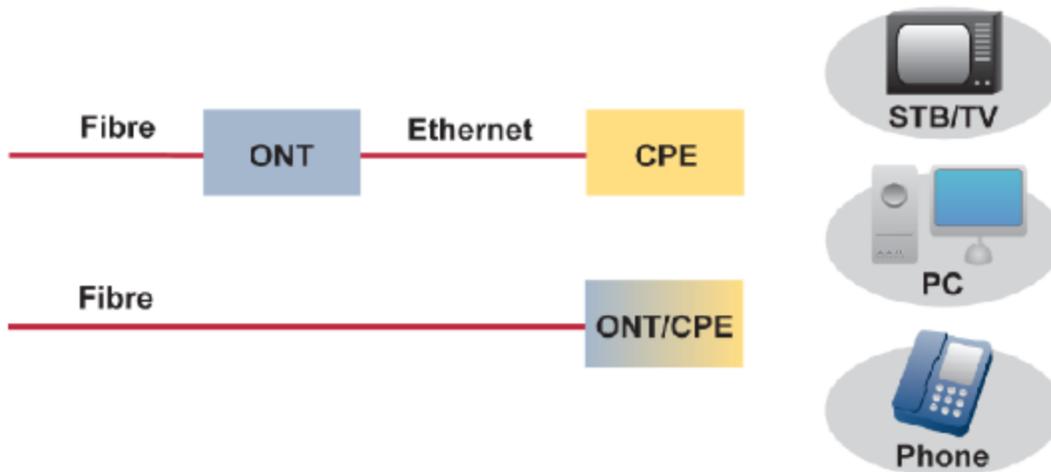


Figure 13: Subscriber Network

4.2.1.1 Requirements

Fujitsu considered and analyzed specific requirements while studying various vendor ONT options.

4.2.1.2 Analysis

Fujitsu, as part of FTTx system, not only analyzed GPON OLT system but also compared home ONT systems from several vendors. Fujitsu compared Indoor and outdoor ONTS with primary focus on integrated capabilities and rich in provisioning and troubleshooting capabilities. The features compared were based on TCLP objectives.

See **Appendix E** for detailed analysis information regarding the Home Electronics and how Fujitsu developed the following recommendation.

4.2.1.3 Recommendation

The Analysis shows one vendors approach introduces an additional point of failure and extra cost for the HW and additional installation and increased spare management.

4. Functional Requirements, Analysis and Recommendations

██████████ has large number of product portfolio and is well positioned. EMS/NMS system for monitoring and provisioning is less intuitive than its competition but functions very well.

██████████ products are currently on par with industry standards and show case an elegant EMS/NMS system, supports indoor integrated GPON at very reasonable price points. If combined with ██████████ Core routers, TCLP network will face lesser interoperability challenges.

After considering the Requirements in section 3.1.1, Fujitsu recommends ██████████ as the Home Premises equipment.

5. Design and Engineering

5. Design and Engineering

The Preliminary Network Design will provide a high-level architectural overview of the network solution and significant design decisions to satisfy business and services requirements. The document will summarize the overall preliminary design, product platforms, network services and various technical components of the proposed networks which consists of: Outside Plant (OSP) Design and Equipment Locations

In section 4 Fujitsu has evaluated GPON technology for TCLP. The telecommunication industry has adapted gigabit passive optical network ("GPON") topology, primarily to achieve cost efficiencies by simplifying deployment models. GPON architecture typically uses a splitter to transport the fiber optic signals from a passive Optical Line Terminal (OLT) to a termination point at the premise, known as an Optical Network Termination ("ONT"). The splitting ratio, often set at 1:32, reduces the fiber optic cabling required for a comparable active network, which has a dedicated fiber connection to each premise. Within the GPON deployments we reviewed two types of architecture Distributed and Centralized split architecture.

- The distributed split architecture has splitters placed in multiple areas of the network.
- Centralized split architecture has splitters located at a single point or central point within the network.

Backbone Fiber

Today TCLP has a tremendous amount of backbone fiber in place throughout the city and outside of the city boundaries.

Distribution fiber

We have designed for a distribution fiber to be placed from each data center to the 1:32 splitters in each of the LCP cabinets. Extra capacity is planned on the distribution fiber to allow for growth and expansion outside of the city boundaries. The LCP cabinets will be able to be placed on utility poles as well as located on large vaults or cement pads that is located in the right of way.

Access Fiber

There will be a single dedicated fiber for every address within the city. The fiber originates from the LCP cabinet and is designed to a network access point or NAP which is a connectorized multiport terminal as shown in the diagram below. This fiber equipment was chosen for two reasons. First, because of the weather in Traverse City, we wanted to ensure that drops could be placed during the winter months and a multiport terminal has connector allowing the fiber to be mechanically connected rather than requiring a fusion machine to splice the fiber. Second, with having all the fiber terminated it allows FNC to have complete test results for every fiber that is designed in the network. It gives the TCLP a completely tested system and that all fiber met the specification to deliver the service without interruption.

Figure 14 Recommended Network Architecture

5. Design and Engineering



Figure 15" Connectorized Multiport Terminal with Drop Fiber Connected

Drop Fiber

A single drop fiber is planned for every residential property, In MDU and Commercial buildings multiple fiber will be planned based on Commercial size and number of units within structure.

Below is an overview of the Data Center boundaries within the current reach of the electrical distribution areas for TCLP.

5.1 Engineering

Fujitsu will design and engineer the Traverse City TCLP Fiber-to-the-Home (FTTH) network using a multi-talented and functional team. FNC will employ an engineering staff comprised of OSP engineers, field survey engineers, aerial make ready engineers, GIS specialists, CAD drafters, permitting specialists, and site acquisition specialists. Major steps include Preliminary Engineering of the Backbone, Huts, and Distribution Fiber and Access Fiber (DF and AF); Permitting, Detailed Engineering, and As-Built documentation in standard GIS format after construction is completed.

Field Survey

Fujitsu deployed OSP field engineers to the area to perform a make ready assessment of existing utility poles. The field engineers' field assessed all of area 1. During the field walk the engineers looked for NESC violations and existing ground to low communication clearance as well as communication to power clearances. The evaluation determined what make ready construction would be required to facilitate a new attachment to the utility pole either within the communication space or within the power supply space. This assessment was to verify what type of aerial fiber to deploy, either an all-dielectric self-supporting (ADSS) cable placed in the power supply zone or fiber cable that is lashed to a support strand in the communication zone on the utility pole.

As illustrated in the figure below Traverse City is located in a heavy loading zone and placing additional lines higher on the utility pole increases the load on the poles thus increasing risk and potential maintenance on poles.

5. Design and Engineering

Design and Engineering

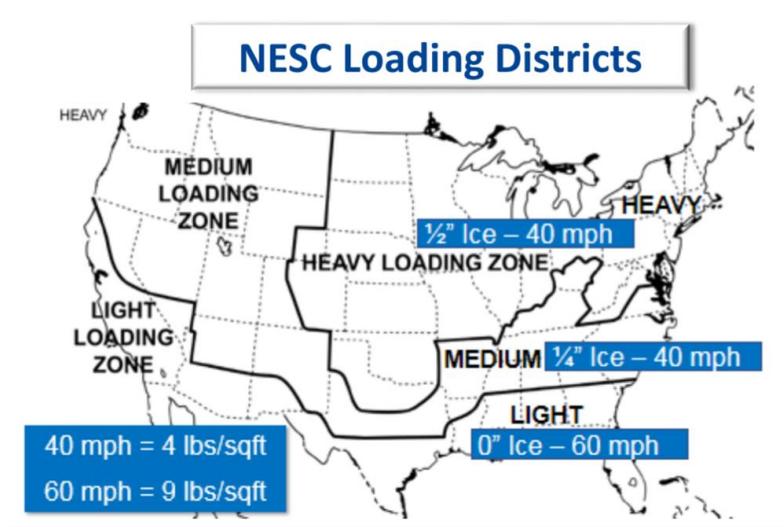


Figure 16: NESC Loading zones

In choosing to build the OSP network we considered the following factors: weather, reliability, cost, schedule and future operations and maintenance costs and time along with all other environmental concerns. It was also determined that having a flexibility within the network for future expansion and having access to the fiber cable is necessary to operate a network such as this.

6. Construction and Project Management

6. Construction and Project Management

Construction of the network is tied to the engineering of the network. When Fujitsu hands off construction prints to the contractors we will have given them a punch list of every task by geographic location that has to be completed on the project. As the units get completed they are changed within the program management tool that was used in issuing out the work to the vendors. These two platforms communicate with each other and provides checks and balances of both groups. The biggest advantage of performing the work this way is it will enable a data driven analysis that for the rest of the build can be tailored to the most cost efficient deployment.

We have reviewed all upcoming projects with the city engineer and this Phase 1 project will not impact any other existing city projects planned for this year.

The design build team is a combination of dedicated in-market resources and shared (or pooled) resources that can travel into market when needed or work remotely.

Construction Management requires specialized focus and an extensive field presence. Fujitsu will staff a design build construction manager on-site in Traverse City for the duration of the major construction phases of the project. The assigned CM will create and maintain the construction schedules and report statuses of construction regularly. The CM will also manage all the risks, issues and changes and will coordinate with the Fujitsu program manager. He will manage and direct all construction subcontractors.

To finalize the design and for Phase 1 of the project Fujitsu intends on having several crews out performing data collection on utility poles in late spring early summer while at the same time the high level design will be field walked to evaluate all of the constructible design and make notes and confirm decisions that were made in the design phase. With informing the design of as found conditions a second iteration of design will be completed and reviewed by project team. If approval is given then ready for construction packages will created and delivered to the construction project management team.

The ready for construction packages will contain construction drawings that show the placement of the fiber both overhead and underground. It will contain a splice schematic and associated fiber call outs and fiber numbers that show what fibers are on each cables and where the fiber are spliced to other cables. There will be a complete Bill of Material issued for every serving area. This BOM will have detailed labor and material units associated with a specific location along with a summary of units being placed in a serving area or project area. Below is a typical example of detailed drawings.

6.1 Construction Operating Plan

Fujitsu is committed to providing outstanding products and services to our valued customers by utilizing industry best practice, by setting and attaining high quality standards, and through continual improvement of our business processes. Fujitsu's implementation of and adherence to a full-service quality assurance plan will facilitate success in meeting the expectations and requirements of TCLP. Fujitsu enables the utilization of detailed policies and procedures, enabling our managers and employees to establish and adhere to performance measurement systems designed to meet and exceed TCLP's objectives, requirements, and expectations.

Fujitsu places high value on and takes pride in the quality of workmanship and processes. This approach provides an orderly, methodical framework in which in which steps are taken to guarantee that all required tasks are accomplished on time and in conformance with TCLP and industry standards with the allocated resources, and with TCLP's satisfaction always in mind. This will be of mutual benefit to TCLP and of Fujitsu – by limiting rework impacting project success, and thereby increasing productivity and overall project profitability. The operational plan defines acceptable procedures and

6. Construction and Project Management

processes that all team members must adhere to, and suggestions are encouraged from all team members to build on this program and continually improve and enhance our overall success.

The operating plan defines the operating guidelines that all Fujitsu employees and its subcontractors will follow when performing work for TCLP. It sets forth standards and references TCLP approved guidelines. The completed or associated work for the project will be a product of these guidelines, referenced documentation, best practices, and local rules and regulations.

At every level, adherence to this plan is essential to ensure strict compliance with contract specification. All subcontractors and other parties on the project will be advised of these procedures and are expected to incorporate these policies into their schedules to maintain compliance.

To ensure all parties are in line and understanding of the project a project specifications and a plan of record is being developed to instruct Contractors program management and TCLP project stake holders how the project will be constructed what key metrics will be reported on and how often. It will describe the efforts required for performing the work and the safety needed to perform the work. All environmental concerns will be taken into consideration and procedures and process in place to ensure best practices and industry standards are adhered to and installations guidelines are followed.

6.2 Project Management Process and Controls

Below are some high level processes that will be used when managing this project.

Communications Planning

The fundamental communication principles between the Fujitsu team and TCLP are based on an open forum consistent with good business and program management practices. The Fujitsu PM will develop a formal Communications Plan with TCLP to ensure stakeholders have the information (both content and format) they need at a frequency that is agreed to by all parties.

6. Construction and Project Management

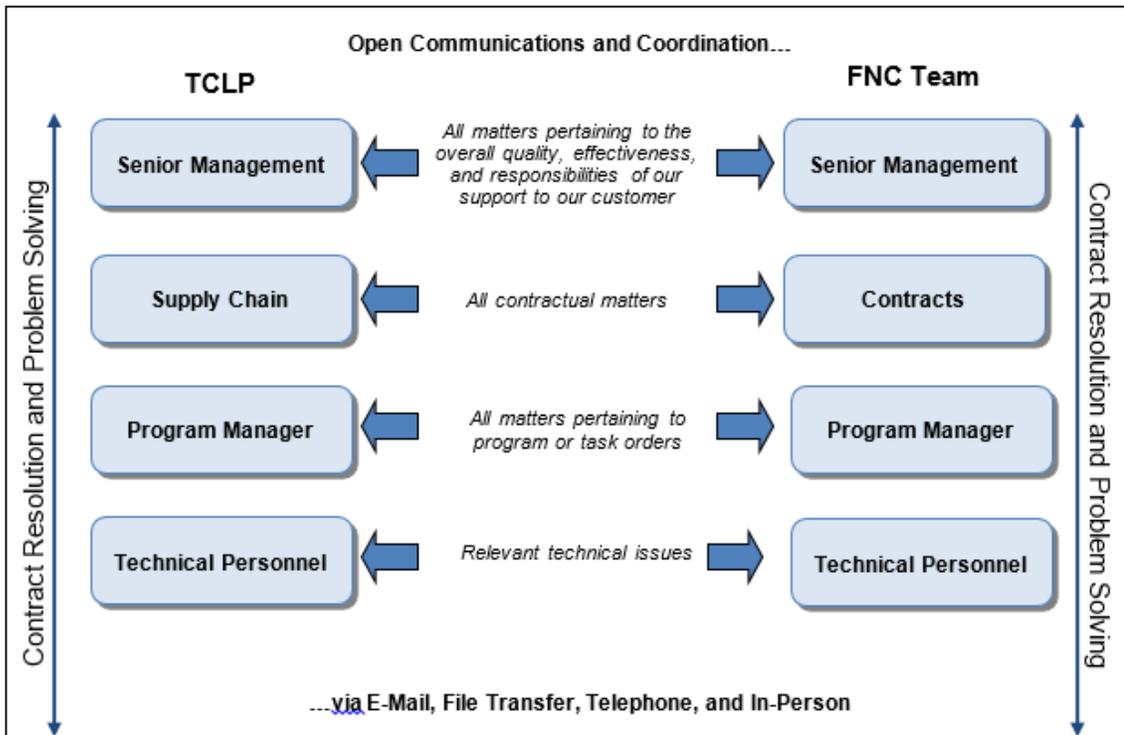


Figure 17: Communications Plan

Risk

Risk assessment and mitigation is an integral part of the overall approach to managing the program. To reduce the impact of uncertainties, the Fujitsu PM monitors risk elements by tracking performance against requirement and looking ahead to future requirements to make sure risks are identified and mitigated.

