



Broadband Upgrade Study

Prepared for:

Norwood Light & Broadband
(Norwood Light)

Prepared by:

Power System Engineering, Inc.

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Broadband Upgrade Study
for
Norwood Light & Broadband (Norwood Light)

Authors:

Tom Asp
Cynthia Studner
Eric Wirth

Contact: Tom Asp

aspt@powersystem.org

Direct: 608-268-3509

Mobile: 847-922-3978

1532 W. Broadway, Suite 103

Madison, WI 53713

www.powersystem.org

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1 Executive Summary (Overview and Recommendations)

Norwood Light & Broadband (Norwood Light) has been the leading broadband provider in the Town of Norwood since 2002. Norwood Light was the first provider in the Town of Norwood to offer a high-speed internet offering. Norwood Light deployed a state-of-the-art Hybrid Fiber Coaxial (HFC) network and has been delivering high quality profitable services since entering the business. Although the Norwood Light HFC network has served the community well, the HFC network is at the end of its anticipated life. To continue to support the needs of residents and businesses in the Town of Norwood, a network upgrade is required.

This report was prepared by Power System Engineering (PSE) for Norwood Light and evaluates and compares leveraging the existing fiber and migrating to a fiber-to-the-premises (FTTP) platform (FTTP migration) with an option of upgrading the existing Hybrid Fiber Coaxial (HFC) network to work with the latest DOCSIS platform (HFC Upgrade).

This report reviews and estimates the costs of each upgrade (implementation and operating), reviews performance characteristics of each alternative, reviews potential impact to long-term operations and service support, and presents financial forecasts for each upgrade option.

Separately, we conducted residential market research regarding electric and broadband services and developed a profile of businesses located in the Town of Norwood to help identify potential broadband demand. These companion reports were issued under separate cover, as follows:

1. Residential Market Research, October 2021
2. Business Profile, October 2021

1.1 Observations and Recommendations

Based upon our assessment of Norwood Light operations, understanding of trends in the broadband industry, and discussions with Norwood Light, we recommend that Norwood Light consider the following actions:

1. Begin efforts to reposition video programming to an over-the-top (OTT) video programming model. The net margins (video revenue less video expenses) have eroded, and we project that in the next 1 to 2 years, the margins will be negative. Moving to OTT video programming leverages economy of scale and provides Norwood residents more choices and better ability to align programming with their interest.
2. Initiate marketing efforts to reposition Norwood Light offerings. Today, Norwood Light is viewed as a cable television provider with a moderate to low-cost internet service. With internet (broadband) continuing to increase its importance to households, we recommend repositioning Norwood Light to an affordable, reliable, and high-performing internet provider that enables a broad range of OTT services.

- Moving Norwood Light customers to a high-value high-performance internet service , (higher performance) that with OTT video programming can lower the net monthly fees (internet plus video) and offer an enhanced user experience.
3. Initiate a migration to a FTTP platform. This best positions Norwood Light to compete with Comcast, Verizon, and wireless broadband options.
 - Highlighting a FTTP platform in marketing can help position market perceptions of Norwood Light performance and reliability.
 - FTTP positions Norwood Light to support continued increased demand or high-performance and reliable broadband.
 - It is important that Norwood Light initiate market efforts and the FTTP migration as soon as possible before the competition upgrades and fixed wireless gets a foothold.
 4. Initiate borrowing of up to \$9.52 million that is required for the FTTP migration:
 - Uses \$2.1 million of depreciation reserves to reduce borrowing to \$9.52 million.
 - The annual principal and interest (P&I) payment is estimated at \$635,600 per year, compared the \$757,275 P&I payment that will be retired this year.
 - Set up a depreciation reserve to fund ongoing capital replenishments and network upgrades.
 - Continued re-investment in the network is required in order to maintain market positioning.

Highlights of our review and recommendation process are summarized below.

1.1.1 Broadband Market Research Highlights

As part of this project, we surveyed a random selection of residences in the Town of Norwood to evaluate a variety of topics, including customer service, preferred methods of communications, opportunities for renewable energy and electric vehicles, and the availability, attributes, and satisfaction with internet services in Norwood. The study included a survey to obtain feedback regarding these topics and future needs.

Key broadband and cable television findings from the Norwood Light residential survey include:

- Respondents are highly connected, with 95 percent of households having some form of internet connection. Norwood Light is the leading internet service provider among survey respondents (58%), followed by Verizon Fios fiber service (25%), and Comcast cable modem (10%).
- Home internet connections are most frequently used for general information use/searching and watching movies, video, or TV, followed by shopping online, social media, and working from home.

- Internet subscribers are generally loyal to their service provider. More than three-fourths would be very or extremely likely to renew their contract, and seven in 10 would be very or extremely likely to recommend their provider. Norwood Light subscribers would be more likely than Verizon Fios subscribers to recommend their provider (53% very likely vs. 31% very likely) or to renew their contract (61% very likely vs. 33% very likely).
- Reliability of the internet connection ranks as the most important aspect, followed by price paid and connection speed. Most residents are satisfied overall with the speed and reliability of their internet service provided by Norwood Light, but room for improvement exists given the high expectations for these service factors.
- Respondents indicated some willingness to switch to 300 Mbps or 1 Gbps internet service for \$50 per month, but willingness to switch drops sharply at higher price points. Only a small share of respondents would be willing to pay more than \$100 to install a high-speed internet connection to their home.
- Six in 10 respondents said a household member teleworks from home, including 57 percent with sufficient internet service and just three percent whose internet service is too slow to effectively telework. One-third of teleworkers said they need at least a very high or extremely high-speed connection to support working from home.
- Nearly one-half of homes use the internet in some manner for formal education purposes. More than one-half (57%) of households with children use the internet for education.
- More than six in 10 respondents subscribe to cable television service through Norwood Light (37%), Verizon Fios (17%), or Comcast (8%). Fewer households use over-the-air television service primarily (5%) or have no television service (9%).
- Another 21 percent of respondents have internet-based television (streaming) as their primary service. Internet television customers were more likely than cable subscribers to strongly agree they receive a good value for their service.

