MEETING NOTICE

STUDY SESSION

Of The

TRAVERSE CITY LIGHT AND POWER BOARD

Will Be Held On

TUESDAY, January 23, 2018

At

5:15 p.m.

In The

COMMISSION CHAMBERS
(2nd floor, Governmental Center)
400 Boardman Avenue

Traverse City Light and Power will provide necessary reasonable auxiliary aids and services, such as signers for the hearing impaired and audio tapes of printed materials being considered at the meeting, to individuals with disabilities at the meeting/hearing upon notice to Traverse City Light and Power. Individuals with disabilities requiring auxiliary aids or services should contact the Light and Power Department by writing or calling the following.

Jennifer St. Amour
Administrative Assistant
1131 Hastings Street
Traverse City, MI 49686
(231) 922-4940 ext. 201

AGENDA

Roll Call

1. Discussion regarding Fiber to the Premise (FTTP).
2. Public Comment.

Traverse City Light and Power
1131 Hastings Street
Traverse City, MI 49686
(231) 922-4940

Posting Date: 1-23-18
3:00 p.m

FOR THE LIGHT & POWER BOARD STUDY SESSION JANUARY 23, 2018

TRAVERSE CITY
LIGHT & POWER

To:	**Light and Power Board**
From:	Amy Shamroe, FTTP Ad Hoc Chair
Date:	January 13, 2018
Subject:	Fiber to the Premise (FTTP) – Study Session

The ad hoc committee met to review and discuss the FTTP project on six occasions throughout 2017. During these meetings, the ad hoc reviewed pertinent documentation for the project in greater depth and formulated questions for Staff to review and discuss in each subsequent meeting. Three main documents were of heavy focus, in which are being included for all Board Members to review for the Study Session. These documents were as follows:

- TCL&P Lighted & Dark Fiber Analysis 2005 – Utility Financial Solutions
- TCL&P Fiber to the Home 2017 – Conexon
- FTTP Master Decision Matrix 2017 - Staff

In an effort to not stray away from a conceptually Board acknowledged agenda that was presented via Staff Memo at the December 12, 2017 Board Meeting, the following language will serve as the topic of discussion for the FTTP Study Session.

At the first ad hoc meeting, the focus was on the full Board approved CIP project of TCL&P owning and operating the fiber, but not acting as the ISP. As members of ad hoc weighed the implications of not serving as the ISP, including the uncertainty surrounding the utility's ability to retain local control of critical project elements against the potential risk mitigation benefits, it was determined that also exploring a role for TCLP as the ISP would be prudent.

While the ad hoc fully respects the current approved decision, they came to a unanimous conclusion that the options originally voted on did not include potentially important nuances, and that further discussion with the entire TCL&P Board in the form of a study session would be beneficial. This study session would allow the ad hoc members to engage with the full Board in an effort to discuss material issues learned throughout the ad hoc meetings, which may ultimately have an impact on the final decision with how TCL&P should proceed with FTTP.

Specifically, the ad hoc would recommend the Board assess the following additional project considerations during this study session:

- As an alternative to delegating the function of ISP to a third-party project risk can be mitigated by securing contractual services from experienced firms.

- TCLP could serve as the ISP, but acquire significant contractor support to address project elements it does not currently possess regarding institutional expertise or capacity.

- TCLP could serve as the ISP initially while retaining the option of securing a third-party ISP'(s) in the future.

- Phasing the project, beginning with customers on a particular substation in order to assess TCLP's ability to serve effectively as ISP, could also reduce risk of TCLP serving as the ISP.

OCTOBER 7, 2017

TRAVERSE CITY LIGHT & POWER

FIBER TO THE PREMISE (FTTP) MASTER DECISION MATRIX

PREPARED BY: SCOTT MENHART

TRAVERSE CITY LIGHT & POWER

Table of Contents

INTRODUCTION AND EXPLANATION

This document is a guideline to assist with the decision making process for the TCLP Fiber to the Premise (FTTP) Project. While some of the topics contained within this document may have already been discussed and decided upon, it is meant to serve as a tool to utilize for all decisions in regards to all aspects of the project; as such, those topics were included. As this project is so vast, some sections may not contain every single detail to every single item, but it was intended to capture high-level items and to spark discussions to make decisions on how to proceed.