Monitor/Control

To facilitate program monitoring and control, Fujitsu will create schedules for each of the phases of the project. Each of these schedules has been integrated together to provide an overall program view that can be managed by our Program Management Office (PMO). The individual schedule view will enable the manager to examine only those tasks and activities that directly contribute to the accomplishment of major milestones and deliverables for the individual tasks. Additionally, the team will perform the following during monitor and control:

- Project Schedule will be referenced daily
- Schedule Performance Index (SPI) and resource utilization to be reviewed weekly with team leads
- Critical Path to be reviewed weekly with team leads and affected subcontractors
- Mid-Project baselines to be saved weekly and referenced regularly against current progress
- Data Date to be updated weekly
- Unfinished work is pushed up to status date

6. Construction and Project Management

- Activity Status (Actual Start/ Actual Finish / Percent Complete) will be driven primarily by Fujitsu’s production software tool

Project schedules will be audited regularly by Project Controls Manager or assignee.

6.3 Material Vendor Selection

To ensure we are getting the best price for materials FNC recommends that all the material required for the build to be bid on by both material vendors and the manufacturers of the material. When the detailed design is complete a bill of material will be sent out with pricing requested for all the fiber equipment and materials. The best vendor(s) will be selected.

The critical evaluation factors will be cost, delivery timeframes, and manufacturer recommended specifications with regards to the environment within Traverse City.

6.4 Construction Vendor Selection Process

Fujitsu has spoken with and received high level pricing from multiple separate contractors who specialize in utility construction and fiber to the home construction. These contractors were a mix of regional and national contractors that boasted extensive fiber, construction and utility experience working with some of the largest providers in the United States.

Critical Evaluation Factors	
Fiber/ PPP Experience	Brownfield engineering and construction of a new network necessitates selection of an experienced contractor that is able to efficiently integrate the network design into the existing infrastructure. The GPON network topology is also relatively rare in the market, further increasing the importance of selecting an experienced contractor that can successfully implement this typology for both overhead and underground drops.
Project Understanding and Resources	Contractors that are local to the state and have the ability to support the build with both resources and experience to understand the network’s topology, and tailor their response to consider the project’s specific environment.
Contractor Engagement	Fujitsu is seeking contractor(s) that match our commitment to delivering a high quality solution to TCLP. Selecting two active and engaged contractors that demonstrate real appetite to complete the project should increase the competitive tension through the bid development process and deliver a more efficient proposal to Fujitsu.

Figure 18: Critical Evaluation Factors

6.5 High Level Process and Timelines / Schedule

Phase 1 of the project including engineering and construction is expected to be completed [REDACTED] of starting the detailed design. It incorporates all the engineering and pole permitting required along with the make ready and construction of the network. We have made assumptions in preparing this high level schedule and below will be a more detailed timeline and process flows for each engineering/design and construction portions of the project.

6. Construction and Project Management

OSP Engineering and Construction Process

High level process flow to keep TCLP informed and up to date on current status and what is expected next within the design or construction phase of the network. Phase 1 of the project will begin immediately after approval and engineering is expected to take [REDACTED] to complete with the make ready process included within the engineering deliverable.

6. Construction and Project Management

Construction and Project Management

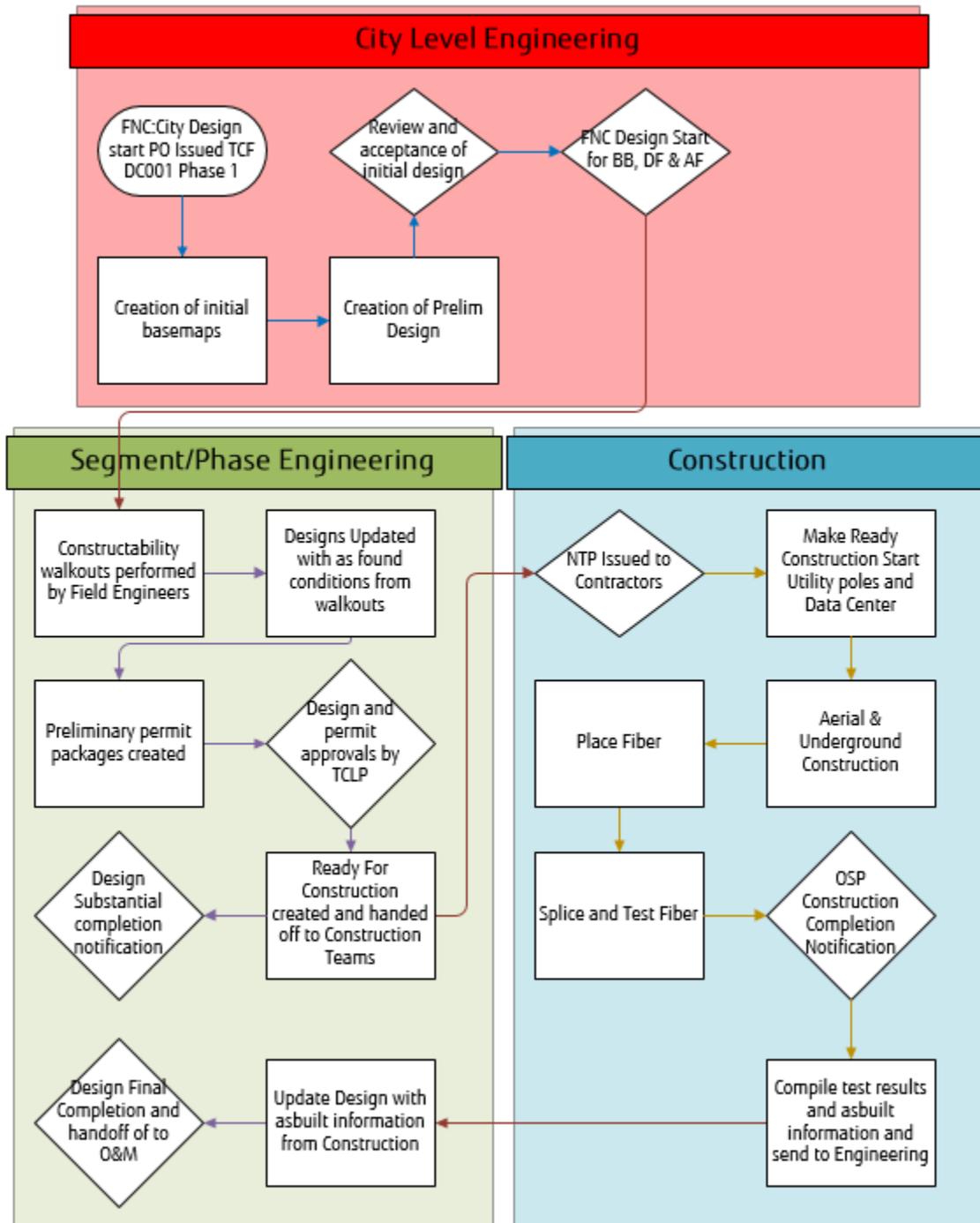


Figure 19: Fujitsu has a well-defined OSP process with clearly identified check points for TCLP to review and provide input.

6. Construction and Project Management

6.6 Typical Risks

During this time we have found that fiber demand is up and the wait time for the fiber as much as 12 weeks for delivery. We will need to order fiber as early in the process as possible to ensure timely delivery of the fiber.

Make ready construction of 3rd party attachers is and has been a problem all over the United States. We have planned for the least intrusive approach that has minimal dependency on 3rd parties in moving their attachment on the utility pole to facilitate the new Attachment. However it is still a risk and we hope through focusing on these risk we can mitigate any schedule delay associated with performing the work.

With a project like this there are a lot of concurrent processes and project moving at once and timely completion of the project requires complex planning. At any point during the project if any of these process fail or if subcontractors fail to meet the project schedule, the project cost and time will be impacted.

If the approval of the project from TCLP is not done within a reasonable timeframe to accommodate the proposed schedule, the winter months may impact the schedule and cost as city dictated construction moratoriums may go into place. Those environmental conditions could lead to a de-mobilization of network construction crews due to the moratorium, which would significantly impact cost and schedule. A re-mobilization of crews would be needed to be done once the moratorium is lifted, which is not ideal nor cost effective. Fujitsu believes this is a scenario that should be avoided if possible as it would impact the project negatively.

6.7 Key Project Assumptions

The proposed Engineering and Construction models are based on best practices and our experience to deliver FTTH builds along with data provided by TCLP. These assumptions will need to be validated through further engineering and field analysis and additional data gathering. Below is a list of assumptions that was used for deriving project costs schedule and estimated units.

- Fujitsu has created a high level design that incorporates [REDACTED] for the placement of the data center and associated electronics
- The existing backbone fiber has capacity to serve redundant fiber between data centers. There will be a short additional of back bone fiber that will be designed to offer full redundancy of the network. The existing fiber should be free from defects and will be tested to ensure the characteristics of the fiber are suitable for use of Core network traffic.
- A blanket permit will be acceptable and TCLP will be the recipients of our construction packages and they will submit packages to the city engineering department of work notification.
- Make Ready costs and percentages were estimated by performing make ready assessment on Utility poles. If loading and make ready substantially changes the make ready engineering will detail the exact work required for make reading the pole for a new attachment.
- Any make ready construction required by 3rd parties attachers will be completed within 30 days of notification.
- No rock adder was added to the underground construction because soil conditions are expected to be mostly sandy soil with some clay soil headed towards the west of the city

6. Construction and Project Management

- High level pricing was obtained from materials vendors for the project as we finalize the project actual costs for material will be obtained.

7. Sales and Marketing Plan

7. Sales and Marketing Plan

Building a sales and marketing organization for an internet service provider requires important steps to be made and milestones to be met to ensure a successful launch and continued profitability. In general, Fujitsu believes it is broken into three parts:

- Strategy
- Operations and Execution
- Analytics and Metrics

Each part is important to build on each other and continuously refreshed to allow for the optimal go-to-market campaign to occur with the highest business success possible.



The focus of this sales and marketing plan is to provide strategic and tactical guidance on the core mandate of the organization's sales and marketing capability. The core objective of sales and marketing is to gain and retain customers. This main objective is accomplished by setting up the correct processes to follow, people to execute on those processes, and technology to assist and improve the capability of those people. A well-run internet service provider business utilizes every avenue to improve itself to remain competitive in an already highly competitive business.

7.1 Fujitsu's Recommendation

7. Sales and Marketing Plan

Sales and Marketing Plan

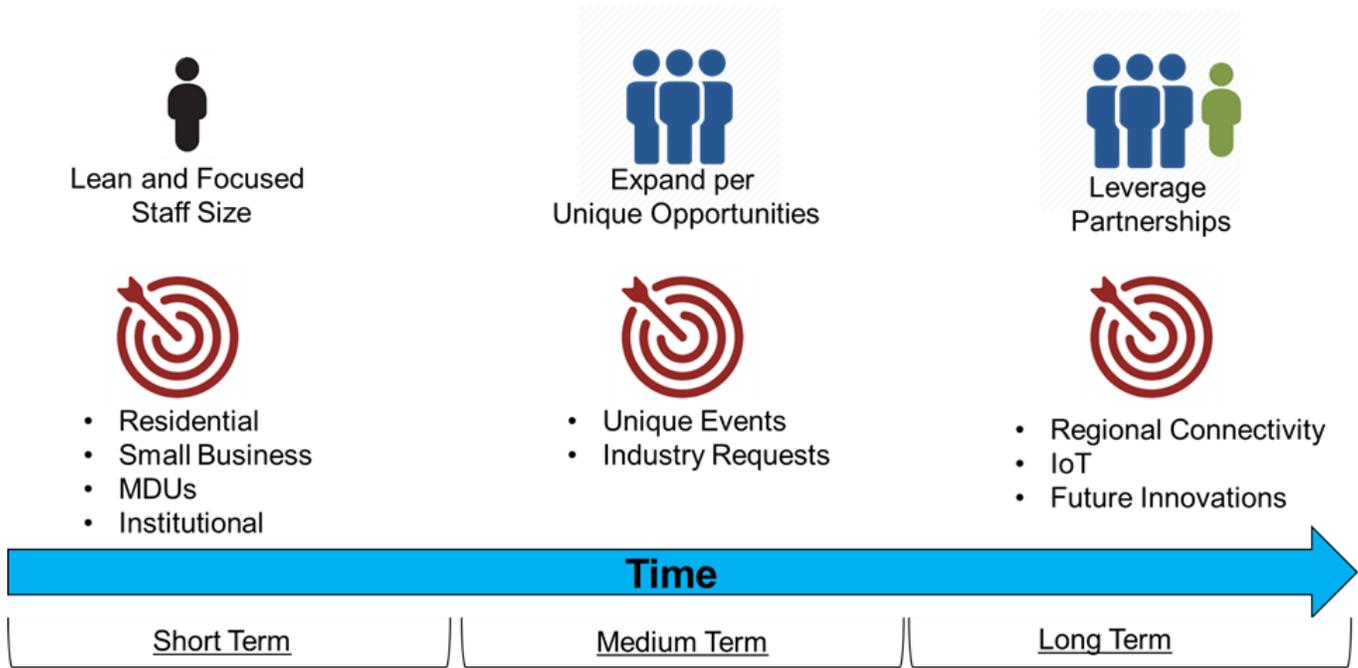


Figure 20: Recommended Go-To-Market Strategy

Fujitsu recommends that TCLP should become the sole retail ISP for Traverse City for phase 1. The sales and marketing efforts should ramp from an initial lean and focused staff size, focusing on residential, small business, multi-dwelling units, and institutional customers in the short term. At a time in the future to be determined by TCLP, unique events within the town of Traverse City such as the Cherry Festival will provide opportunities to expand the use of the network, as well as specific and unique industry requests from large customers like manufacturing. Tailored hiring should be taken when these unique requests present themselves. Long term opportunities like providing regional connectivity, internet of things (IoT), and other future innovations will allow for partnerships to be made that leverage the strengths of these organizations.