In [Section 3](#), we leverage these market research results to present considerations for market positioning. As previously noted, please refer to the companion report, *Residential Market Research* for the complete survey results.

1.1.2 Business Model Alternatives and Considerations

Based on the market research, review of Norwood Light pricing, and discussions with staff, Norwood Light is positioned in the market as a locally based cable television provider that provides moderate to low-priced internet services. While Norwood Light ranks well in customer service and price, it lags behind competitors in perceived service performance and reliability.

The theme of being a local provider (Keep Your Money on Main Street, Not on Wall Street) will continue to be a key foundation in marketing efforts. Investing Norwood Light funds locally is critical to maintaining this all-important aspect of Norwood Light. However, the bundle of services

and positioning in the marketplace does need a strategic review and a potential reset. This market positioning drives the network technology selection (FTTP migration vs HFC upgrade).

1.1.2.1 Business Model Options

As a first step in considering which technology platform is best for Norwood Light, we examined six models, each with a slightly different service focus. For each model, we outlined the core services, the business horizon (short-, mid-, and long-term), and model characteristics. The models are presented in the table on the following page.

In Norwood, Comcast, Verizon, and Norwood Light supply and deliver traditional cable television content via their respective connection (cable) to the households and businesses. The same connection also provides internet access. Therefore, a single cable provides the customer with cable television service and internet. The operator maintains a head-end that is used to supply and distribute the cable television programs that they offer in each service bundle.

In looking at business models, Norwood Light has two cable television options:

1. Norwood Light can look at offering the traditional cable television service they do now – either continuing with the existing cable television headend or migrating to a hosted cable television headend. In either case, Norwood Light is responsible for channel lineup selection, obtaining rights and agreements to include the selected channels, and collecting fees from subscribers who select the Norwood Light cable television service.
2. Norwood Light can promote and help consumers select Over the Top (OTT) video services. With OTT video, the consumer selects video content over the internet at their request. The internet provider does not provide or supervise the service, unlike traditional cable television. To put it a better way, an OTT service is an online video streaming service.

The availability of OTT services has expanded over the past few years and now provides local and sports programming that was previously only available to traditional cable television offers. The purchasing power of the OTT providers has increased to the point that they can often offer service pricing well below that of smaller local providers such as Norwood Light. Additional details on available OTT services are provided in [Section 3](#).

Table 1: Business Models

Option	Long-Term (20-Year)			Mid-Term (10-Year)	Short-Term (5-Year)	
	A	B	C	D	E	F
Service Focus	Data Focus	Data Primary (resell voice and video)	Triple Play (with upgrade and hosted cable headend)	Triple Play (continue "as-is" with upgrade to hosted cable headend and DOCSIS 3.1 upgrade)	Triple Play (continue "as-is" with upgrade to hosted cable headend)	Triple Play (continue "as-is" with only minimal upgrades)
Description	Provide data and transport services. Educate consumers on OTT video options (video repositioning).	Provide data and transport services. Resell OTT voice and video options (local provider). Local provider supplies IP headend for video services (provider headend). Resell options collapsing. T-Mobile bought Layer3, only available in certain markets and Skitter pivoted offering as a virtual headend, does not	If HFC maintained, upgrade to DOCSIS 3.1 (CMTS and split), then DOCSIS 4.x or other every 5 years. If HFC is pursued, replace coax drops in 7 to 10 years Hosted video headend (TiVo, Skitter, other). Required to negotiate content and consent agreements (Norwood maintains position of cable television provider	Upgrade to DOCSIS 3.1 (CMTS and splits). Same as Option C, but with deferred FTTP upgrade decision.	Maintain HFC platform. Upgrade to hosted headend (HH). Defer network upgrades. Build cash reserves by minimizing capital investments. Build cash reserves by minimizing expenses.	Maintain HFC platform. Maintain existing headend (HH). Defer network upgrades. Build cash reserves by minimizing capital investments. Build cash reserves by minimizing expenses.
Interest	High	Low	High	Moderate to Low	Low	Low
	Is traditional cable programming required to maintain data market? Short-term? Long-Term? Can cable programming be transitioned in 3 to 5 years?	Would need to find cable operator that would become cable provider of record and have ability to market services and stream OTT content.	Can Norwood maintain a margin on traditional cable television?		Will a data-only option make more sense in 5 years?	

As seen in the above table (Table 1), we also ranked the potential interest in a given model (low, moderate, or high). Findings include:

- Taking a short-term approach (build up cash and potentially sell or shut down the broadband business) does not serve Norwood Light or the community’s best interest. (Model E and Model F). This is based on discussions with staff and our observations.
- Moving to a cable television resell model (similar to Norwood Light’s telephone offering today) would be an attractive approach; however, by default, this began at low interest since the vendors that could have supported the model are no longer in business or have changed their focus (Model B).
- Deferring a network upgrade decision is possible but not recommended. This would entail doing the initial HFC upgrade, then deferring a FTTP migration decision until the next CMTS upgrade (5 years). However, this model has the risk of falling behind the competition – Verizon already operates a FTTP network in Norwood, and Comcast continues to improve performance or their HFC platform. In addition, deferring allows new competition to catch up to Norwood Light capabilities. This is Model D.
- Maintaining a status-quo market positioning is, in essence, Model C. It can be supported by either a FTTP migration or an HFC upgrade. A concern with this model, however, is the moderate to long-term viability of the traditional cable television market (eroding operating margins and decline of subscribers).
- Migrating to a data focus model (Model A) aligns with the movements in the industry. The two core questions with this model are: 1) Will the Norwood market support the model? and 2) Will Norwood Light customers transition away from a traditional cable television offering to over-the-top video programming alternatives?

We recommend that Norwood Light consider a transition to Model A, the data focus model that leverages OTT services.

Table 2 on the following page shows the ability of either the FTTP migration or the HFC upgrade to support a given business model. The FTTP migration will support the recommended Model A, and it will also support Model C. The HFC upgrade will also support either model A or C; however, if Norwood Light desires or needs to become a “high-value”¹ internet provider, the HFC upgrade may limit Norwood Light’s ability to compete.