The purpose of this document is to ask all pertinent questions in a state that allows progression into each section of the project with decisions being made along the way with how to proceed. It attempts to address, at a high level, all questions that would be associated with an FTTP project. As such, it was intentionally delivered in a collapsed format with only the questions showing. This was done with the intent to trigger individual views of each question without immediately being collectively directed into a single line of thoughts and comments. This will aid in generating distinct and different views on each part of the project.

I would recommend reading each question through once prior to expanding the document to get a streamlined view. Reading the table of contents would achieve the same results as well. To expand Staffs input to the questions, click the arrow on the left side of the question that looks like this: ▷

This document was also intended to serve as a flowchart for decision-making. However, because it is done in a linear fashion and not in a flowchart/fish bone format, it will discuss and ask questions based on the other sections of the document. As a result, some of the sections may appear redundant, but it was necessary to show the relation of decisions. Therefore, the sections will still feed off each other and answering all of the questions should form the basis for how TCLP should proceed with the project.

Finally, this document will serve to identify TCLP's involvement in the different portions of the project. It will not get into the technical details of how to achieve a solution such as what type of cable, software, or networking equipment to utilize. For example, there is no sense in defining what type of television head-end equipment to procure if TCLP is not going to be in the business of offering television services in house. Those details will be defined based on what the Board ultimately supports as the project progresses.

LEGEND, ACRONYMS, TERMINOLOGY, DEFINITIONS

Each different bullet represents a different meaning defined as follows:

- ❖ Answer/Information/Definition/Notes
- \+ Task
- ✓ Complete
- ? Question

Acronyms:

- ❖ FTTP = Fiber to the Premise

- FN = Fiber Network
- ISP = Internet Service Provider
- CDN = Content Delivery Network
- IX or IXP = Internet Exchange
- Colo = Colocation
- AE = Active Ethernet
- PON = Passive Optical Network
- CAPEX = Capital Expenditures
- OPEX = Operating Expenditures
- OSP = Outside Plant

Definitions:

- Fiber Network: the fiber cable itself and the electronics to complete the network, not the head-end equipment. *This may or may not include the CPE, which should be discussed and decided.*

- Customer Premise Equipment (CPE): The device located at a customer's facility to provide content delivery to inside their home.

- Internet Exchange: An Internet exchange point (IX or IXP) is a physical infrastructure through with ISPs and CDNs exchange Internet traffic between their networks (autonomous systems).

- Peering: Peering is a process by which two Internet networks connect and exchange traffic. It allows them to directly hand off traffic between each other's customers, without having to pay a third party to carry that traffic across the Internet for them.

- Colocation: A colocation is a data center facility in which a business can rent space for servers and other computing hardware. Typically, a colo provides the building, cooling, power, bandwidth and physical security while the customer provides the servers and storage.

- PoP: A PoP is an artificial demarcation point or interface point between communicating entities.

- ISP: Distinctions between what ISP means should be made to help throughout this document. There has been much discussion between whether TCLP should be the ISP or not and it has become clear that there are different levels of understanding of what this means.

  A true ISP would have connections that run to Internet exchanges and large expensive head-end equipment to perform all of the switching and routing required for an ISP. Therefore, if TCLP became a true ISP, it would have to run or lease transport fiber to these exchanges and then negotiate deals at that level, as well as procure and install expensive head-end equipment. This would be similar to how TCLP's electric department procures power from power plants, which includes the costs of transmission of that power. The difference with electric versus fiber is that the cost to build and maintain power plants for power is drastically higher when compared to running or leasing fiber lines to different Internet exchanges and procuring head-end equipment.