7.2 Retail Business Model

For Phase 1 of the TCLP broadband project, there are many reasons for TCLP to become the sole retail ISP. TCLP should focus on three (3) main areas to allow for the most successful ISP business. Those three areas include:

7. Sales and Marketing Plan



Figure 21: Critical Business Model

Revenue Potential:

With TCLP being the sole ISP on the network, the highest revenue and profitability can be gained by collecting all revenue from the subscribers of services. This provides the greatest chance of profitability by having control of the price of services being offered over this new high speed network. Pricing is a critical aspect of competitive success and control of pricing will allow for agility in when this new ISP organization is formed.

Control of the service catalog is vital to expand and evolve to the needs of the customers within Traverse City. When TCLP has control of this catalog, by being the sole ISP, it provides another important ability to maintain competitiveness and serve the customers of Traverse City. While TCLP should be the sole ISP, it should also look at ways to allow other organizations that do not compete with TCLP to utilize the network for greater community success and higher profitability.

A challenge of the retail business model is that revenue attainment responsibility will be squarely placed on TCLP. This responsibility should be met by allowing experienced professionals within the telecommunications industry to provide advice and perform the activities needed to achieve the revenue goals laid out.

Service Quality:

Being the sole ISP allows for continued control of service quality offered to subscribers. TCLP's existing electrical business has a strong reputation of service quality and focus on the end user, and Fujitsu believes that quality can remain with this new broadband business line. Quality of service is a vital measure of success and has proven to be a driver of take rates and retention rates of subscribers. TCLP should keep service quality at the forefront when marketing this new service, and continuously monitor and improve service once broadband is being offered.

With this control of service comes the responsibility of caring for the subscriber regardless of the situation. It is the ultimate responsibility of TCLP to provide quality care to the subscribers, which can be done by setting up tested and proven processes to facilitate the best resolution for any situation. Speed and reliability of service connections routinely top considerations in Internet choice. Other quality items include fast network discovery, authentication and added value applications. Experienced professionals and technology can improve the ease of this customer care and is recommended.

Operational Costs:

An ISP organization requires skilled professionals all working in concert to achieve the goals achieving profitability. Staffing for a retail business model generally is highest due to all functions being provided and performed by the sole

7. Sales and Marketing Plan

ISP business. TCLP should be aware that this increases the minimum costs per year when trying to achieve profitability, compared to their existing dark fiber and wholesale business.

Robust back office systems and software, referred to as Operation Support Systems (OSS) and Business Support Systems (BSS), is critical to the success of any ISP business. This retail business model ensures the requirement of these systems to provide high quality service and at the same time automate tasks that provide no value when done by the ISP staff. TCLP must be aware that ISP OSS/BSS have unique capabilities not always seen in other business systems, and should understand that investment in this area provides great value.

Once a subscriber is gained, they must receive quality service and their network components must be maintained to allow for the greatest chance of retaining that customer. With the retail model, that maintenance falls to the sole ISP, through their staff or partners to provide for high reliability and service level agreements.

7.3 Other Business Models

Open Access:



Figure 22: Open Access Model Components

Fujitsu believes that phase 1 of the TCLP project is not suited for an Open Access business model. The top challenges of an Open Access business model within phase 1 include issues relating to financial viability, operational complexity, and the health of ISPs to join the network.

Financially, the phase 1 footprint is too small to sustain multiple ISPs. Significant revenue dilution of this phase for multiple organizations will overall reduce the viability of all parties.

Operationally, the quality of service provided to the end subscriber will always be tied to TCLP regardless if another ISP is the brand name of the service. As a new entrant into the broadband business, it is critical TCLP's service be high quality and be successful. This success is made more difficult initially if that quality of service is not within TCLP's control.

Health of ISPs is important to understand, both initially and long term, to allow for this model to be successful. There are Open Access networks that have been successful in the US, but those networks are significantly larger in size and have established financial criteria that have not always focused on competitive market views. These factors do not provide enough evidence that existing or new Open Access ISPs would be able to initially sustain the competitive forces of this new network within Traverse City.

Fujitsu does believe the Open Access model is evolving quickly and has shown to be viable in certain circumstances. While an Open Access ISP is not viable for phase 1 of TCLP's network, other complementary services can and should be encouraged to be offered to utilize this network to improve profitability.

7. Sales and Marketing Plan

7.4 Potential Customers



Figure 23: Potential Customers to Pursue

Fujitsu’s recommendation for target customers throughout the life of the new proposed network is laid out at the beginning of this section. The potential customers list is not exhaustive but should be seen as typical ones to focus on. Different customers have different needs, so it is necessary to break out those customers into segments to best serve them. Business, residential, and institutional customers are generally the major customer segments to be targeted in any network footprint. Each of these customers will have unique needs and require the sales team to provide that customer with their expected service offering. Each customer will have unique needs, including but not limited to, capacity, service level agreements, pricing, service quality expectation, and much more. The phase 1 footprint has quantified the reach to these potential customers, mostly covering single family homes, multi-dwelling units, small businesses, and select institutional customers.

7.5 Customer Care and Sales Team Formation

Hiring talent for the sales team is important as it directly impacts the financial goals of the company. When evaluating people to fill this team, these are a few things that should be looked at to have the right perspective:

- Ability to Listen to Customer Needs
- Empathy
- Enthusiasm
- Resilience
- Hunger to Succeed
- Confidence

Customer sales cycle, which is the time from initial contact to being signed up for service, is important to understand in forecasting the monthly revenues for the network business. Things such as business customers being locked into a long term contract can impact the overall success of take rates within a service area. This is critical to be aware of and have the team understand so they can best navigate the competitive landscape.

Setting targets for the sales team is important to establish expectations for the team, as well as financial projections for the organization. These targets and quotas should be established based on current and potential competitive offerings

7. Sales and Marketing Plan

and customer market evaluation. A successful sales organization continues to build on the sales pipeline available within the market, and ensures that current customers are well served. This process of managing the pipeline directly leads to future success.

Online, over the phone, or in person, a customer expects to buy service through any method they wish. This is expected and will be allowed for the customers of TCLP's network. Through websites to access a catalogue of services, customer care representatives to provide high touch interaction and a physical presence in Traverse City to fulfil the service request, all customer types will be allowed to gain service. Potentially there is the ability for an agent sales channel, but that is to be determined in the future.

Every sales member is incentivized by their compensation, and that compensation plan drives action to benefit the organization. In general, a partial salary and partial incentive compensation framework is best to ensure a continuously motivated work force. This approach may change at different points in the life cycle of the network given the success and objectives of TCLP.

7.6 Marketing Tactics



There are many marketing tactics to consider when looking to reach your targeted customer segments. A way to represent these tactics is by categorizing them into direct to customer actions, and indirect to customer actions.

Direct:

The main source of direct sales and marketing should be contact from the ISP sales team, either inbound or outbound, by customer services representatives or specialized staff to care for unique business needs. Achieving customer satisfaction especially early in launch is paramount. All customer touch points (retail center/call center, Tier 1 help desk, employees) should be measured at all times to ensure the pulse of the customer is known.

Indirect:

Other methods of engaging and obtaining new customers can include referral programs from existing organizations such as local interest, community involvement, or professional groups looking to socialize this new network and the benefits it can bring. Low cost social media tactics and collaborations can improve the reach of the TCLP brand beyond traditional methods. Social media has become a significant avenue of reaching new customers and it highly recommended to be utilized. This new service will also benefit significantly from utilizing the existing TCLP electric brand, but should have its own brand to differentiate slightly from the electric service. A TCLP brand must be chosen wisely, as it is the first thing a customer sees, and will be tied to the TCLP electric service as well as the broadband service. This brand must fit with the new organization and what potential it brings to the city and surrounding area.

7. Sales and Marketing Plan

7.7 Review and Refinement

Efficiency of sales and customer care activity is critical when running an ISP, and should be reviewed on a continuous basis. Utilizing industry standard KPI of success, such as those listed below, and review of customer acquisition and retention will allow for continuous improvement.

- Customer service quality
- Time to resolve customer issue
- Total revenue
- Market penetration (Take Rate)
- Profitability
- Year over year growth
- Per service and product offering financials

CRM systems allow for great visibility into the sales team and customer care activity. It should be the intent to utilize market leading CRM systems to best manage and review sales performance. Providing customer profile information to all TCLP team members is vital for the best execution of the sales plan and continuous customer care. Providing guidance and coaching to the sales and customer care team is just as important as setting goals. The competitive environment changes and must be handled with superior coordination and collaboration of the entire organization. Staffing for this agile structure and establishing efficient processes will ensure that changes can be made fluidly throughout the months and years to remain competitive.

7.8 Service Catalog

Multiple internet data tiers as well as voice are important to offer to ensure significant take rates of residential and business customers.

8. Back Office Functions and Staffing Plan

8. Back Office Functions and Staffing Plan

8.1 Introduction

Traverse City Light & Power (TCLP) will require a strong business structure of processes, people and systems to effectively manage and deliver competitive services in the most efficient and cost-effective way possible. Commonly referred to as back office functions, these processes, people and systems support the underlying business operations framework of the entire business. It is therefore critical that these functions be fully defined in the context of TCLPs operating structure, to develop an implementation strategy and to identify the needed staffing and associated costs to operate and deliver these back office functions.

This section will identify the needed functions, a recommended strategy for implementation and a complete 5-year staffing plan with associated costs. In developing the recommendations, we followed TCLPs guidance to (1) source to Fujitsu Managed Services those functions that cannot be internally supported; (3) minimize the need to hire additional internal resources and (4) provide a framework that flexes with TCLPs planned growth.

8.2 Back Office Functions

The back office functions are broken into two (2) major categories: Customer Management and Financial Management. Customer Management will include all of the functions related to managing addresses, Customer records (Service Orders, Trouble Tickets, customer and address history, and Billing). The financial Management includes all functions related to the financials: Capital projects, WOs, POs, inventory, AR/AP, and revenue management).

8.3 Implementation Strategy

The first year of operation will be focused on network build out and customer acquisition with customers coming online post-network activation. Back office expenses during this initial period need to be closely synchronized with the relatively small initial revenue stream. Outsourcing of back office functions of any kind is to be a flexible, volume-based model. The recommended business model is as follows:

- **Utilize Fujitsu's Managed Services for Back Office Systems Support:** Fujitsu can offer complete back office customer care and billing systems for broadband service providers. The features and functions of this service is customizable to TCLPs specific requirements and pricing is based on volume which enables TCLP to control expenses as its customer base expands. Combined with Fujitsu's Managed Service for TCLP Network Operation and Maintenance, TCLP will have an end-to-end integrated operations model.
- **Build a Small Support Organization:** Fujitsu can provide a small support organization to support this new ISP back office functions. Type of personnel assumptions, timing of hire and associated costs are covered in the Staffing Plan section. The strategy of creating a lean operations team that limits costs, coupled with the option of national economies of scale functions will keep the headcount in this organization relatively static over the next 5 years.

8.4 Staffing Plan

8. Back Office Functions and Staffing Plan

The staffing plan shown below was developed based on industry-standard, direct Fujitsu experience, and personnel assumptions for the projected size of TCLPs business.

Years	1	2	3+
Broadband Specialist	1	1	1
Accounting Clerk	1	0	0
Customer Service Representative	2	2	3
Direct Sales (Commercial)	0	1	1
Installation and Repair Technician	2	2	3
OSP Engineer	0	1	1
Total	6	7	9

Figure 24: Staffing Plan Projection

9. Operations and Maintenance Plan

9. Operations and Maintenance Plan

Operations and maintenance will summarize the overall preliminary design, product platforms, network services and various technical components of the proposed networks which consists of:

9.1 Site Addresses and Listings

Site address listings will be imported into [REDACTED] for the initial construction project and will be imported into the OSS/BSS system where the records are maintained with all of the Plant Records information related to each address within the serving area. The OSS/BSS system allows for reporting to identify which addresses have what services and those that do not. Custom reports can be generated to aid in marketing programs to onboard new customers, offer services, and manage notifications for maintenance work and more.

9.2 Roles and Responsibilities Matrix

Responsibility Matrix	P=Primary / S=Secondary / X=sole responsibility	
	TCLP	Fujitsu
Call Center		
Hire GM	S	P
Hire support staff	-	X
Service offering packages	S	P
Process Flows	S	P
Terms and Conditions Agreement for service	S	P
Managing Deposits	S	P
Billing intervals/mailing, messaging on bills	S	P
Daily cash drawers	S	P
Office Space	S	P
Building Access/Alarms	P	S
Dispatch	-	X
Order Intervals - Scheduling	-	X
Bank accounts	X	-
Deposits	P	S
Set Up General Ledger	P	S
Voice Service Provider	-	X
OSP		
Service Installation	-	X
Hiring Staff	-	X
Vehicles	-	X
Tool Tracking/Management system	-	X
Technician cell phones, laptops, HH devices	-	X
Fiber Splicing tools (Fusion Splicer, Cleaver, OTDR, Power Meter)	-	X
Inventory Tracking Process	-	X

9. Operations and Maintenance Plan

Operations and Maintenance Plan

Technician Training	-	X
Technician time reporting	-	X
Plant maintenance	-	X
Plant records keeping	-	X
Safety program for OSP/Construction	-	X
Technician time reporting	S	P
After hours technical support for OSP	-	X
After hours call out process	-	X
Cut UG cable construction support	-	X
Underground Service Alert	S	P
Test and turn-up	-	X
QA Acceptance	-	X
Records Retention	-	X
Circuit Assignment	-	X
Provisioning	-	X
Change Order Requests Process	S	P
Change Order Scope/Pricing	S	P
Change Order Approval	P	S
Facilities Moves (Road moves/widening, pole moves, pole replacements)	S	P
Service reporting	-	X
Network Operations		
Network Assurance		
Network Monitoring	-	X
Capacity Management	-	X
Fault Isolation	-	X
SLA Performance Tracking/Reporting	-	X
Network Dispatch	-	X
Network Repair (including the network side of the ONT)	-	X
Service Assurance		
Service Monitoring	-	X
Capacity Management for Upstream Internet Connections	-	X
Network Fault Isolation	-	X
SLA Performance Tracking/Reporting	-	X
Service Dispatch	-	X
Service Repair	-	X
End-user Repair (Home/MDU/Commercial)	-	X
Tier 1 Help Desk/ Call center	-	X
Network Activation		
Network Service Orders	-	X
TAC Center	-	X
Tier 2 Help Desk (Network Device Management)	-	X
Service Activation		
Service Requests (FTTx)	-	X

9. Operations and Maintenance Plan

Retail Center	-	X
Usage	-	P
Infrastructure Management		
Utility Joint Pole Attachments	-	X
Cable Locating Association Admin	-	X
Outside Plant Break / fix	-	X
Break / fix splicing	-	X
Fixed Wireless Tower Attachments	-	X
Data Center		
Access Control	P	S
Monitoring and Managing Environmentals	-	X
Managed Security (Antivirus, Vulnerability Scans)	-	X

9.3 Service Level Objectives

Service Level Objectives are established based on the priority level of the network devices and the role of the device in the sub-customer Network. Incident severity is defined as device condition and the degree of immediacy for diagnostics and resolution. Upon completion of the network design each device will be assigned a priority in the operations priority matrix which is communicated to the Network Operations Center to monitor maintain, and report accordingly. The Network Operations Center is manned by our trained professional staff 24X7X365 that is redundant to all functionality in multiple locations in the US.