Given that homes and businesses continue to increase reliance on internet, we recommend that Norwood Light consider transitioning to become the locally based “high-value” internet provider.

¹ Internet service provider that stresses performance and reliability over cost of service

Table 2: Technology Support of Business Models

		Long-Term (20-Year)			Mid-Term (10-Year)	Short-Term (5-Year)	
Option		A	B	C	D	E	F
Network	Supported by FTTP?	Yes	Yes	Yes	No	No	No
	FTTP Considerations	Favored- technical and marketing. Highest speeds (up and down). Is FTTP affordable?	Favored- technical and marketing. Highest speeds (up and down). Is FTTP affordable?	Favored- technical and marketing. Highest speeds (up and down). Is FTTP affordable?			
	Supported by HFC?	Maybe	Maybe	Yes	Yes	Yes	Yes
	HFC Considerations	Video is streamed OTT (repositioned video programming). Frees up HFC download speed, does not increase upload. Split upgrade required. In 7 to 12 years, anticipate need to replace coaxial drops to subscriber premises (coaxial cable is approaching 20 years old).	Video is streamed OTT (repositioned video programming). Frees up HFC download speed, does not increase upload. Split upgrade required.	Every 5 years DOCSIS or other upgrade required (4.x, 5.x, other). In 7 to 12 years, anticipate need to replace coaxial drops to subscriber premises (coaxial cable is approaching 20 years old).		Stay at DOCSIS 3.0 for 5 years.	Keeps HFC network as-is, only minim upgrades done.

An alternative to the above models is for Norwood Light to seek a buyer for the existing network and customer base. For example, Braintree recently sold their HFC network for an estimated \$750 per subscriber. Given Norwood Light's current base, a similar transaction might bring in \$2.0 to \$3.5 million. However, this estimated sell price does not present the entire financial picture. It does not account for the indirect benefits (avoided costs for internal connections, commitment to maintain franchise fees, keeping consumer costs down, etc.) nor does it recognize the profitability of Norwood Light broadband today. Given the total picture, PSE does not recommend that Norwood Light pursue a sale of the business.

1.1.2.2 Competition Highlights

[Section 3](#) reviews existing and potential Norwood Light competition. It is important that Norwood Light understand the competition, how Norwood Light's services align with market demand, and detail what market and service strategies are required to remain viable.

Internet competition includes:

- Households and businesses not acquiring internet
- Verizon FiOS (FTTP)
- Verizon Broadband Wireless
- Comcast (HFC)
- T-Mobile/Sprint Broadband Wireless

Cable television competition includes:

- Households and businesses not acquiring cable television
 - Over the air stations
- Verizon FiOS
- Comcast
- Over-the-top (OTT) alternatives

We recommend that Norwood Light closely examine their desired market position and what strategies are required to counter existing and emerging competition. As seen in the market research, household internet demand is highly sensitive to price. **If Norwood Light shifts to become a “high-value” internet provider, it will be important to develop strategies that show the value of high-performance internet. Upgrading to FTTP will better position Norwood Light to compete for high-margin internet customers.**

Cable television is a changing industry with multiple over-the-top video sources now available. Traditional cable television customers are declining while internet customers increase. It is becoming more difficult to compete with Comcast and Verizon (their programming costs are substantially lower than Norwood Light's), and subscribers continue to decline. Even with significant rate increases, we doubt that Norwood Light will be able to maintain a positive margin (revenues less programming expenses) on cable services even for another 18 to 24 months.

We recommend that Norwood Light consider repositioning video programming to an OTT model in the next 3 to 5 years. Given Norwood Light's Market Position today and customer perceptions today, a quick conversion is not advisable.

We recommend that Norwood Light consider the following steps to reposition video programming:

- Encourage consumers to transition to OTT video programming.
 - Educate customers on over-the-top (OTT) alternatives.
 - Leverage My Bundle² or a similar service to assist in the education efforts.
 - Train CSRs on how to leverage My Bundle or a similar service.
 - Show consumers they can lower monthly fees paid by using OTT options with a 1 Gbps service. This will require Norwood Light to change the sales commission and promotion structure with the existing sales contractor.
- Determine desired internet positioning.
 - Increase average revenue per user.
 - Initiate promotion of Norwood Light services offering security and ability to assist consumers.
 - Transition customer service representative (CSR) to have “Geek Squad” skills to support a transition to OTT video programming and other services.
 - Reduce service tiers.
 - Consider elimination of low-end tiers.
 - Consumers tend to acquire lowest price service.
 - Offer services that Comcast and Verizon struggle with (technical and policy).
 - Look at lifeline and other grants for households with K-12 students.
 - Consider elimination of low-end tier and move to a Gbps service.
 - Push Gbps based services.
 - Consider pricing a 1 Gbps similar to Comcast’s and Verizon’s 200 Mbps or 400 Mbps service.

1.1.2.3 Total Cost of Ownership Comparison

We examined the total cost of ownership for the FTTP migration and HFC upgrade options. The total cost of ownership looks at not only the initial implementation costs, but capital replenishments and operating costs as well.

The total cost of ownership comparison is show in the following four tables. For the comparison, we show the total non-discounted costs and the net present value (NPV) using a four percent discount rate. The operating costs include all Norwood Light’s operating costs, not just network-

² My Bundle is an on-line tool will assist consumers to find the streaming video services that have the video content that best matches viewing and channel preferences.

specific costs. The operating costs for the FTTP migration include \$1.53 million for decommissioning the HFC network. Comparisons are shown for 20-year and 10-year terms.