As TCLP looks into FTTP, the initial intent was not to lease transport fiber to Internet exchanges, but to begin by leasing local bandwidth from existing ISPs that already have these connections and head-end equipment. TCLP not acting as this 'true' ISP, and leasing bandwidth from local providers, would actually start by being a cheaper option for customers. This is because the cost of leasing transport services, which you would need to have at least a secondary geographically different connection for redundancy, as well as the head-end gear, would be high compared to the initial take rate. However, there is a customer point when it would be cheaper for TCLP to become a true ISP as described above. At this point, it would be advantageous for TCLP to migrate off leasing local bandwidth and become a 'true' ISP.

The downside of initially leasing bandwidth from local providers, and not acting as a true ISP, is the limitation of being bound to their bandwidth pricing (similar to how TCLP buys power). However, TCLP can still offset this by aggregating bandwidth across all customers for a deployment, which needs a mix of residential and C&I customers to achieve. Residents will use far less bandwidth than an organization with many employees, but not all at the same time. Therefore, you buy an appropriate amount of bandwidth from an ISP and aggregate the bandwidth between residents and C&I. Because C&I would be in a different rate classification, they would have performance guarantees on their service when they need it, whereas residential would not. Therefore, if a company bought a true gig connection, their quality of service (QOS) would be set to give them this full gig when needed. However, when they are not using it, it would be dispersed to other portions of the network. This happens instantly and dynamically and is the industry standard.

The issue and rationale for the length of this section is because these lines have been blurred by different perceptions of what an ISP means when dealing with multiple ISPs. The one idea that has had much focus on is defining the ISP as installing all of the electronics throughout a Fiber Network for an FTTP deployment. This would mean installation of head-end gear, field device gear, and then customer premise gear (CPE). While this method is achievable by TCLP only operating the dark fiber, it would be advised against for reasons that will be defined more in the risk section below. For example, if the company failed, but owned all of the field gear, this would be a monumental undertaking to switch to another provider. If TCLP owned and operated the field gear and the CPE, getting a different provider up and running would be a matter of plugging in a different cable from a different ISP.

TCLP was envisioning that it would build the Fiber Network, including the field gear to operate the network. The CPE can be discussed and decided upon throughout questions in this document. However, an ISP could ultimately put the gear in at the customer facilities, which would save TCLP CAPEX, but would have other ramifications that are identified further in the document.

SECTION 1: COMMUNITY NEED

Is this a new service offering or is there a lack of this service offering in the community?

If a feasibility study and business plan show support, does the community actually want the service?

Are there any other community benefits to the project?

Are there any other TCLP benefits to the project?

SECTION 2: PROJECT IDENTIFICATIONS: WHY, RISKS, LEGAL, STRUCTURE

Should TCLP be involved in FTTP?

Should this be another City Department or should it be a sub department of TCLP?

Should a private sector business be doing this instead of TCLP?

What are the advantages of a municipality deploying FTTP?

Does TCLP have the legal rights to do FTTP? Any other legal limitations?

What are the high-level risks associated with FTTP?

Should TCLP own and operate the Customer Premise Equipment (CPE)?

What happens if TCLP goes out for bid for different content delivery (internet, television, phones), and does not receive any?

What happens if TCLP selects a bidder for services and they fail to perform adequately?

What would the OPEX requirements be for a deployment?

SECTION 3: FUNDING SOURCES AND ASSISTANCE IDENTIFICATION

Are there any federal, state, or local grants or assistance programs that can help with portions of this project?

Are there any private or public partnerships that can exist to help with the project financially or in some other fashion?

If there are no grants or partnerships, how is the project feasible by TCLP alone? What are the options for deployment to adjust CAPEX/OPEX?

SECTION 4: FIBER DEPLOYMENT METHODS: WHO, HOW, AND WHEN

For this document, it is assumed that TCLP will be building, owning, and operating a Fiber Network to the community, regardless of what services are offered or how those services are delivered over the FN. Therefore, this section will focus on the deployment strategies for just the FN, but will link together service offerings or partnerships from other sections as well.