9.4 Reporting Requirements

Critical to any operations are the means to report how well service is delivered and managed. Reporting must include the ability to monitor how customer’s expectations are met with respect to service activation and service interruptions. The data is used to improve on delivering exceptional service to the customer. Primary service delivery metrics include:

- Commitments met & missed
- Service order intervals (number of days from the initial customer contact through completion of the order)
- Trouble Ticket Cause codes
- Trouble Ticket Completion Codes
- Technician activity codes (en-Route, On-Site, Completion time)
- Service Order, Trouble Ticket, and Technician activity are an integral part of the OSS.BSS System that are required fields to complete the SO/TT within the system. The system captures the data by the SO/TT number, customer’s name, SO/TT initiation date, CSR and technician user ID etc. The reports are used to adjust force and workload, improve dispatch, and track faulty plant facilities and electronics to name a few. As the OSS/BSS system is integrated additional reports can be generated based on business needs,
- Also important to operations are the ability to monitor and manage the network. Through Fujitsu’s Network Operations Center (NOC) are standard reports that include

9. Operations and Maintenance Plan

- Monthly Service Report:
 - This report is designed to track and report the incidents that occur with each device and tracked by FNC NOC monitoring tools and team. This will include the current status of individual device incidents that are logged and tracked within the NOCs ticketing system
- Monthly Inventory Report
 - This report is designed to track and report the network elements identified by FNC's monitoring tools and team.
- Monthly Fault History Report
 - This report is designed to track and report the alarms that are being opened and tracked by the FNC NOC monitoring tools and team. This will include the current status by having the individual device alarms logged and tracked within the NOCs Siebel ticketing system. The information gathered will be reviewed and analyzed by FNC's NOC Problem Management Team. FNC's SDM will report any trends found by the Problem Management Team and provide recommendations to address findings such as chronic problem resolution

9.5 Plant Records Management Approach

Plant records management is an integral part of the OSS/BSS System and is the primary driver to all Service Orders and Trouble ticketing. The plant records will be downloaded from the TCLP records database and imported to [REDACTED] for the initial design build portion of the project. As-built records are imported into the OSS/BSS system where the service address will be retained. Each Serviceable address is assigned a Network Access Point, splitter, and port within the OSS/BSS System therefore allowing for automated Service activation. Likewise the Service Address with all of its associated plant facilities are utilized to generate and analyze trouble tickets. Periodical [REDACTED] updates are imported into the OSS/BSS system upon completion of new construction projects. The OSS/BSS system is designed to run periodical plant reports to proactively manage network capacity, damaged cable and repairs, as well as network expansions and changes.

9.6 Connectivity

Secure VPN

A virtual private network ("VPN") extends TCLPs private Network across the internet. It enables the managed device to send and receive data across internet as if it were directly connected to the private Network, while benefiting from the functionality, security and management policies of the private Network. This is done by establishing a virtual point-to-point connection through the use of dedicated connections back to the FNC NOC.

- FNC provides dedicated and redundant secure VPN connections to the two (2) geographically diverse FNC NOC data networks to two (2) geographically diverse Company gateway elements into the managed Network.
- TCLP must provide electrical connections, internet service provider ("ISP") connectivity, access to the gateway facilities, and routing to the managed Network.
- Third party network access may be required when TCLP has another support organization with whom it is necessary to collaborate, such as when a FNC NOC technician might wish to share remote access sessions with TCLP, multivendor technical support, and/or a third party helpdesk. Due to the

9. Operations and Maintenance Plan

numerous physical, security, logistical and contractual issues whenever third parties are utilized; FNC's standard approach will be to limit all such access to the TCLP network. FNC will negotiate direct access on a case by case basis.

- FNC will ensure that the NOC technicians have full access to telephony in order to discharge operational functions. The NOC will interface with the service desk based on requirements to engage with external parties such as third parties, business partners, multivendor and technical support etc. via telephone

9.7 Change Control Procedures

The Network Operations Center will be responsible for engineering and provisioning changes within the Network. FNC requires notification of any changes prior to the required date to identify issues that may adversely affect the Network. When TCLP requires MACD (e.g. circuit deletion, configuration change to managed nodes) or has scheduled maintenance within the Network, out a request template (provided at new customer activation kick-off meeting) and submit to the NOC Change Control Administrator ("CCA"). Upon receipt, the CCA will confirm receipt with the requestor submitting the NOC change control request ("CCR") and will review the change request. As necessary, the CCA will contact the submitter for any clarification of the request or capture additional details. Once the change request is confirmed, the NOC CCA will coordinate with TCLP to create a schedule for implementation

9.8 Managed Service Takeover Plan

The TCLP Operations Plan identifies the functions, systems and people in place at the time Fujitsu transfers the managed service operations to a TCLP management of operations. The Plan needs to be structured to enable components to be transferred individually or collectively. This will require a comprehensive operations transfer plan that will be jointly developed between TCLP and Fujitsu. We recommend that the business have well documented processes, reporting, financials, etc. prior to transferring to lessen risk of negatively impacting on-going business operations and maintaining transparency to current customers. We will review with TCLP the level of overall preparedness as part of the plan; e.g. is the TCLP NOC staffed and equipped to operate 24x7x360 and build a plan to prepare the transfer.

10. Regulatory and Compliance Considerations

10. Regulatory and Compliance Considerations

The services being introduced to TCLP, High-Speed Internet and Voice over Internet Protocol (VoIP) are classified as non-regulated services and therefore are not subject to regulatory oversight, either at the State or Federal level. However, the State does request that any company rolling out a facilities based network register their company on the Michigan PUC website. The State PUC has a Broadband monitoring role for the states broadband initiatives. Fujitsu has included a table below which shows the available service providers types that providers have available, and the definition and the services we plan to launch with on day one. As you will see only two service types.

During our due diligence we discovered TCLP provides broadband to schools, upon our interview with TCLP, it was conveyed that TCLP does not seek E-Rate funds for these customers. If they did then there would be regulatory reporting requirements.

Depending upon the funding sources TCLP would be required to report to the lending agency. This can and will be a non-trivial effort, once the source of funding is chosen Fujitsu as the network operator will ensure to participate with TCLP to ensure reporting requirements are met.

10. Regulatory and Compliance Considerations

Type of Provider	Definition	Applicable to TCLP
Broadband Provider	A Broadband provider is defined as retail service capable of transmitting data over an access line at a rate greater than 200 kilobits per second.	Yes
Competitive Access Provider	A Competitive Access Provider (CAP) offers to other providers an alternative means of connecting another carrier to an IXC, bypassing the ILEC. CAPs are facilities based and also known as a "carrier's carrier" or a wholesale provider of capacity. A tariff must be filed with the MPSC per Sec. 202 of the Michigan Telecommunications Act (MTA).	No
Competitive Local Exchange Carrier	A Competitive Local Exchange Carrier (CLEC) is a licensed basic local exchange provider that competes with an local exchange carrier by providing service through its own network and switching or by reselling service from an incumbent local exchange carrier. A tariff must be filed with the MPSC per Sec. 202 of the MTA.	No
Eligible Telecommunications Carrier	An Eligible Telecommunications Carrier (ETC) is a common carrier that has been designated to receive Lifeline and other universal service support in the area for which the carrier is designated an ETC. To be designated an ETC a carrier must file an application with the MPSC and meet all Federal and state ETC criteria.	No
Incumbent Local Exchange Carrier	An Incumbent Local Exchange Carrier (ILEC) is a licensed telephone company providing local service before competition was permitted by the Michigan Telecommunications Act. (See also Sec. 252 of the Telecommunications Act of 1996 - FCC.) A tariff must be filed with the MPSC per Sec. 202 of the MTA.	No
Interexchange Carrier	An Interexchange Carrier (IXC) is a long distance facilities based inter/intra-LATA service provider. Examples of IXCs include AT&T, Verizon and Sprint. A tariff must be filed with the MPSC per Sec. 202 of the MTA.	No
Lifeline Program	The Lifeline Program is a government approved program that provides telephone service discounts for eligible low-income customers. Qualified Michigan residents can receive a monthly credit on their basic local telephone bills. Wireless providers also offer various Lifeline discounts. Lifeline is one of four universal service programs authorized by the federal government.	No
Lifeline Provider	A Lifeline Provider is a telecommunications carrier that offers the Lifeline program discounts to its customers. In Michigan, although only basic local telephone service providers are required to offer the monthly Lifeline credit to their income-eligible customers, there are wireless carriers that also provide Lifeline discounts. Only telephone providers that have been authorized as ETCs, however, can be reimbursed for the federal Lifeline credits they give to their customers.	No
Operator Service Provider	An Operator Service Provider (OSP) is a company that provides long distance or local telephone service that includes automatic or live assistance to a person to arrange for completion and billing of a telephone call originating in the state that does not involve 1) a direct-dialed call, 2) a call dialed with an access code or proprietary account number or 3) call completion in association with directory assistance services. An OSP must file a registration form and pay a filing fee to the MPSC.	No
Pay Phone Provider	A Payphone Provider (PP) in Michigan provides telephone service from a public, semipublic or individually owned and operated telephone that is available to the public, and is accessed by the depositing of coin or currency or by other means of payment at the time the call is made. A payphone provider must file a registration form and pay a filing fee to the MPSC.	No
Toll Reseller	A Toll Reseller (TR) purchases blocks of long distance minutes from an interexchange carrier and resells those minutes to telephone customers. Toll resellers may bill customers directly or use a billing agency, or use the local carrier to bill a customer. A tariff is not required, but may be filed under Sec. 402 of the MTA.	No
Voice over Internet Protocol	A Voice over Internet Protocol (VoIP) carrier transmits voice conversations over a data network using the Internet Protocol such as the Internet or a corporate Intranet.	Yes
Wireless Provider	A Wireless Provider (WP) allows customers to transmit and receive information without wires, commonly via a "cell phone."	No

10. Regulatory and Compliance Considerations

10.1 Agencies to Engage

Regulatory activity will be a joint effort between TCLP and Fujitsu as regulatory environment changes frequently. At this time engaging the FCC is up to TCLP, and Fujitsu can assist if needed. As USDA/RUS is a federal entity, reporting will be a requirement, once the program is chosen, Fujitsu can be available to assist TCLP.

10.2 Expected Licenses

Fujitsu has investigated whether or not TCLP would need to become a licensed Competitive Local Exchange Carrier (CLEC), or not. At this stage Fujitsu does not see a reason for TCLP to become a CLEC. We continue to review Joint Pole Attachment agreements in an effort to ascertain whether or not a CLEC License is required to attach facilities (cable or drop cable) to incumbent carrier poles.

10.3 Continuous Regulatory and Compliance Effort

The regulatory environment consistently changes; therefore, it is a given that TCLP and Fujitsu monitor state and federal law making, notice of proposed rule makings, and notifications.

10.4 Regulatory Assumptions

The current assumption is TCLP already has necessary business licenses and pole attachment agreements to run this new business. This assumption is based upon TCLP having conducted Internet Service business for several years.

11. Key Assumptions

11. Key Assumptions

11.1 Break Even Scenario

- **Take Rate**
 - Based on industry low/medium average for similar areas and service offers
- **Miles of Fiber Constructed**
 - 11 Miles
- **Loan**
 - \$4M
 - Rate: 3.25%
 - Term: 20 Years
 - Cost of Issuance: 1%
- **\$3.2M CAPEX, \$0.8M 1st year OPEX**
- **Outside Plant Depreciation**
 - Straight Line: 20 years
- **Equipment Depreciation**
 - Straight Line: 7 years
- **Pole Attachment Fees**
 - \$8.5/pole/year
- **Preliminary Construction Timeline**
 - 6 Months
 - Single Mobilization
- **City Gross Revenue Take**
 - 5%
- **Dark Fiber Cash Flow Added**
 - Years 1-4 from provided projections
 - Years 5+ rolling 5 year average
- **Expected Initial Local Operations Headcount**
 - 6 (GM, CSRs, Techs, etc)
- **No equipment refresh modeled due to unknown technology status or competitive requirements in the future**
- **Model is generated with flat growth given unknown inflation in revenue or cost, future competitive environment, or available technology and innovation**

Market Size		
Residential		1,006
Business		945
VoIP		1,951

Take Rate		# of Customers
Residential	40% at steady state	402
Business	40% at steady state	378
VoIP	28% of data customers at steady state	219

Figure 25: Break Even Scenario Assumptions

11.2 Most Likely Scenario

- **Take Rate**
 - Based on industry low/medium average for similar areas and service offers
- **Miles of Fiber Constructed**
 - 11 Miles
- **Loan**
 - \$4.2M
 - Rate: 3.25%
 - Term: 20 Years
 - Cost of Issuance: 1%
- **\$3.4M CAPEX, \$0.8M 1st year OPEX**
- **Outside Plant Depreciation**
 - Straight Line: 20 years
- **Equipment Depreciation**
 - Straight Line: 7 years
- **Pole Attachment Fees**
 - \$8.5/pole/year
- **Preliminary Construction Timeline**
 - 6 Months
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 - Years 1-4 from provided projections
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- **Expected Initial Local Operations Headcount**
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- **Model is generated with flat growth given unknown inflation in revenue or cost, future competitive environment, or available technology and innovation**

Market Size		
Residential		1,006
Business		945
VoIP		1,951

Take Rate		# of Customers
Residential	50% at steady state	503
Business	50% at steady state	473
VoIP	35% of data customers at steady state	341

Figure 26: Most Likely Scenario Assumptions

11. Key Assumptions

11.3 Optimistic Scenario

- **Take Rate**
 - Based on industry low/medium average for similar areas and service offers
- **Miles of Fiber Constructed**
 - 11 Miles
- **Loan**
 - \$4.4M
 - Rate: 3.25%
 - Term: 20 Years
 - Cost of Issuance: 1%
- **\$3.47M CAPEX, \$0.8M 1st year OPEX**
- **Outside Plant Depreciation**
 - Straight Line: 20 years
- **Equipment Depreciation**
 - Straight Line: 7 years
- **Pole Attachment Fees**
 - \$8.5/pole/year
- **Preliminary Construction Timeline**
 - 6 Months
 - Single Mobilization
- **City Gross Revenue Take**
 - 5%
- **Dark Fiber Cash Flow Added**
 - Years 1-4 from provided projections
 - Years 5+ rolling 5 year average
- **Expected Initial Local Operations Headcount**
 - 6 (GM, CSRs, Techs, etc)
- **No equipment refresh modeled due to unknown technology status or competitive requirements in the future**
- **Model is generated with flat growth given unknown inflation in revenue or cost, future competitive environment, or available technology and innovation**

Market Size	
Residential	1,006
Business	945
VoIP	1,951

Take Rate		# of Customers
Residential	60% at steady state	604
Business	60% at steady state	567
VoIP	35% of data customers at steady state	410

Figure 27: Optimistic Scenario Assumptions

12. Funding Methods

12. Funding Methods

TCLP has several options to fund the entire project (self-funded, Bonds, Bank Loans, USDA/RUS loans and grants). Subsequent phases can be funded through USDA/RUS loans and grants if pursued. It is anticipated the TCLP, the electric utility, will apply for USDA loans through electrical efficiency program and or Rural E-Connect program for infrastructure and perhaps BB grants offered by RUS for electronics. The conventional RUS loans taken by TCLP can fund the fiber infrastructure up to and including drop and electronics inside the premise (home or commercial building). Fujitsu will assist TCLP with all necessary documents that support the build, and on-going operation of the network. The type of funding will be at the sole discretion of TCLP.