Table 3: 20-Year NPV Comparison

Description	HFC Upgrade	FTTP Migration	Delta
Capital Additions (NPV)	\$ 18,525,200	\$ 19,531,700	\$ (1,006,500)
Operating Expenses (NPV)	65,398,900	66,363,000	(964,100)
Total (NPV)	\$ 83,924,100	\$ 85,894,700	\$ (1,970,600)

Table 4: 10-Year NPV Comparison

Description	HFC Upgrade	FTTP Migration	Delta
Capital Additions (NPV)	\$ 10,814,400	\$ 15,372,700	\$ (4,558,300)
Operating Expenses (NPV)	42,529,600	43,665,100	(1,135,500)
Total (NPV)	\$ 53,344,000	\$ 59,037,800	\$ (5,693,800)

Table 5: 20-Year Total Comparison

Description	HFC Upgrade	FTTP Migration	Delta
Capital Additions (Total)	\$ 25,501,800	\$ 25,273,900	\$ 227,900
Operating Expenses (Total)	92,823,000	94,000,000	(1,177,000)
Total (Total)	\$ 118,324,800	\$ 119,273,900	\$ (949,100)

Table 6: 10-Year Total Comparison

Description	HFC Upgrade	FTTP Migration	Delta
Capital Additions (Total)	\$ 12,443,500	\$ 17,725,400	\$ (5,281,900)
Operating Expenses (Total)	50,897,100	52,387,800	(1,490,700)
Total (Total)	\$ 63,340,600	\$ 70,113,200	\$ (6,772,600)

The 20-year costs are quite close, both in total costs and NPV. The 10-year costs for capital are, however, quite different. This is due to the condition that the FTTP migration capital costs are more front loaded, with lower capital replenishment requirements than the HFC upgrade. The HFC upgrade replenishment requirements are substantially higher than the FTTP migration.

³ are higher, thus increasing the financial risk (up to \$9.52 million in borrowing for the FTTP migration vs up to \$3.25 million for HFC upgrade). On the other hand, the FTTP migration better positions Norwood Light for a higher performing and reliable internet service (high-value service).

1.1.2.4 The Decision Process used to Guide Recommendations

The decision process that was used to guide and develop our recommendations included:

- Does Norwood want to continue in the broadband business long-term?

³ Borrowing requirements are based upon MLEB using cash reserves and establishing a depreciation reserve account for funding on-going replenishments and upgrades.

- If no:
 - Do minimal upgrades and continue as-is (Model E or Model F).
- If yes:
 - Examine market positioning.
 - Consider either the FTTP migration or the HFC upgrade.
 - Continue with telephone.

The consensus with Norwood Light staff is to continue in the broadband business.

- How is Norwood Light positioned in the market today?
 - Today, Norwood Light is a cable television provider that offers a moderate-priced internet service.
 - Is this the correct long-term positioning?
 - If yes:
 - Selection of FTTP migration vs HFC upgrade is based upon total cost of ownership and financial risk.
 - The total cost of ownership slightly favors the HFC upgrade in the short-term.
 - Examine the allocations between cable and internet in bundles.
 - Appears that the allocations to cable television revenue is high and cable television expense allocations are low.
 - Will need to create cable television bundles and seek content that might allow Norwood Light break-even on cable television services (if possible).
 - If no:
 - Examine and determine desired positioning.
 - Telephone is an OTT option today and does not impact capital investment or technology platform.

The consensus with Norwood Light staff and PSE is that, given the evolution of wireless as a moderate service, it is best to migrate to a higher-value internet offering. Given this, the importance for Norwood Light to keep ahead of the competition's technology and performance greatly increases.

- **Should Norwood Light continue with a traditional cable television offering?**
 - Can Norwood Light continue to survive in the traditional cable business?
 - Is traditional cable required to maintain internet customers?
 - In the short-term, yes.
 - Can Norwood Light be successful in "selling" a video reprogramming transition?
 - Exit traditional cable services in the next 3 to 5 years?
 - If yes:
 - Minimize capital investments that are only used to support cable television services.

- Do not implement TiVo (or other)
 - Cost of transition reduces value – recovery of costs longer than 5 years.
- Start education process to consumers – alternatives to cable
 - Incent consumers to “Cut the Cord.”
 - Increase cable pricing?
 - Risk is shifting consumers to Comcast or Verizon.
 - Leverage resources like “My Bundle.”
- Selection of FTTP migration vs HFC upgrade is based upon total cost of ownership and internet positioning.
 - If no:
 - Implement TiVo.
 - Review package pricing and cost allocations.

The consensus with Norwood Light staff and PSE is that, given the increases in traditional cable television programming, repositioning of video programming to OTT alternatives is recommended.

- **Determine internet positioning:**
 - Consider reducing the number internet service levels
 - Increase per subscriber internet revenue
 - Consumers tend to converge towards lowest cost service
 - Become premier internet providers?
 - If yes:
 - Demonstrate value of a Gbps service
 - Need to start transformation into a high-performance internet provider that enables OTT video and other cloud applications
 - Will the market support this position?
 - How to position against Comcast? Verizon?
 - Update packages
 - Push what Comcast and Verizon will struggle with
 - 1 Gbps and 10 Gbps packages
 - Drives need for FTTP migration
 - If no:
 - Continue with similar packages
 - Selection of FTTP migration vs HFC upgrade based upon total cost of ownership

The consensus with Norwood Light staff and PSE is that, given the evolution and increased importance of internet, it is best to migrate to the high-value internet offering.

- **FTTP Migration vs HFC Upgrade?**
 - Balance of technology, service capabilities, and total cost of ownership
 - Drivers are based on business decisions – what is the market positioning that Norwood Light desires
 - FTTP is better able to support the high-value internet offering for residents and businesses
 - Can consider a HFC platform for residents and expand fiber to businesses
 - If FTTP migration, look at a 3- or 4-year transition
 - Deploy FTTP to Internet only consumers
 - Keep traditional cable consumers on HFC
 - Maintain two networks during transition
 - Start campaign to get subscribers to move to alternative video programming (OTT)

The consensus with Norwood Light staff and PSE is to consider a FTTP migration.