There are a few different portions when dealing with deployment of a FN that can be broken out. There is the fiber cable itself, then the networking and electronics to run the network. There are different deployment technologies that can be utilized for a FTTP project, such as Active Ethernet (AE) versus a

next generation Passive Optical Network (PON) architecture, but for the sake of this documentation, we will assume TCLP will be deploying both methodologies, as this has become the standard. AE is more for commercial and industrial (C&I) customers and PON is for residential. Once we make high-level decisions about what TCLP should do, we can get into discussions about different technical solutions.

Note: The Conexon Study focused on a full PON architecture. However, each deployment strategy, including a mix, would be identified and evaluated for each deployment scenario.

It is also needs to be mentioned that when building a citywide FN that can host services, both the cable are electronics to achieve the backbone are necessary. However, services that are delivered over this network would require both head-end equipment and customer premise equipment (CPE). For example, if TCLP owned and operated the FN and contracted out the internet to an internet service provider (ISP), then the ISP would either install head-end equipment at TCLP facilities, or route the cable back to their facilities to use their head-end. Who owns the CPE equipment would change operating models, and risks associated, and thus why it was a focal point earlier in the document.

For the questions in this section, Fiber Network (FN) will mean the fiber cable itself and the electronics to complete the network, and potentially the CPE, but not the head-end equipment.

How should the Fiber Network be engineered and designed (not constructed)?

Should TCLP design and engineer the fiber construction plans in house or contract this out?

Should TCLP perform the construction in house or contract this out?

Should TCLP perform operation and maintenance on the fiber in house or contract this out?

Should TCLP be responsible for the networking and electronics of the fiber network?

Should TCLP design and engineer the network and electronics of the FN?

Should TCLP perform the configuration and installation of the network and electronics of the FN in house or contract this out?

If TCLP is responsible for any portion of the network, electronics or OSP fiber cable, should TCLP hire additional staff?

What would typical Staff look like for a deployment?

Should TCLP utilize project management contractors for the initial phases of building and deploying the Fiber Network, or perform this functionality in house?

How should the Fiber Network deployment be handled?

What is a suitable timeframe to rollout the project based upon decision made for deployment methods?

What is a suitable payback term for the project? What should the rate structure be?

SECTION 5: SERVICE IDENTIFICATION, SERVICE OFFERINGS, SERVICE OBLIGATIONS

What services should be offered?

Who should offer the services?

Who should market, attract customer, and sign them up?

Who should perform customer support?

How should customers be billed?

SECTION 6: TECHNOLOGY SELECTION AND FUTURE SERVICES

This section will be developed after decisions are made regarding TCLP's involvement in the different levels of FTTP. Doing this prior could prove to be inefficient. For example, if it were decided that TCLP would not be providing a phone service, there would be no reason to list all the different phone options now.

SECTION 7: RFPS

Based on the answers to the questions in this document, the need for which RFPs TCLP should develop should now be conceptualized. However, this also recognizes that there may be outstanding questions and discussions that need to take place. Once the RFP choices are solidified, Staff will work with the Ad-Hoc and/or Board for input on development of the specific RFPs to ensure they meet expectations.

The following RFPs are identified as possibilities:

- Project Management and Coordination for the overall FTTP project. Industry expertise for FTTP would be sought out for this. Note: each individual RFP can/should have a project manager identified for that specific RFP.
- Outside Plant Fiber Cable Engineering
- Outside Plant Fiber Cable Construction
- Initial O&M on Outside Plant Fiber
- Network Design and Engineering
- Network Installation and Configuration
- Initial O&M on Network
- Initial Marketing and Promotion
- Call Center Support Service

REFERENCED DOCUMENTATION

Below is a list of items that are referenced throughout this document and can be provided upon request:

- Conexon Study
- Utility Financial Solutions Study
- Community Survey
- Business and Community Letters of support
- Cool and Connected Grant
- EDA Grant
- State of Michigan Technology Meeting
- TCLP Fiber Map and Customers

- Legal reviews
- FCC Reference
- Fiber Fund Financials – Conexon and TCLP
- Board Meeting and Public Hearing meeting for TCLP Metro Act
- Failed multiple ISP attempts (multiple sources)
- Holland Business Plan and Reference
- Various Business Plans from other Communities for FTTP