12.1 General Sources

Fujitsu concludes that these low-interest loans from federal sources are the most favored approach to debt due to the interest rate. USDA/RUS anticipates these programs will carry an interest rate at slightly higher than 2%.

12. Funding Methods

APPENDICES

13. Appendix A – Detailed Financials for Each Scenario

13. Appendix A – Detailed Financials for Each Scenario

13.1 Break Even Scenario

- **Take Rate**
 - Based on industry low/medium average for similar areas and service offers
- **Miles of Fiber Constructed**
 - 11 Miles
- **Loan**
 - \$4M
 - Rate: 3.25%
 - Term: 20 Years
 - Cost of Issuance: 1%
- **\$3.2M CAPEX, \$0.8M 1st year OPEX**
- **Outside Plant Depreciation**
 - Straight Line: 20 years
- **Equipment Depreciation**
 - Straight Line: 7 years
- **Pole Attachment Fees**
 - \$8.5/pole/year
- **Preliminary Construction Timeline**
 - 6 Months
 - Single Mobilization
- **City Gross Revenue Take**
 - 5%
- **Dark Fiber Cash Flow Added**
 - Years 1-4 from provided projections
 - Years 5+ rolling 5 year average
- **Expected Initial Local Operations Headcount**
 - 6 (GM, CSRs, Techs, etc)
- **No equipment refresh modeled due to unknown technology status or competitive requirements in the future**
- **Model is generated with flat growth given unknown inflation in revenue or cost, future competitive environment, or available technology and innovation**

Market Size		
Residential		1,006
Business		945
VoIP		1,951

Take Rate		# of Customers
Residential	40% at steady state	402
Business	40% at steady state	378
VoIP	28% of data customers at steady state	219

Figure 28: Break Even Scenario Assumptions

Capital Costs	Total Years 1-5	1	2	3	4	5
Professional and Contractual Services						
Outside Plant Capital						
Design, Engineering, Construction	\$ 2,044,323	\$ 2,044,323	\$ -	\$ -	\$ -	\$ -
Materials	\$ 398,913	\$ 398,913	\$ -	\$ -	\$ -	\$ -
Data Center	\$ 252,131	\$ 252,131	\$ -	\$ -	\$ -	\$ -
Equipment Capital	\$ 465,150	\$ 465,150	\$ -	\$ -	\$ -	\$ -
IP Addresses	\$ 42,000	\$ 42,000	\$ -	\$ -	\$ -	\$ -
Total	\$ 3,202,516	\$ 3,202,516	\$ -	\$ -	\$ -	\$ -

Figure 29: Break Even Scenario, Years 1-5 CAPEX

13. Appendix A – Detailed Financials for Each Scenario

Appendix A – Detailed Financials for Each Scenario

Income Statement		Total Years 1-5	1	2	3	4	5	
REVENUE								
Sales								
Residential	\$	2,074,586	\$	331,389	\$	435,799	\$	435,799
Business	\$	3,152,615	\$	503,591	\$	662,256	\$	662,256
VoIP	\$	398,851	\$	63,711	\$	83,785	\$	83,785
Total Revenue	\$	5,626,052	\$	898,691	\$	1,181,840	\$	1,181,840
Cost of Goods								
	\$	-	\$	-	\$	-	\$	-
COGS	\$	-	\$	-	\$	-	\$	-
GROSS MARGIN	\$	5,626,052	\$	898,691	\$	1,181,840	\$	1,181,840
%				100.0%		100.0%		100.0%
Operations Expenses								
Professional and Contractual Services								
Network Operations Center	\$	258,336	\$	43,704	\$	53,658	\$	53,658
Pole Attachments	\$	23,375	\$	4,675	\$	4,675	\$	4,675
Fiber Maintenance	\$	65,190	\$	13,038	\$	13,038	\$	13,038
Cable Locates	\$	25,056	\$	4,320	\$	5,184	\$	5,184
Staff and Fleet Expenses	\$	2,940,951	\$	501,779	\$	609,793	\$	609,793
Help Desk	\$	217,500	\$	37,500	\$	45,000	\$	45,000
Software	\$	241,875	\$	48,375	\$	48,375	\$	48,375
VoIP Service	\$	113,920	\$	28,701	\$	21,305	\$	21,305
Internet Backhaul	\$	140,000	\$	28,000	\$	28,000	\$	28,000
IP Addresses	\$	2,000	\$	-	\$	500	\$	500
Misc Office	\$	30,000	\$	6,000	\$	6,000	\$	6,000
Marketing	\$	175,000	\$	35,000	\$	35,000	\$	35,000
City Fee	\$	281,303	\$	44,935	\$	59,092	\$	59,092
EBITDA	\$	1,111,546	\$	102,664	\$	252,220	\$	252,220
INTEREST EXPENSE	\$	501,164	\$	-	\$	132,668	\$	127,855
EQUIPMENT DEPRECIATION	\$	332,250	\$	66,450	\$	66,450	\$	66,450
OSP DEPRECIATION	\$	673,842	\$	134,768	\$	134,768	\$	134,768
Net Income	\$	(395,709)	\$	(98,554)	\$	(81,666)	\$	(76,853)
								(66,753)

Figure 30: Break Even Scenario, Years 1-5 Income Statement

13. Appendix A – Detailed Financials for Each Scenario

Appendix A – Detailed Financials for Each Scenario

Cash Flow	Total Years 1-5	1	2	3	4	5
Net Income	\$ (395,709)	\$ (98,554)	\$ (81,666)	\$ (76,853)	\$ (71,884)	\$ (66,753)
Add: Equip Depreciation Expense	\$ 332,250	\$ 66,450	\$ 66,450	\$ 66,450	\$ 66,450	\$ 66,450
Add: OSP Depreciation Expense	\$ 673,842	\$ 134,768	\$ 134,768	\$ 134,768	\$ 134,768	\$ 134,768
CASH FROM OPERATIONS (after Interest)	\$ 610,382	\$ 102,664	\$ 119,552	\$ 124,365	\$ 129,335	\$ 134,466
Capital Expenses	\$ (3,202,516)	\$ (3,202,516)	\$ -	\$ -	\$ -	\$ -
Dark Fiber Business Cash Flow Add	\$ 585,817	\$ 39,100	\$ 50,198	\$ 27,910	\$ 232,299	\$ 236,310
Equity Contribution	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Loan Proceeds with Cap Int	\$ 4,082,100	\$ 4,082,100	\$ -	\$ -	\$ -	\$ -
Less: Cost of Issuance	\$ (40,821)	\$ (40,821)	\$ -	\$ -	\$ -	\$ -
Less: Principal Paydowns	\$ (473,791)	\$ -	\$ -	\$ (152,907)	\$ (157,877)	\$ (163,008)
Cash Flow	\$ 1,561,171	\$ 980,528	\$ 169,750	\$ (632)	\$ 203,757	\$ 207,768
Ending Cash Balance	\$ -	\$ 980,528	\$ 1,150,278	\$ 1,149,646	\$ 1,353,403	\$ 1,561,171
Estimated Annual Pmt (Net of Capitalized Interest)		\$ 132,668	\$ 132,668	\$ 280,762	\$ 280,762	\$ 280,762
Coverage (Net Debt Svc / Prior year ETITDA)		0.77	0.77	0.90	0.90	0.90

Figure 31: Break Even Scenario Years 1-5, Cash flow

13.2 Most Likely Scenario

- **Take Rate**
 - Based on industry low/medium average for similar areas and service offers
- **Miles of Fiber Constructed**
 - 11 Miles
- **Loan**
 - \$4.2M
 - Rate: 3.25%
 - Term: 20 Years
 - Cost of Issuance: 1%
- **\$3.4M CAPEX, \$0.8M 1st year OPEX**
- **Outside Plant Depreciation**
 - Straight Line: 20 years
- **Equipment Depreciation**
 - Straight Line: 7 years
- **Pole Attachment Fees**
 - \$8.5/pole/year
- **Preliminary Construction Timeline**
 - 6 Months
 - Single Mobilization
- **City Gross Revenue Take**
 - 5%
- **Dark Fiber Cash Flow Added**
 - Years 1-4 from provided projections
 - Years 5+ rolling 5 year average
- **Expected Initial Local Operations Headcount**
 - 6 (GM, CSRs, Techs, etc)
- **No equipment refresh modeled due to unknown technology status or competitive requirements in the future**
- **Model is generated with flat growth given unknown inflation in revenue or cost, future competitive environment, or available technology and innovation**

Market Size	
Residential	1,006
Business	945
VoIP	1,951

Take Rate		# of Customers
Residential	50% at steady state	503
Business	50% at steady state	473
VoIP	35% of data customers at steady state	341

Figure 32: Most Likely Scenario Assumptions

13. Appendix A – Detailed Financials for Each Scenario

Appendix A – Detailed Financials for Each Scenario

Capital Costs	Total Years 1-5	1	2	3	4	5
Professional and Contractual Services						
Outside Plant Capital						
Design, Engineering, Construction	\$ 2,141,396	\$ 2,141,396	\$ -	\$ -	\$ -	\$ -
Materials	\$ 398,913	\$ 398,913	\$ -	\$ -	\$ -	\$ -
Data Center	\$ 252,131	\$ 252,131	\$ -	\$ -	\$ -	\$ -
Equipment Capital	\$ 502,089	\$ 502,089	\$ -	\$ -	\$ -	\$ -
IP Addresses	\$ 42,000	\$ 42,000	\$ -	\$ -	\$ -	\$ -
Total	\$ 3,336,528	\$ 3,336,528	\$ -	\$ -	\$ -	\$ -

Figure 33: Most Likely Scenario Years 1-5, CAPEX

Income Statement	Total Years 1-5	1	2	3	4	5
REVENUE						
Sales						
Residential	\$ 2,573,939	\$ 394,943	\$ 544,749	\$ 544,749	\$ 544,749	\$ 544,749
Business	\$ 3,911,450	\$ 600,170	\$ 827,820	\$ 827,820	\$ 827,820	\$ 827,820
VoIP	\$ 618,569	\$ 94,913	\$ 130,914	\$ 130,914	\$ 130,914	\$ 130,914
Total Revenue	\$ 7,103,957	\$ 1,090,025	\$ 1,503,483	\$ 1,503,483	\$ 1,503,483	\$ 1,503,483
Cost of Goods	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
COGS	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
GROSS MARGIN	\$ 7,103,957	\$ 1,090,025	\$ 1,503,483	\$ 1,503,483	\$ 1,503,483	\$ 1,503,483
%		100.0%	100.0%	100.0%	100.0%	100.0%
Operations Expenses						
Professional and Contractual Services						
Network Operations Center	\$ 274,217	\$ 45,726	\$ 57,123	\$ 57,123	\$ 57,123	\$ 57,123
Pole Attachments	\$ 23,375	\$ 4,675	\$ 4,675	\$ 4,675	\$ 4,675	\$ 4,675
Fiber Maintenance	\$ 65,190	\$ 13,038	\$ 13,038	\$ 13,038	\$ 13,038	\$ 13,038
Cable Locates	\$ 25,056	\$ 4,320	\$ 5,184	\$ 5,184	\$ 5,184	\$ 5,184
Staff and Fleet Expenses	\$ 2,940,951	\$ 501,779	\$ 609,793	\$ 609,793	\$ 609,793	\$ 609,793
Help Desk	\$ 217,500	\$ 37,500	\$ 45,000	\$ 45,000	\$ 45,000	\$ 45,000
Software	\$ 241,875	\$ 48,375	\$ 48,375	\$ 48,375	\$ 48,375	\$ 48,375
VoIP Service	\$ 169,790	\$ 36,634	\$ 33,289	\$ 33,289	\$ 33,289	\$ 33,289
Internet Backhaul	\$ 140,000	\$ 28,000	\$ 28,000	\$ 28,000	\$ 28,000	\$ 28,000
IP Addresses	\$ 2,000	\$ -	\$ 500	\$ 500	\$ 500	\$ 500
Misc Office	\$ 30,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000
Marketing	\$ 175,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000
City Fee	\$ 355,198	\$ 54,501	\$ 75,174	\$ 75,174	\$ 75,174	\$ 75,174
EBITDA	\$ 2,443,805	\$ 274,477	\$ 542,332	\$ 542,332	\$ 542,332	\$ 542,332
INTEREST EXPENSE	\$ 519,413	\$ -	\$ 137,499	\$ 132,511	\$ 127,361	\$ 122,043
EQUIPMENT DEPRECIATION	\$ 358,635	\$ 71,727	\$ 71,727	\$ 71,727	\$ 71,727	\$ 71,727
OSP DEPRECIATION	\$ 698,110	\$ 139,622	\$ 139,622	\$ 139,622	\$ 139,622	\$ 139,622
Net Income	\$ 867,647	\$ 63,128	\$ 193,484	\$ 198,472	\$ 203,623	\$ 208,940