1.2 Network Options

[Section 4](#) presents the network upgrade options for Norwood Light moving forward. The existing field equipment has reached the end of its lifecycle; therefore, Norwood Light will need to invest in capital upgrades regardless of which technology path is chosen. The two options are:

1. Upgrade the existing hybrid fiber coaxial (HFC) system.
2. Migrate to a fiber to the premises (FTTP) network.

Norwood Light built the system 20 years ago with the expectation of eventually migrating to FTTP. Due to this foresight Norwood Light is positioned to migrate to an FTTP network at lower capital costs than most cable operators given the original design of the HFC network. Fiber is already installed deep into neighborhoods, which decreases the fiber construction needed to reach every home and business. Upgrading the HFC system will require Norwood Light to replace all active and passive devices in the network. As new HFC data standards evolve, the HFC system will need to be upgraded roughly every five years.

1.3 Financial Forecast

We prepared financial projections for:

1. Fiber-to-the-premises (FTTP) migration.
2. Hybrid Fiber Coaxial (HFC) upgrade.

[Section 5](#) presents a complete overview of the financial forecast. Please refer to this section for a summary of assumptions and a complete set of financial statements. In addition, working copies of the financial model are included as Exhibit B and Exhibit C.

The financial analysis assumes that Norwood Light will transition to alternative video programming in year 5. In [Section 5.5.4](#) and [Section 5.6.4](#), we show an example of continuing with traditional cable television programming.

The FTTP migration is more dependent upon the need to grow and expand the internet business than the HFC upgrade. The subscriber and revenue projections used in the analysis allow a comparison between the FTTP migration and the HFC upgrade options. Decisions on Norwood Light market positioning and strategies will greatly impact subscriber levels and resulting financial projections.

1.3.1 FTTP Migration

The FTTP migration model deployment assumes that Norwood Light will be able to deploy the network at the mid-range cost estimate. The estimate assumes that with the subscriber levels presented in [Section 5.1](#) over a 20-year period the total implementation and replenishment cost is \$25.27 million (\$19.53 million net present value (NPV) at a 4 percent discount rate).

The capital additions (depreciation) requirements for years one, two, three, four, five, 10, and 20 is shown in the table on the following page. In Section 5 we show the capital additions for years 1 to 20. In addition to the capital additions, the FTTP migration includes \$1.53 million in operating expenses to decommission the HFC plant over a 5-year period starting in year 5.

Table 7: FTTN Migration Capital Additions

Year	1	2	3	4	5	10	20
a. Connectivity Implementation Costs							
MDU Cabling Upgrades (20 year depreciati	\$ -	\$ 450,000	\$ 750,000	\$ 300,000	\$ -	\$ -	\$ -
Drops (15 year depreciation)	314,500	1,257,900	1,257,900	314,500	85,500	-	21,400
CMTS (5 year depreciation)	-	-	-	-	-	-	-
Network Equipment (10 year depreciation)	190,000	773,800	773,800	203,800	13,800	-	-
Customer Equipment (6 year depreciation)	194,500	777,800	777,800	194,500	52,900	194,500	867,400
Total	\$ 699,000	\$ 3,259,500	\$ 3,559,500	\$ 1,012,800	\$ 152,200	\$ 194,500	\$ 888,800
b. Support Equipment (5 year depreciation)							
Vehicle (7-year)	\$ -	\$ 40,000	\$ -	\$ 80,000	\$ -	\$ -	\$ -
Bucket Truck (7 year)	150,000	150,000	300,000	-	-	-	-
Total	\$ 150,000	\$ 190,000	\$ 300,000	\$ 80,000	\$ -	\$ -	\$ -
c. Construction and Fiber OSP							
Construction (20-Year Depreciation)	452,600	1,959,900	1,809,900	452,600	-	-	-
	\$ 452,600	\$ 1,959,900	\$ 1,809,900	\$ 452,600	\$ -	\$ -	\$ -
Total	\$ 1,301,600	\$ 5,409,400	\$ 5,669,400	\$ 1,545,400	\$ 152,200	\$ 194,500	\$ 888,800

The model assumes a straight-line depreciation of assets, and that the fiber outside plant will have a 20-year life span while the network equipment will need to be replaced after ten years. Miscellaneous implementation costs will occur every five years, vehicles and bucket trucks every seven years, and customer electronics will need to be replaced every six years. The model plans for a depreciation reserve account, starting in year four to fund future electronics replacements and upgrades.

The model also includes replacement of all coaxial drops with fiber in the first four years.

The table below shows the projected income statement for years one, two, three, four, five, 10, and 20.

Table 8: FTTP Migration – Income Statement

Year	1	2	3	4	5	10	20
a. Revenues (see sheet "Revenues" for breakdown)							
Telephone Revenues	\$ 671,100	\$ 637,700	\$ 603,100	\$ 573,000	\$ 544,600	\$ 417,800	\$ 274,000
Cable Revenues	3,828,700	3,638,200	3,629,200	3,448,500	-	-	-
Internet Revenues	3,505,100	3,645,500	3,981,300	4,141,100	4,306,800	5,308,500	5,634,300
Transport Revenues	-	-	-	-	-	-	-
Dark Fiber Revenues	-	-	-	-	-	-	-
Total	\$ 8,004,900	\$ 7,921,400	\$ 8,213,600	\$ 8,162,600	\$ 4,851,400	\$ 5,726,300	\$ 5,908,300
b. Operating Expenses - Cash (not including fees and taxes in line h)							
Cost of Good Sold - Telephone	\$ 276,400	\$ 262,600	\$ 254,600	\$ 241,900	\$ 229,900	\$ 185,300	\$ 131,000
Cost of Good Sold - Cable	3,423,500	3,351,600	3,280,300	3,211,500	-	-	-
Cost of Good Sold - Internet	240,200	254,900	270,300	286,700	303,800	386,200	470,900
Maintenance Expenses - Cable	91,200	92,100	93,000	94,000	-	-	-
Maintenance Expenses - Internet	35,600	35,900	36,300	36,600	37,000	38,800	42,400
Customer Service Expenses	202,500	204,500	206,500	208,500	252,700	264,800	289,100
Sales Expenses	470,900	475,600	480,300	485,000	489,700	458,800	500,900
Administrative & General Expenses	322,100	274,800	246,900	249,300	168,600	176,700	192,900
Operational Expense	305,100	308,200	311,100	314,100	635,600	332,400	363,000
Discretionary Support	-	-	-	-	208,000	218,000	238,000
Franchise Fee	242,400	232,600	234,300	224,800	-	-	-
Salaries	1,538,500	1,569,200	1,600,000	1,630,800	1,661,400	1,815,300	2,215,300
Total	\$ 7,148,400	\$ 7,062,000	\$ 7,013,600	\$ 6,983,200	\$ 3,986,700	\$ 3,876,300	\$ 4,443,500
c. Revenues less Cash Operating Expenses							
EBITDA (a-b)	\$ 856,500	\$ 859,400	\$ 1,200,000	\$ 1,179,400	\$ 864,700	\$ 1,850,000	\$ 1,464,800
d. Operating Expenses - Non-Cash							
Depreciation	\$ 1,316,400	\$ 1,155,000	\$ 1,316,700	\$ 1,439,500	\$ 1,455,400	\$ 1,274,600	\$ 1,116,200
e. Operating Income (d-c)							
	\$ (459,900)	\$ (295,600)	\$ (116,700)	\$ (260,100)	\$ (590,700)	\$ 575,400	\$ 348,600
f. Non-Operating Income							
Interest Expense (all)	\$ (28,700)	\$ (107,300)	\$ (229,800)	\$ (246,500)	\$ (233,500)	\$ (171,600)	\$ (41,600)
Misc Income	-	-	-	-	-	-	-
Total	\$ (28,700)	\$ (107,300)	\$ (229,800)	\$ (246,500)	\$ (233,500)	\$ (171,600)	\$ (41,600)
g. Net Income (e+f)							
	\$ (488,600)	\$ (402,900)	\$ (346,500)	\$ (506,600)	\$ (824,200)	\$ 403,800	\$ 307,000
h. Taxes and Fees							
Revenue Fee	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CIAC (one-time) Fee	-	-	-	-	-	-	-
Taxes (allocated)	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
i. Net Income after Fees (g+h)							
	\$ (488,600)	\$ (402,900)	\$ (346,500)	\$ (506,600)	\$ (824,200)	\$ 403,800	\$ 307,000

The table below shows the cash flow statement for years one, two, three, four, five, 10, and 20.

Table 9: FFTP Migration – Cash Flow Statement

Year	1	2	3	4	5	10	20
a. Net Income (From Income Statement)	\$ (488,600)	\$ (402,900)	\$ (346,500)	\$ (506,600)	\$ (824,200)	\$ 403,800	\$ 307,000
b. Cash Outflows							
Debt Service Reserve	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	(824,600)	(829,700)
Capital Lease	-	-	-	-	-	-	-
Issuance Cost (Financing)	-	(34,000)	(51,200)	(10,000)	-	-	-
Capital Expenditures	\$ (1,301,600)	\$ (5,409,400)	\$ (5,669,400)	\$ (1,545,400)	\$ (152,200)	\$ (554,500)	\$ (984,800)
Total	\$ (1,301,600)	\$ (5,443,400)	\$ (5,720,600)	\$ (1,555,400)	\$ (152,200)	\$ (1,379,100)	\$ (1,814,500)
c. Cash Inflows							
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	554,500	984,800
Debt Service Reserve	-	-	-	-	-	-	-
Source A	-	-	-	-	-	-	-
Source B	\$ -	\$ 3,400,000	\$ 5,120,000	\$ 1,000,000	\$ -	\$ -	\$ -
Total	\$ -	\$ 3,400,000	\$ 5,120,000	\$ 1,000,000	\$ -	\$ 554,500	\$ 984,800
d. Total Cash Outflows and Inflows (b+c)	\$ (1,301,600)	\$ (2,043,400)	\$ (600,600)	\$ (555,400)	\$ (152,200)	\$ (824,600)	\$ (829,700)
e. Non-Cash Expenses - Depreciation	\$ 1,316,400	\$ 1,155,000	\$ 1,316,700	\$ 1,439,500	\$ 1,455,400	\$ 1,274,600	\$ 1,116,200
f. Adjustments (Proceeds from)							
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Source A	-	-	-	-	-	-	-
Source B	-	(3,400,000)	(5,120,000)	(1,000,000)	-	-	-
Total	\$ -	\$ (3,400,000)	\$ (5,120,000)	\$ (1,000,000)	\$ -	\$ -	\$ -
g. Adjusted Available Net Revenue	\$ (473,800)	\$ (4,691,300)	\$ (4,750,400)	\$ (622,500)	\$ 479,000	\$ 853,800	\$ 593,500
h. Principal Payments on Debt							
Principal Payment (all)	\$ 160,000	\$ 158,000	\$ 300,000	\$ 439,400	\$ 490,100	\$ 464,000	\$ 593,900
Total	\$ 160,000	\$ 158,000	\$ 300,000	\$ 439,400	\$ 490,100	\$ 464,000	\$ 593,900
i. Net Cash (before adjustment)	\$ (633,800)	\$ (1,449,300)	\$ 69,600	\$ (61,900)	\$ (11,100)	\$ 389,800	\$ (400)
Net Cash	\$ (633,800)	\$ (1,449,300)	\$ 69,600	\$ (61,900)	\$ (11,100)	\$ 389,800	\$ (400)
j. Fee Adjustment (end of term)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fee Adjustment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
k. Net Cash (after adjustment)	\$ (633,800)	\$ (1,449,300)	\$ 69,600	\$ (61,900)	\$ (11,100)	\$ 389,800	\$ (400)
Net Cash	\$ (633,800)	\$ (1,449,300)	\$ 69,600	\$ (61,900)	\$ (11,100)	\$ 389,800	\$ (400)
l. Beginning Cash	\$ 2,100,000						
Beginning Cash	\$ 2,100,000						
Cash Balance (with beginning cash)							
Unrestricted Cash Balance	\$ 1,466,200	\$ 16,900	\$ 86,500	\$ 24,600	\$ 13,500	\$ 223,600	\$ 2,208,400
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	321,700	1,065,200
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 1,466,200	\$ 16,900	\$ 86,500	\$ 24,600	\$ 13,500	\$ 545,300	\$ 3,273,600

1.3.3 HFC Upgrade

The HFC upgrade estimate assumes that, with the subscriber levels presented above, over a 20-year period, the total implementation and replenishment cost is \$25.50 million (\$18.53 million net present value (NPV) at a 4 percent discount rate).