Figure 34: Most Likely Scenario Years 1-5, Income Statement

13. Appendix A – Detailed Financials for Each Scenario

Appendix A – Detailed Financials for Each Scenario

Cash Flow	Total Years 1-5	1	2	3	4	5
Net Income	\$ 867,647	\$ 63,128	\$ 193,484	\$ 198,472	\$ 203,623	\$ 208,940
Add: Equip Depreciation Expense	\$ 358,635	\$ 71,727	\$ 71,727	\$ 71,727	\$ 71,727	\$ 71,727
Add: OSP Depreciation Expense	\$ 698,110	\$ 139,622	\$ 139,622	\$ 139,622	\$ 139,622	\$ 139,622
CASH FROM OPERATIONS (after Interest)	\$ 1,924,392	\$ 274,477	\$ 404,833	\$ 409,821	\$ 414,972	\$ 420,289
Capital Expenses	\$ (3,336,528)	\$ (3,336,528)	\$ -	\$ -	\$ -	\$ -
Dark Fiber Business Cash Flow Add	\$ 585,817	\$ 39,100	\$ 50,198	\$ 27,910	\$ 232,299	\$ 236,310
Equity Contribution	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Loan Proceeds with Cap Int	\$ 4,230,747	\$ 4,230,747	\$ -	\$ -	\$ -	\$ -
Less: Cost of Issuance	\$ (42,307)	\$ (42,307)	\$ -	\$ -	\$ -	\$ -
Less: Principal Paydowns	\$ (491,044)	\$ -	\$ -	\$ (158,475)	\$ (163,626)	\$ (168,943)
Cash Flow	\$ 2,871,075	\$ 1,165,488	\$ 455,031	\$ 279,256	\$ 483,645	\$ 487,656
Ending Cash Balance	\$ -	\$ 1,165,488	\$ 1,620,518	\$ 1,899,774	\$ 2,383,419	\$ 2,871,075
Estimated Annual Pmt (Net of Capitalized Interest)		\$ 137,499	\$ 137,499	\$ 290,986	\$ 290,986	\$ 290,986
Coverage (Net Debt Svc / Prior year ETITDA)		2.00	2.00	1.86	1.86	1.86

Figure 35: Most Likely Scenario Years 1-5, Cash flow

13.3 Optimistic Scenario

- **Take Rate**
 - Based on industry low/medium average for similar areas and service offers
- **Miles of Fiber Constructed**
 - 11 Miles
- **Loan**
 - \$4.4M
 - Rate: 3.25%
 - Term: 20 Years
 - Cost of Issuance: 1%
- **\$3.47M CAPEX, \$0.8M 1st year OPEX**
- **Outside Plant Depreciation**
 - Straight Line: 20 years
- **Equipment Depreciation**
 - Straight Line: 7 years
- **Pole Attachment Fees**
 - \$8.5/pole/year
- **Preliminary Construction Timeline**
 - 6 Months
 - Single Mobilization
- **City Gross Revenue Take**
 - 5%
- **Dark Fiber Cash Flow Added**
 - Years 1-4 from provided projections
 - Years 5+ rolling 5 year average
- **Expected Initial Local Operations Headcount**
 - 6 (GM, CSRs, Techs, etc)
- **No equipment refresh modeled due to unknown technology status or competitive requirements in the future**
- **Model is generated with flat growth given unknown inflation in revenue or cost, future competitive environment, or available technology and innovation**

Market Size	
Residential	1,006
Business	945
VoIP	1,951

Take Rate		# of Customers
Residential	60% at steady state	604
Business	60% at steady state	567
VoIP	35% of data customers at steady state	410

Figure 36: Optimistic Scenario Assumptions

13. Appendix A – Detailed Financials for Each Scenario

Appendix A – Detailed Financials for Each Scenario

Capital Costs	Total Years 1-5	1	2	3	4	5
Professional and Contractual Services						
Outside Plant Capital						
Design, Engineering, Construction	\$ 2,238,469	\$ 2,238,469	\$ -	\$ -	\$ -	\$ -
Materials	\$ 398,913	\$ 398,913	\$ -	\$ -	\$ -	\$ -
Data Center	\$ 252,131	\$ 252,131	\$ -	\$ -	\$ -	\$ -
Equipment Capital	\$ 539,028	\$ 539,028	\$ -	\$ -	\$ -	\$ -
IP Addresses	\$ 42,000	\$ 42,000	\$ -	\$ -	\$ -	\$ -
Total	\$ 3,470,541	\$ 3,470,541	\$ -	\$ -	\$ -	\$ -

Figure 37: Optimistic Scenario Years 1-5, CAPEX

Income Statement	Total Years 1-5	1	2	3	4	5
REVENUE						
Sales						
Residential	\$ 3,080,102	\$ 465,306	\$ 653,699	\$ 653,699	\$ 653,699	\$ 653,699
Business	\$ 4,680,632	\$ 707,096	\$ 993,384	\$ 993,384	\$ 993,384	\$ 993,384
VoIP	\$ 740,210	\$ 111,822	\$ 157,097	\$ 157,097	\$ 157,097	\$ 157,097
Total Revenue	\$ 8,500,943	\$ 1,284,225	\$ 1,804,180	\$ 1,804,180	\$ 1,804,180	\$ 1,804,180
Cost of Goods	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
COGS	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
GROSS MARGIN	\$ 8,500,943	\$ 1,284,225	\$ 1,804,180	\$ 1,804,180	\$ 1,804,180	\$ 1,804,180
%		100.0%	100.0%	100.0%	100.0%	100.0%
Operations Expenses						
Professional and Contractual Services						
Network Operations Center	\$ 290,315	\$ 47,963	\$ 60,588	\$ 60,588	\$ 60,588	\$ 60,588
Pole Attachments	\$ 23,375	\$ 4,675	\$ 4,675	\$ 4,675	\$ 4,675	\$ 4,675
Fiber Maintenance	\$ 65,190	\$ 13,038	\$ 13,038	\$ 13,038	\$ 13,038	\$ 13,038
Cable Locates	\$ 25,056	\$ 4,320	\$ 5,184	\$ 5,184	\$ 5,184	\$ 5,184
Staff and Fleet Expenses	\$ 2,940,951	\$ 501,779	\$ 609,793	\$ 609,793	\$ 609,793	\$ 609,793
Help Desk	\$ 217,500	\$ 37,500	\$ 45,000	\$ 45,000	\$ 45,000	\$ 45,000
Software	\$ 241,875	\$ 48,375	\$ 48,375	\$ 48,375	\$ 48,375	\$ 48,375
VoIP Service	\$ 200,721	\$ 40,934	\$ 39,947	\$ 39,947	\$ 39,947	\$ 39,947
Internet Backhaul	\$ 140,000	\$ 28,000	\$ 28,000	\$ 28,000	\$ 28,000	\$ 28,000
IP Addresses	\$ 2,000	\$ -	\$ 500	\$ 500	\$ 500	\$ 500
Misc Office	\$ 30,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000
Marketing	\$ 175,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000
City Fee	\$ 425,047	\$ 64,211	\$ 90,209	\$ 90,209	\$ 90,209	\$ 90,209
EBITDA	\$ 3,723,913	\$ 452,429	\$ 817,871	\$ 817,871	\$ 817,871	\$ 817,871
INTEREST EXPENSE	\$ 537,230	\$ -	\$ 142,216	\$ 137,056	\$ 131,729	\$ 126,229
EQUIPMENT DEPRECIATION	\$ 385,020	\$ 77,004	\$ 77,004	\$ 77,004	\$ 77,004	\$ 77,004
OSP DEPRECIATION	\$ 722,378	\$ 144,476	\$ 144,476	\$ 144,476	\$ 144,476	\$ 144,476
Net Income	\$ 2,079,285	\$ 230,950	\$ 454,176	\$ 459,335	\$ 464,662	\$ 470,163

Figure 38: Optimistic Scenario Years 1-5, Income Statement

13. Appendix A – Detailed Financials for Each Scenario

Appendix A – Detailed Financials for Each Scenario

Cash Flow	Total Years 1-5	1	2	3	4	5
Net Income	\$ 2,079,285	\$ 230,950	\$ 454,176	\$ 459,335	\$ 464,662	\$ 470,163
Add: Equip Depreciation Expense	\$ 385,020	\$ 77,004	\$ 77,004	\$ 77,004	\$ 77,004	\$ 77,004
Add: QSP Depreciation Expense	\$ 722,378	\$ 144,476	\$ 144,476	\$ 144,476	\$ 144,476	\$ 144,476
CASH FROM OPERATIONS (after Interest)	\$ 3,186,684	\$ 452,429	\$ 675,655	\$ 680,815	\$ 686,142	\$ 691,642
Capital Expenses	\$ (3,470,541)	\$ (3,470,541)	\$ -	\$ -	\$ -	\$ -
Dark Fiber Business Cash Flow Add	\$ 585,817	\$ 39,100	\$ 50,198	\$ 27,910	\$ 232,299	\$ 236,310
Equity Contribution	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Loan Proceeds with Cap Int	\$ 4,375,865	\$ 4,375,865	\$ -	\$ -	\$ -	\$ -
Less: Cost of Issuance	\$ (43,759)	\$ (43,759)	\$ -	\$ -	\$ -	\$ -
Less: Principal Paydowns	\$ (507,887)	\$ -	\$ -	\$ (163,911)	\$ (169,238)	\$ (174,738)
Cash Flow	\$ 4,126,179	\$ 1,353,094	\$ 725,853	\$ 544,814	\$ 749,203	\$ 753,214
Ending Cash Balance	\$ -	\$ 1,353,094	\$ 2,078,948	\$ 2,623,762	\$ 3,372,965	\$ 4,126,179
Estimated Annual Pmt (Net of Capitalized Interest)		\$ 142,216	\$ 142,216	\$ 300,967	\$ 300,967	\$ 300,967
Coverage (Net Debt Svc / Prior year ETITDA)		3.18	3.18	2.72	2.72	2.72

Figure 39: Optimistic Scenario Years 1-5, Cash flow

14. Appendix B – Data Center Analysis

14. Appendix B – Data Center Analysis

Traverse City Light and Power has various substation and office locations around its currently serving areas. Both substation and office locations are strategically located to reach the neighborhood and ease of access and can act as either Data Center core or hub-site for fiber distribution area. Based on the phase 1 area and considering expansion to phase 2 Fujitsu considered and analyzed following sites to operate as FTTx Core Data Center location



Data Center Analysis		
Item		
Centrally located Ph1	Yes	No
Centrally located Ph2	No	Partial
Phase 1 Homes Reachability	Yes	Partial
Phase 2 Homes Reachability	Partial	Partial
DC power supply	Yes	Yes
DC Redundant Power supply	Yes ¹	Yes ¹
Secure Access in the building	Yes	Yes
24x7 Access in the building	Yes ²	Yes ²
Controlled Access to Data Center for authorized personnel only	Yes ³	Yes ³
Environmentally Controlled	Yes	Yes
Space Availability (min 12' x 20')	Yes	Yes
EMI interference	Limited	No
Ease of Data Center Adaptability	Yes	Yes
WAN Internet Connectivity 1	To be confirmed	To be confirmed
WAN Internet Connectivity 2	To be confirmed	To be confirmed

1Redundant power supply to be arranged through rectifiers
 2Access will need to be coordinated with TCLP
 3Site modifications maybe required to arrange controlled access

15. Appendix C - Core Wan Gateway Electronics Analysis

15. Appendix C - Core Wan Gateway Electronics Analysis

Some of the Core WAN gateways along with their salient features are described below.

██████████ support high density 100G, 40G, 10G and 1G interfaces to support the demanding requirements of Service provider, Cloud, Datacenter and Enterprise Networks. ██████████ software is feature rich in Layer 2 and Layer 3 technologies, SDN enabled and it features versatile programmability, scripting support, open APIs, and popular orchestration frameworks, while providing DevOps-style management for continuous service delivery and infrastructure as code. The ██████████ high end WAN Gateways like the ██████████ products support innovative architectures such as virtual-chassis, MC-LAG, Ethernet Fabric, IP Fabric and IP Fabric with overlay to support different sized datacenter and enterprise networks.

15.1 Vendor

██████████ WAN gateway routers devices support high density 400G, 100G, 40G, 10G and 1G interfaces enabling support for wide range of applications such as Internet backbone routing, metro core, MPLS switching, data center interconnect and virtualized solutions. The ██████████ WAN gateway routers combine agility and scalability to help support Internet Service provider Edge (PE), Broadband Network Gateway (BNGs), Advanced Gateway functions like CGNAT, SecGW, WLANGW), Internet peering, data center gateways, backbone routers, DC/WAN aggregation applications and virtualized service router applications.

The vendor Operating System supports the industry's most comprehensive suite of IP, MPLS and segment routing features. Deployed in the field for more than a decade, it offers high-availability features such as non-stop routing and provides deterministic and scalable control plane performance through a 64-bit symmetric multiprocessing (SMP) architecture.

15.2 Analysis

15. Appendix C - Core Wan Gateway Electronics Analysis

Appendix C - Core Wan Gateway Electronics Analysis

CORE WAN ROUTER FEATURE COMPARISON		
Item	Vendor	Vendor
DC Power	Y	Y
AC Power	Y	Y (External AC option)
100G/400G Uplinks	Y	Y
System Capacity	4 Tb/s	4 Tb/s
Security Features – in built real time data analytics and DDOS protection	Y (optional service card required)	Y (Yes optional service card required)
High availability (NSS/NSR / ISSU)	Y	Y
High performance at scale (FP4) Flexipath Network Processing (2.4 Tb/s) latest silicon technology.	N	Y
Strict separation of control plane and data plane	Y	Y
Power Redundancy	Y	Y
Broad Portfolio span - WAN gateways	N	Y
Hardened Options	N	Y
Possible interoperability issues with other FTTx infrastructure	Y	N [REDACTED]
Single NMS / EMS for FTTx infrastructure	N	N
One Vendor Complete Solution	N	Y

16. Appendix D - Core FTTx Electronics Analysis

16. Appendix D - Core FTTx Electronics Analysis

16.1 Vendor

The [REDACTED] Ethernet products provide cost-effective, flexible service delivery of advanced IP services across the entire access network and are designed to work in conjunction with existing Calix equipment.

16.2 Vendor

The [REDACTED] OLT product portfolio comprises of primarily the [REDACTED] series of platforms.

16.3 Vendor

The [REDACTED] Optical Line Terminals (OLT's) are high-capacity access nodes that addresses mass-market fiber deployments

17. Appendix E – Home Network Electronics Analysis

Appendix E – Home Network Electronics Analysis

17. Appendix E – Home Network Electronics Analysis

Item			
Indoor GPON ONT	█	█	█
Outdoor GPON ONT	█	█	█
Integrated Indoor GPON ONT/R-GW	█	██████████	█
Integrated Indoor GPON ONT/R-GW/Wi-Fi	█	██████████	█
Integrated indoor XGS PON ONT/GWWi-Fi	█	██████████	█
Integrated Indoor NGPON2 ONT/GW	█	██████████	█
AC power option	█	█	█
DC Power Option	█	█	█
Auto Detect (optional)	█	█	█
AE support	█	█	█
One box solution	█	█	█

18. Appendix F – Marketplace Demographics

18. Appendix F – Marketplace Demographics¹⁸

Traverse City is a vibrant community whose population swells during summer months. Here is a look at full-time resident demographics that will be taken into consideration as we micro-target social media and advertising.