The capital additions (depreciation) requirements for years one, two, three, four, five, 10, and 20 is shown in the table on the following page. In Section 5 we show the capital additions for years 1 to 20.

One key difference from the FTTP migration is that the initial capital is much lower with the HFC upgrade, but the on-going replenishments are substantially higher. This is why the total 20-year cost is higher than the FTTP migration, but with a lower NPV.

Table 10: HFC Upgrade Capital Additions

Year	1	2	3	4	5	10	20
a. Connectivity Implementation Costs							
MDU Cabling Upgrades (20 year depreciation) \$	-	\$ 300,000	\$ 500,000	\$ 200,000	\$ -	\$ -	\$ -
Drops (15 year depreciation)	250,000	-	-	-	45,300	-	22,700
CMTS (5 year depreciation)	1,500,000	-	-	-	-	-	-
Network Equipment (10 year depreciation)	972,000	1,761,600	-	-	-	-	-
Customer Equipment (6 year depreciation)	1,111,200	-	-	-	30,200	-	51,200
Total	\$ 3,833,200	\$ 2,061,600	\$ 500,000	\$ 200,000	\$ 75,500	\$ -	\$ 73,900
b. Support Equipment (5 year depreciation)							
Vehicle (7-year)	\$ -	\$ 40,000	\$ -	\$ 80,000	\$ -	\$ -	\$ -
Bucket Truck (7 year)	150,000	150,000	300,000	-	-	-	-
Total	\$ 150,000	\$ 190,000	\$ 300,000	\$ 80,000	\$ -	\$ -	\$ -
C. Construction and Fiber OSP							
Construction (20-Year Depreciation)	-	150,000	-	-	-	-	-
	\$ -	\$ 150,000	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 3,983,200	\$ 2,401,600	\$ 800,000	\$ 280,000	\$ 75,500	\$ -	\$ 73,900

The model assumes a straight-line depreciation of assets, and that the fiber outside plant will have a 20-year life span while the network equipment will need to be replaced after ten years. Miscellaneous implementation costs will occur every five years, CMTS upgrades occur every five years, vehicles and bucket trucks every seven years, and customer electronics will need to be replaced every six years. The model plans for a depreciation reserve account, starting in year four to fund future electronics replacements and upgrades.

The estimate also assumes that 15 percent of the coaxial drops are replaced in year 1 and the remaining drops (85%) replaced in year 11.

The HFC upgrade model assumes the same revenue as with the FTTP migration. This assumption however is aggressive since the performance of the HFC upgrade is considerably lower, especially for high-value services.

The table below shows the projected income statement for years one, two, three, four, five, 10, and 20.

Table 11: HFC Upgrade – Income Statement

Year	1	2	3	4	5	10	20
a. Revenues (see sheet "Revenues" for breakdown)							
Telephone Revenues	\$ 671,100	\$ 637,700	\$ 603,100	\$ 573,000	\$ 544,600	\$ 417,800	\$ 274,000
Cable Revenues	3,828,700	3,638,200	3,629,200	3,448,500	-	-	-
Internet Revenues	3,505,100	3,645,500	3,981,300	4,141,100	4,306,800	5,308,500	5,634,300
Transport Revenues	-	-	-	-	-	-	-
Dark Fiber Revenues	-	-	-	-	-	-	-
Total	\$ 8,004,900	\$ 7,921,400	\$ 8,213,600	\$ 8,162,600	\$ 4,851,400	\$ 5,726,300	\$ 5,908,300
b. Operating Expenses - Cash (not including fees and taxes in line h)							
Cost of Good Sold - Telephone	\$ 276,400	\$ 262,600	\$ 254,600	\$ 241,900	\$ 229,900	\$ 185,300	\$ 131,000
Cost of Good Sold - Cable	3,423,500	3,351,600	3,280,300	3,211,500	-	-	-
Cost of Good Sold - Internet	240,200	254,900	270,300	286,700	303,800	386,200	470,900
Maintenance Expenses - Cable	91,200	92,100	93,000	94,000	-	-	-
Maintenance Expenses - Internet	35,600	35,900	36,300	36,600	37,000	38,800	42,400
Customer Service Expenses	202,500	204,500	206,500	208,500	252,700	264,800	289,100
Sales Expenses	470,900	475,600	480,300	485,000	489,700	458,800	500,900
Administrative & General Expenses	352,100	254,600	165,300	166,900	168,600	176,700	192,900
Operational Expense	332,500	335,900	339,000	342,300	345,700	362,300	395,600
Discretionary Support	-	-	-	-	208,000	218,000	238,000
Franchise Fee	242,400	232,600	234,300	224,800	-	-	-
Salaries	1,538,500	1,569,200	1,600,000	1,630,800	1,661,400	1,815,300	2,215,300
Total	\$ 7,205,800	\$ 7,069,500	\$ 6,959,900	\$ 6,929,000	\$ 3,696,800	\$ 3,906,200	\$ 4,476,100
c. Revenues less Cash Operating Expenses							
EBITDA (a-b)	\$ 799,100	\$ 851,900	\$ 1,253,700	\$ 1,233,600	\$ 1,154,600	\$ 1,820,100	\$ 1,432,200
d. Operating Expenses - Non-Cash							
Depreciation	\$ 1,820,500	\$ 1,446,300	\$ 1,214,200	\$ 1,235,600	\$ 1,243,600	\$ 1,220,700	\$ 1,308,400
e. Operating Income (d-c)							
	\$ (1,021,400)	\$ (594,400)	\$ 39,500	\$ (2,000)	\$ (89,000)	\$ 599,400	\$ 123,800
f. Non-Operating Income							
Interest Expense (all)	\$ (63,700)	\$ (103,600)	\$ (96,600)	\$ (88,400)	\$ (80,800)	\$ (53,900)	\$ (8,200)
Misc Income	-	-	-	-	-	-	-
Total	\$ (63,700)	\$ (103,600)	\$ (96,600)	\$ (88,400)	\$ (80,800)	\$ (53,900)	\$ (8,200)
g. Net Income (e+f)							
	\$ (1,085,100)	\$ (698,000)	\$ (57,100)	\$ (90,400)	\$ (169,800)	\$ 545,500	\$ 115,600
h. Taxes and Fees							
Revenue Fee	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CIAC (one-time) Fee	-	-	-	-	-	-	-
Taxes (allocated)	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
i. Net Income after Fees (g+h)							
	\$ (1,085,100)	\$ (698,000)	\$ (57,100)	\$ (90,400)	\$ (169,800)	\$ 545,500	\$ 115,600