In 2017, in Traverse City median ages were:

All people: 40.6

Native-born citizens: 41

Foreign-born citizens: 39

(Most common countries of origin: Mexico, India, Iraq)

Population:

The breakdown by population is 15,515 (2017/ US Census Bureau):

Median age: 40.6

Marital status:

- 43.3% are married
- 16.0% are divorced
- 26.7% are married with children
- 17.4% have children, but are single

Median household income: \$53,237

Number of households: 6,663

Median property value: \$216,800

Homeownership: 63.3%

Median property taxes: \$3,000+ range

Poverty rate: 10.2 %

Number of full-time employees: 8,173

Ethnicity (2017):

White residents: 14,300 (91.7%)

Hispanic or Latino residents: 392 (2.52%),

Two or More Races: 347 residents (2.23%)

African American: 276 residents (1.77%), 179

American Indian & Alaska Native residents: 179 (1.15%),

¹⁸<https://www.census.gov/searchresults.html?q=traverse+city%2C+MI&page=1&stateGeo=none&searchtype=web&cssp=SERP& charset=UTF-8>

18. Appendix F – Marketplace Demographics

Asian residents: 94 (0.605%)

Misc/other: 6 (0.0386%)

Languages most commonly spoken besides English:

Spanish or Spanish Creole: 267

German: 92

French or Cajun/Patois; 28

Education levels:

In Traverse City, MI, 21.4% hold a high school degree; 22.6% of residents hold a two year degree; 44.9% of residents have a bachelor's degree; 2.5% master's degree; 2% professional degree.

Healthcare Coverage:

91.3% of the population of Traverse City carries healthcare insurance (48.3% employee plans)

13.5% on Medicare,

11.6% on Medicaid,

16.7% on non-group plans

1.16% on military or VA plans.

Housing:

The median property value in Traverse City, MI was \$216,800 in 2017 (In 2019, it is estimated at \$257,000), which is 0.996 times smaller than the national average of \$217,600. Between 2016 and 2017 the median property value increased from \$198,000 to \$216,800, a 9.49% increase. The homeownership rate in Traverse City, MI is 63.3%, which is lower than the national average of 63.9%.

Large employers:

The largest employers (larger than 400 employees) in the Traverse City area besides the school systems and colleges include Munson Medical Center, Grand Traverse Resort & Spa, Interlochen Center for the Arts, Grand Traverse County Government, Grand Traverse Pavilions, Tyson foods, Hagerty Insurance, Britten Banners, Charter Communications, and smaller companies such as Grand Traverse Pie Company, Frontier Computer Corporation, Cherry Republic, Cherry Growers, Century, Clark Manufacturing, Lead Screws International, Quantum Sail Design, Salamander Technologies, Shoreline Fruit, Electro-Optics Technology etc. Additionally, around the time of the annual cherry harvest, the city hosts the annual week-long National Cherry Festival, approximately 500,000 visitors annually. The surrounding countryside is a key center of Midwest wine production, so the vineyards are a source of tourism year round.

Full Time Employment by Industry (2017):

Healthcare: 1,391

Retail: 1,156

Food service: 913

18. Appendix F – Marketplace Demographics

Manufacturing: 825

Education: 585

Professional/technical services: 538

Administrative/support services/waste management: 459

Finance & Insurance: 402

Public Administration/misc: 376

Construction: 269

Information: 266

Wholesale trade: 219

Real Estate: 207

Arts/Entertainment/Recreation: 187

Transportation/warehousing: 124

Income levels:

Traverse City median household income is \$53,237 (less than US median household income of \$60,336). The average male salary in Traverse City is \$63,869 whereas the average female salary is \$46,762.

Most common occupations:

Managers

Nurses

Sales workers

Truck drivers

Administrative assistants/secretaries

Cashiers.

Other Stats:

Unemployment rate: 3.80%

Recent job growth: 1.65%

The Sales Tax Rate for Traverse City is 6.0%. The US average is 7.3%.

The Income Tax Rate for Traverse City is 4.3%. The US average is 4.6%.

19. Appendix G – Living Wage Information

19. Appendix G – Living Wage Information

19.1 Grand Traverse County

Hourly Wages	1 Adult	1 Adult 1 Child	1 Adult 2 Children	1 Adult 3 Children	2 Adults (1 Working)	2 Adults (1 Working) 1 Child	2 Adults (1 Working) 2 Children	2 Adults (1 Working) 3 Children	2 Adults (1 Working Part Time) 1 Child*	2 Adults	2 Adults 1 Child	2 Adults 2 Children	2 Adults 3 Children
Living Wage	\$11.27	\$23.54	\$28.71	\$36.53	\$18.69	\$21.84	\$24.44	\$27.40	\$25.19	\$9.35	\$12.93	\$15.71	\$18.67
Poverty Wage	\$5.84	\$7.91	\$9.99	\$12.07	\$7.91	\$9.99	\$12.07	\$14.14		\$3.96	\$5.00	\$6.03	\$7.07
Minimum Wage	\$9.25	\$9.25	\$9.25	\$9.25	\$9.25	\$9.25	\$9.25	\$9.25		\$9.25	\$9.25	\$9.25	\$9.25

Annual Expenses	1 Adult	1 Adult 1 Child	1 Adult 2 Children	1 Adult 3 Children	2 Adults (1 Working)	2 Adults (1 Working) 1 Child	2 Adults (1 Working) 2 Children	2 Adults (1 Working) 3 Children	2 Adults (1 Working Part Time) 1 Child*	2 Adults	2 Adults 1 Child	2 Adults 2 Children	2 Adults 3 Children
Food	\$3,058	\$4,508	\$6,786	\$9,001	\$5,607	\$6,979	\$9,012	\$10,972		\$5,607	\$6,979	\$9,012	\$10,972
Child Care	\$0	\$7,068	\$12,287	\$17,506	\$0	\$0	\$0	\$0		\$0	\$7,068	\$12,287	\$17,506
Medical	\$2,214	\$5,536	\$5,192	\$5,274	\$4,749	\$5,192	\$5,274	\$4,993		\$4,749	\$5,192	\$5,274	\$4,993
Housing	\$6,900	\$10,824	\$10,824	\$14,616	\$9,072	\$10,824	\$10,824	\$14,616		\$9,072	\$10,824	\$10,824	\$14,616
Transportation	\$4,866	\$8,867	\$10,426	\$12,063	\$8,867	\$10,426	\$12,063	\$11,925		\$8,867	\$10,426	\$12,063	\$11,925
Other	\$2,785	\$4,633	\$5,030	\$5,855	\$4,633	\$5,030	\$5,855	\$5,729		\$4,633	\$5,030	\$5,855	\$5,729
Required annual income after taxes	\$19,824	\$41,435	\$50,546	\$64,315	\$32,927	\$38,451	\$43,027	\$48,236		\$32,927	\$45,519	\$55,314	\$65,742
Annual taxes	\$3,610	\$7,522	\$9,181	\$11,672	\$5,953	\$6,979	\$7,812	\$8,746		\$5,953	\$8,266	\$10,048	\$11,932
Required annual income before taxes	\$23,433	\$48,958	\$59,726	\$75,987	\$38,881	\$45,430	\$50,839	\$56,982	\$52,399	\$38,881	\$53,785	\$65,362	\$77,674

Source: <http://livingwage.mit.edu/counties/26055>

Appendix G – Living Wage Information

19. Appendix G – Living Wage Information

19.2 Chicago-Naperville-Elgin Metro Area

Appendix G – Living Wage Information

Hourly Wages	1 Adult	1 Adult 1 Child	1 Adult 2 Children	1 Adult 3 Children	2 Adults (1 Working)	2 Adults (1 Working) 1 Child	2 Adults (1 Working) 2 Children	2 Adults (1 Working) 3 Children	2 Adults (1 Working Part Time) 1 Child*	2 Adults	2 Adults 1 Child	2 Adults 2 Children	2 Adults 3 Children
Living Wage	\$13.34	\$26.96	\$31.50	\$38.72	\$20.96	\$24.64	\$27.26	\$30.26	\$28.53	\$10.04	\$14.65	\$17.11	\$19.77
Poverty Wage	\$5.84	\$7.91	\$9.99	\$12.07	\$7.91	\$9.99	\$12.07	\$14.14		\$3.96	\$5.00	\$6.03	\$7.07
Minimum Wage	\$8.25	\$8.25	\$8.25	\$8.25	\$8.25	\$8.25	\$8.25	\$8.25		\$8.25	\$8.25	\$8.25	\$8.25

Annual Expenses	1 Adult	1 Adult 1 Child	1 Adult 2 Children	1 Adult 3 Children	2 Adults (1 Working)	2 Adults (1 Working) 1 Child	2 Adults (1 Working) 2 Children	2 Adults (1 Working) 3 Children	2 Adults (1 Working Part Time) 1 Child*	2 Adults	2 Adults 1 Child	2 Adults 2 Children	2 Adults 3 Children
Food	\$3,058	\$4,508	\$6,786	\$9,001	\$5,607	\$6,979	\$9,012	\$10,972		\$5,607	\$6,979	\$9,012	\$10,972
Child Care	\$0	\$8,135	\$12,186	\$16,236	\$0	\$0	\$0	\$0		\$0	\$8,135	\$12,186	\$16,236
Medical	\$2,473	\$7,229	\$6,885	\$6,967	\$5,817	\$6,885	\$6,967	\$6,687		\$5,817	\$6,885	\$6,967	\$6,687
Housing	\$10,181	\$13,826	\$13,826	\$17,656	\$11,784	\$13,826	\$13,826	\$17,656		\$10,181	\$13,826	\$13,826	\$17,656
Transportation	\$4,866	\$8,867	\$10,426	\$12,063	\$8,867	\$10,426	\$12,063	\$11,925		\$8,867	\$10,426	\$12,063	\$11,925
Other	\$2,785	\$4,633	\$5,030	\$5,855	\$4,633	\$5,030	\$5,855	\$5,729		\$4,633	\$5,030	\$5,855	\$5,729
Required annual income after taxes	\$23,364	\$47,197	\$55,140	\$67,778	\$36,709	\$43,146	\$47,722	\$52,970		\$35,105	\$51,281	\$59,908	\$69,206
Annual taxes	\$4,376	\$8,881	\$10,386	\$12,769	\$6,893	\$8,113	\$8,980	\$9,963		\$6,669	\$9,655	\$11,290	\$13,040
Required annual income before taxes	\$27,739	\$56,078	\$65,526	\$80,548	\$43,601	\$51,260	\$56,703	\$62,933	\$59,341	\$41,774	\$60,936	\$71,198	\$82,245

Source: <http://livingwage.mit.edu/metros/16980>

19. Appendix G – Living Wage Information

19.3 Detroit-Warren-Dearborn Metro Area

Hourly Wages	1 Adult	1 Adult 1 Child	1 Adult 2 Children	1 Adult 3 Children	2 Adults (1 Working)	2 Adults (1 Working) 1 Child	2 Adults (1 Working) 2 Children	2 Adults (1 Working) 3 Children	2 Adults (1 Working Part Time) 1 Child*	2 Adults	2 Adults 1 Child	2 Adults 2 Children	2 Adults 3 Children
Living Wage	\$11.44	\$23.79	\$28.97	\$36.69	\$18.50	\$22.09	\$24.69	\$27.55	\$25.44	\$8.84	\$13.06	\$15.84	\$18.75
Poverty Wage	\$5.84	\$7.91	\$9.99	\$12.07	\$7.91	\$9.99	\$12.07	\$14.14		\$3.96	\$5.00	\$6.03	\$7.07
Minimum Wage	\$9.25	\$9.25	\$9.25	\$9.25	\$9.25	\$9.25	\$9.25	\$9.25		\$9.25	\$9.25	\$9.25	\$9.25

Annual Expenses	1 Adult	1 Adult 1 Child	1 Adult 2 Children	1 Adult 3 Children	2 Adults (1 Working)	2 Adults (1 Working) 1 Child	2 Adults (1 Working) 2 Children	2 Adults (1 Working) 3 Children	2 Adults (1 Working Part Time) 1 Child*	2 Adults	2 Adults 1 Child	2 Adults 2 Children	2 Adults 3 Children
Food	\$3,058	\$4,508	\$6,786	\$9,001	\$5,607	\$6,979	\$9,012	\$10,972		\$5,607	\$6,979	\$9,012	\$10,972
Child Care	\$0	\$7,068	\$12,287	\$17,506	\$0	\$0	\$0	\$0		\$0	\$7,068	\$12,287	\$17,506
Medical	\$2,214	\$5,536	\$5,192	\$5,274	\$4,749	\$5,192	\$5,274	\$4,993		\$4,749	\$5,192	\$5,274	\$4,993
Housing	\$7,220	\$11,286	\$11,286	\$14,903	\$8,727	\$11,286	\$11,286	\$14,903		\$7,220	\$11,286	\$11,286	\$14,903
Transportation	\$4,866	\$8,867	\$10,426	\$12,063	\$8,867	\$10,426	\$12,063	\$11,925		\$8,867	\$10,426	\$12,063	\$11,925
Other	\$2,785	\$4,633	\$5,030	\$5,855	\$4,633	\$5,030	\$5,855	\$5,729		\$4,633	\$5,030	\$5,855	\$5,729
Required annual income after taxes	\$20,143	\$41,897	\$51,008	\$64,602	\$32,582	\$38,913	\$43,489	\$48,524		\$31,075	\$45,981	\$55,776	\$66,030
Annual taxes	\$3,655	\$7,587	\$9,245	\$11,712	\$5,905	\$7,044	\$7,877	\$8,786		\$5,695	\$8,330	\$10,113	\$11,972
Required annual income before taxes	\$23,798	\$49,484	\$60,253	\$76,314	\$38,487	\$45,956	\$51,365	\$57,309	\$52,925	\$36,770	\$54,311	\$65,889	\$78,002

Source: <http://livingwage.mit.edu/metros/19820>

Appendix G – Living Wage Information

20. Appendix H – High Level Serving Area Designs

20. Appendix H – High Level Serving Area Designs

21. Appendix I – GASB Presentation

21. Appendix I – GASB Presentation

Appendix I – GASB Presentation

TCLP Fiber Pro Forma						
Cost Benefit Analysis						
Break Even Income Statement						
	Total Years					
	1-5	1	2	3	4	5
Operating revenues						
Charges for services						
Residential	\$ 2,074,585	\$ 331,389	\$ 435,799	\$ 435,799	\$ 435,799	\$ 435,799
Business	3,152,615	503,591	662,256	662,256	662,256	662,256
VOIP	398,851	63,711	83,785	83,785	83,785	83,785
Total operating revenues	5,626,051	898,691	1,181,840	1,181,840	1,181,840	1,181,840
Operating expenses						
Professional and Contractual Services						
Network Operations Center	258,336	43,704	53,658	53,658	53,658	53,658
Pole Attachments	23,375	4,675	4,675	4,675	4,675	4,675
Fiber Maintenance	65,190	13,038	13,038	13,038	13,038	13,038
Cable Locates	25,056	4,320	5,184	5,184	5,184	5,184
Staff and Fleet Expenses	2,940,951	501,779	609,793	609,793	609,793	609,793
Help Desk	217,500	37,500	45,000	45,000	45,000	45,000
Software	241,875	48,375	48,375	48,375	48,375	48,375
VOIP Service	113,921	28,701	21,305	21,305	21,305	21,305
Internet Backhaul	140,000	28,000	28,000	28,000	28,000	28,000
IP Addresses	2,000	-	500	500	500	500
Misc Office	30,000	6,000	6,000	6,000	6,000	6,000
Marketing	175,000	35,000	35,000	35,000	35,000	35,000
Depreciation expense	-	-	-	-	-	-
Equipment	332,250	66,450	66,450	66,450	66,450	66,450
OSP	673,840	134,768	134,768	134,768	134,768	134,768
City Fee	281,303	44,935	59,092	59,092	59,092	59,092
Total operating expenses	5,520,597	997,245	1,130,838	1,130,838	1,130,838	1,130,838
Operating income	105,454	(98,554)	51,002	51,002	51,002	51,002
Nonoperating revenues (expenses)						
Interest expense	501,164	-	132,668	127,855	122,886	117,755
Change in net assets	\$ (395,710)	\$ (98,554)	\$ (81,666)	\$ (76,853)	\$ (71,884)	\$ (66,753)

Figure 40: GASB Break Even Income Statement

21. Appendix I – GASB Presentation

Appendix I – GASB Presentation

TCLP Fiber Pro Forma						
Cost Benefit Analysis						
Break Even Cash Flow						
	Total Years					
	1-5	1	2	3	4	5
Cash flows from operating activities						
Receipt from customers	\$ 5,626,051	\$ 898,691	\$ 1,181,840	\$ 1,181,840	\$ 1,181,840	\$ 1,181,840
Payments to suppliers	(4,233,204)	(751,092)	(870,528)	(870,528)	(870,528)	(870,528)
Payment of City Fee	(281,303)	(44,935)	(59,092)	(59,092)	(59,092)	(59,092)
Net cash from Dark Fiber System	585,817	39,100	50,198	27,910	232,299	236,310
Net cash provided by operating activities	1,697,361	141,764	302,418	280,130	484,519	488,530
Cash flow from capital and related financing activities						
Proceeds from capital debt	4,082,100	4,082,100	-	-	-	-
Cost of capital debt	(40,821)	(40,821)	-	-	-	-
Purchases of capital assets	(3,202,516)	(3,202,516)	-	-	-	-
Principal paid on capital debt	(473,792)	-	-	(152,907)	(157,877)	(163,008)
Interest paid on capital debt	(501,164)	-	(132,668)	(127,855)	(122,886)	(117,755)
Net cash provided (used) by capital and related financing activities	(136,193)	838,763	(132,668)	(280,762)	(280,763)	(280,763)
Net increase (decrease) in cash and cash equivalents	1,561,168	980,527	169,750	(632)	203,756	207,767
Balances - beginning of year	-	-	980,527	1,150,277	1,149,645	1,353,401
Balances - end of year	\$ 1,561,168	\$ 980,527	\$ 1,150,277	\$ 1,149,645	\$ 1,353,401	\$ 1,561,168
Reconciliation of operating income (loss) to net cash provided (used) by operating activities:						
Operating income (loss)	\$ 105,454	\$ (98,554)	\$ 51,002	\$ 51,002	\$ 51,002	\$ 51,002
Adjustments to reconcile operating income to net cash provided (used) by operating activities:						
Depreciation expense	1,006,090	201,218	201,218	201,218	201,218	201,218
Dark Fiber System operating income	585,817	39,100	50,198	27,910	232,299	236,310
Net cash provided by operating activities	\$ 1,697,361	\$ 141,764	\$ 302,418	\$ 280,130	\$ 484,519	\$ 488,530
Estimated Annual Payment			132,668.00	280,762.00	280,763.00	280,763.00
Coverage (Debt Service/Operating Income)			1.90	0.90	0.90	0.90

Figure 41: GASB Break Even Cash Flow

21. Appendix I – GASB Presentation

Appendix I – GASB Presentation

TCLP Fiber Pro Forma							
Cost Benefit Analysis							
Most Likely Income Statement							
	Total Years						
	1-5	1	2	3	4	5	
Operating revenues							
Charges for services							
Residential	\$ 2,573,939	\$ 394,943	\$ 544,749	\$ 544,749	\$ 544,749	\$ 544,749	\$ 544,749
Business	3,911,450	600,170	827,820	827,820	827,820	827,820	827,820
VOIP	618,569	94,913	130,914	130,914	130,914	130,914	130,914
Total operating revenues	7,103,958	1,090,026	1,503,483	1,503,483	1,503,483	1,503,483	1,503,483
Operating expenses							
Professional and Contractual Services							
Network Operations Center	274,218	45,726	57,123	57,123	57,123	57,123	57,123
Pole Attachments	23,375	4,675	4,675	4,675	4,675	4,675	4,675
Fiber Maintenance	65,190	13,038	13,038	13,038	13,038	13,038	13,038
Cable Locates	25,056	4,320	5,184	5,184	5,184	5,184	5,184
Staff and Fleet Expenses	2,940,951	501,779	609,793	609,793	609,793	609,793	609,793
Help Desk	217,500	37,500	45,000	45,000	45,000	45,000	45,000
Software	241,875	48,375	48,375	48,375	48,375	48,375	48,375
VOIP Service	169,790	36,634	33,289	33,289	33,289	33,289	33,289
Internet Backhaul	140,000	28,000	28,000	28,000	28,000	28,000	28,000
IP Addresses	2,000	-	500	500	500	500	500
Misc Office	30,000	6,000	6,000	6,000	6,000	6,000	6,000
Marketing	175,000	35,000	35,000	35,000	35,000	35,000	35,000
Depreciation expense							
Equipment	358,635	71,727	71,727	71,727	71,727	71,727	71,727
OSP	698,110	139,622	139,622	139,622	139,622	139,622	139,622
City Fee	355,197	54,501	75,174	75,174	75,174	75,174	75,174
Total operating expenses	5,716,897	1,026,897	1,172,500	1,172,500	1,172,500	1,172,500	1,172,500
Operating income	1,387,061	63,129	330,983	330,983	330,983	330,983	330,983
Nonoperating revenues (expenses)							
Interest expense	519,414	-	137,499	132,511	127,361	122,043	
Change in net assets	\$ 867,647	\$ 63,129	\$ 193,484	\$ 198,472	\$ 203,622	\$ 208,940	

Figure 42: GASB Most Likely Income Statement

21. Appendix I – GASB Presentation

Appendix I – GASB Presentation

TCLP Fiber Pro Forma Cost Benefit Analysis Most Likely Cash Flow						
	Total Years					
	1-5	1	2	3	4	5
Cash flows from operating activities						
Receipt from customers	\$ 7,103,958	\$ 1,090,026	\$ 1,503,483	\$ 1,503,483	\$ 1,503,483	\$ 1,503,483
Payments to suppliers	(4,304,955)	(761,047)	(885,977)	(885,977)	(885,977)	(885,977)
Payment of City Fee	(355,197)	(54,501)	(75,174)	(75,174)	(75,174)	(75,174)
Net cash from Dark Fiber System	585,817	39,100	50,198	27,910	232,299	236,310
Net cash provided by operating activities	3,029,623	313,578	592,530	570,242	774,631	778,642
Cash flow from capital and related financing activities						
Proceeds from capital debt	4,230,747	4,230,747	-	-	-	-
Cost of capital debt	(42,307)	(42,307)	-	-	-	-
Purchases of capital assets	(3,336,528)	(3,336,528)	-	-	-	-
Principal paid on capital debt	(491,044)	-	-	(158,475)	(163,626)	(168,943)
Interest paid on capital debt	(519,414)	-	(137,499)	(132,511)	(127,361)	(122,043)
Net cash provided (used) by capital and related financing activities	(158,546)	851,912	(137,499)	(290,986)	(290,987)	(290,986)
Net increase in cash and cash equivalents	2,871,077	1,165,490	455,031	279,256	483,644	487,656
Balances - beginning of year	-	-	1,165,490	1,620,521	1,899,777	2,383,421
Balances - end of year	\$ 2,871,077	\$ 1,165,490	\$ 1,620,521	\$ 1,899,777	\$ 2,383,421	\$ 2,871,077
Reconciliation of operating income (loss) to net cash provided (used) by operating activities:						
Operating income (loss)	\$ 1,387,061	\$ 63,129	\$ 330,983	\$ 330,983	\$ 330,983	\$ 330,983
Adjustments to reconcile operating income to net cash provided (used) by operating activities:						
Depreciation expense	1,056,745	211,349	211,349	211,349	211,349	211,349
Dark Fiber System operating income	585,817	39,100	50,198	27,910	232,299	236,310
Net cash provided by operating activities	\$ 3,029,623	\$ 313,578	\$ 592,530	\$ 570,242	\$ 774,631	\$ 778,642
Estimated Annual Payment			137,499.00	290,986.00	290,987.00	290,986.00
Coverage (Debt Service/Operating Income)			3.94	1.86	1.86	1.86

Figure 43: GASB Most Likely Cash Flow

21. Appendix I – GASB Presentation

Appendix I – GASB Presentation

TCLP Fiber Pro Forma						
Cost Benefit Analysis						
Optimistic Income Statement						
	Total Years					
	1-5	1	2	3	4	5
Operating revenues						
Charges for services						
Residential	\$ 3,080,102	\$ 465,306	\$ 653,699	\$ 653,699	\$ 653,699	\$ 653,699
Business	4,680,632	707,096	993,384	993,384	993,384	993,384
VOIP	740,210	111,822	157,097	157,097	157,097	157,097
Total operating revenues	8,500,944	1,284,224	1,804,180	1,804,180	1,804,180	1,804,180
Operating expenses						
Professional and Contractual Services						
Network Operations Center	290,315	47,963	60,588	60,588	60,588	60,588
Pole Attachments	23,375	4,675	4,675	4,675	4,675	4,675
Fiber Maintenance	65,190	13,038	13,038	13,038	13,038	13,038
Cable Locates	25,056	4,320	5,184	5,184	5,184	5,184
Staff and Fleet Expenses	2,940,951	501,779	609,793	609,793	609,793	609,793
Help Desk	217,500	37,500	45,000	45,000	45,000	45,000
Software	241,875	48,375	48,375	48,375	48,375	48,375
VOIP Service	200,722	40,934	39,947	39,947	39,947	39,947
Internet Backhaul	140,000	28,000	28,000	28,000	28,000	28,000
IP Addresses	2,000	-	500	500	500	500
Misc Office	30,000	6,000	6,000	6,000	6,000	6,000
Marketing	175,000	35,000	35,000	35,000	35,000	35,000
Depreciation expense	-					
Equipment	385,020	77,004	77,004	77,004	77,004	77,004
OSP	722,380	144,476	144,476	144,476	144,476	144,476
City Fee	425,047	64,211	90,209	90,209	90,209	90,209
Total operating expenses	5,884,431	1,053,275	1,207,789	1,207,789	1,207,789	1,207,789
Operating income	2,616,513	230,949	596,391	596,391	596,391	596,391
Nonoperating revenues (expenses)						
Interest expense	537,230	-	142,216	137,056	131,729	126,229
Change in net assets	\$ 2,079,283	\$ 230,949	\$ 454,175	\$ 459,335	\$ 464,662	\$ 470,162

Figure 44: GASB Optimistic Income Statement

21. Appendix I – GASB Presentation

Appendix I – GASB Presentation

TCLP Fiber Pro Forma Cost Benefit Analysis Optimistic Cash Flow						
	Total Years					
	1-5	1	2	3	4	5
Cash flows from operating activities						
Receipt from customers	\$ 8,500,944	\$ 1,284,224	\$ 1,804,180	\$ 1,804,180	\$ 1,804,180	\$ 1,804,180
Payments to suppliers	(4,351,984)	(767,584)	(896,100)	(896,100)	(896,100)	(896,100)
Payment of City Fee	(425,047)	(64,211)	(90,209)	(90,209)	(90,209)	(90,209)
Net cash from Dark Fiber System	585,817	39,100	50,198	27,910	232,299	236,310
Net cash provided by operating activities	4,309,730	491,529	868,069	845,781	1,050,170	1,054,181
Cash flow from capital and related financing activities						
Proceeds from capital debt	4,375,865	4,375,865	-	-	-	-
Cost of capital debt	(43,759)	(43,759)	-	-	-	-
Purchases of capital assets	(3,470,541)	(3,470,541)	-	-	-	-
Principal paid on capital debt	(507,887)	-	-	(163,911)	(169,238)	(174,738)
Interest paid on capital debt	(537,230)	-	(142,216)	(137,056)	(131,729)	(126,229)
Net cash provided (used) by capital and related financing activities	(183,552)	861,565	(142,216)	(300,967)	(300,967)	(300,967)
Net increase in cash and cash equivalents	4,126,178	1,353,094	725,853	544,814	749,203	753,214
Balances - beginning of year	-	-	1,353,094	2,078,947	2,623,761	3,372,964
Balances - end of year	\$ 4,126,178	\$ 1,353,094	\$ 2,078,947	\$ 2,623,761	\$ 3,372,964	\$ 4,126,178
Reconciliation of operating income (loss) to net cash provided (used) by operating activities:						
Operating income (loss)	\$ 2,616,513	\$ 230,949	\$ 596,391	\$ 596,391	\$ 596,391	\$ 596,391
Adjustments to reconcile operating income to net cash provided (used) by operating activities:						
Depreciation expense	1,107,400	221,480	221,480	221,480	221,480	221,480
Dark Fiber System operating income	585,817	39,100	50,198	27,910	232,299	236,310
Net cash provided by operating activities	\$ 4,309,730	\$ 491,529	\$ 868,069	\$ 845,781	\$ 1,050,170	\$ 1,054,181
Estimated Annual Payment			142,216.00	300,967.00	300,967.00	300,967.00
Coverage (Debt Service/Operating Income of FTTP)			5.75	2.72	2.72	2.72

Figure 45: GASB Optimistic Cash Flow