The table below shows the cash flow statement for years one, two, three, four, five, 10, and 20.

Table 12: FTTP Migration – Cash Flow Statement

Year	1	2	3	4	5	10	20
a. Net Income (From Income Statement)	\$ (1,085,100)	\$ (698,000)	\$ (57,100)	\$ (90,400)	\$ (169,800)	\$ 545,500	\$ 115,600
b. Cash Outflows							
Debt Service Reserve	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	(1,126,300)	(1,463,500)	(791,300)
Capital Lease	-	-	-	-	-	-	-
Issuance Cost (Financing)	(14,000)	(18,500)	-	-	-	-	-
Capital Expenditures	\$ (3,983,200)	\$ (2,401,600)	\$ (800,000)	\$ (280,000)	\$ (75,500)	\$ (360,000)	\$ (169,900)
Total	\$ (3,997,200)	\$ (2,420,100)	\$ (800,000)	\$ (280,000)	\$ (1,201,800)	\$ (1,823,500)	\$ (961,200)
c. Cash Inflows							
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	360,000	169,900
Debt Service Reserve	-	-	-	-	-	-	-
Source A	-	-	-	-	-	-	-
Source B	1,400,000	1,850,000	-	-	-	-	-
Total	\$ 1,400,000	\$ 1,850,000	\$ -	\$ -	\$ -	\$ 360,000	\$ 169,900
d. Total Cash Outflows and Inflows (b+c)	\$ (2,597,200)	\$ (570,100)	\$ (800,000)	\$ (280,000)	\$ (1,201,800)	\$ (1,463,500)	\$ (791,300)
e. Non-Cash Expenses - Depreciation	\$ 1,820,500	\$ 1,446,300	\$ 1,214,200	\$ 1,235,600	\$ 1,243,600	\$ 1,220,700	\$ 1,308,400
f. Adjustments (Proceeds from)							
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Source A	-	-	-	-	-	-	-
Source B	(1,400,000)	(1,850,000)	-	-	-	-	-
Total	\$ (1,400,000)	\$ (1,850,000)	\$ -	\$ -	\$ -	\$ -	\$ -
g. Adjusted Available Net Revenue	\$ (3,261,800)	\$ (1,671,800)	\$ 357,100	\$ 865,200	\$ (128,000)	\$ 302,700	\$ 632,700
h. Principal Payments on Debt							
Principal Payment (all)	\$ 160,000	\$ 216,500	\$ 295,200	\$ 220,600	\$ 224,100	\$ 163,100	\$ 208,700
Total	\$ 160,000	\$ 216,500	\$ 295,200	\$ 220,600	\$ 224,100	\$ 163,100	\$ 208,700
i. Net Cash (before adjustment)	\$ (2,021,800)	\$ (38,300)	\$ 61,900	\$ 644,600	\$ (352,100)	\$ 139,600	\$ 424,000
Net Cash	\$ (2,021,800)	\$ (38,300)	\$ 61,900	\$ 644,600	\$ (352,100)	\$ 139,600	\$ 424,000
j. Fee Adjustment (end of term)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fee Adjustment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
k. Net Cash (after adjustment)	\$ (2,021,800)	\$ (38,300)	\$ 61,900	\$ 644,600	\$ (352,100)	\$ 139,600	\$ 424,000
Net Cash	\$ (2,021,800)	\$ (38,300)	\$ 61,900	\$ 644,600	\$ (352,100)	\$ 139,600	\$ 424,000
l. Beginning Cash	\$ 2,100,000						
Beginning Cash	\$ 2,100,000						
Cash Balance (with beginning cash)							
Unrestricted Cash Balance	\$ 78,200	\$ 39,900	\$ 101,800	\$ 746,400	\$ 394,300	\$ 635,900	\$ 2,809,700
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	1,126,300	3,411,500	2,328,700
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 78,200	\$ 39,900	\$ 101,800	\$ 746,400	\$ 1,520,600	\$ 4,047,400	\$ 5,138,400

2 Broadband Grants

Broadband is now considered “essential,” and yet it remains unavailable to approximately 42 million in the United States, and it is unaffordable for many more. Federal and state governments have offered funding opportunities to potentially help fill the gaps in unserved and underserved areas.

There are a handful of federal programs and loans available. These include a partnership program that enables utilities to partner with their local government or state to serve eligible service areas. In addition, we expect Phase II of the RDOF funding to become available in late 2022 to cover areas that were not covered in Phase I and to allocate the remaining funding. And finally, low-interest, long-term loan guarantees are available to help electric utilities without adding to the federal deficit. The infrastructure bill has \$5B available for long-term loan allocation.

These grants, however, have been limited to census blocks that do not have access to a 25 Mbps down/ 3 Mbps up internet service. In the recently passed Infrastructure Investment and Jobs Act (IIJA), the definition of “underserved” has been expanded to include census blocks that do not have access to 100Mbps service.

In the IIJA, approximately \$65 billion is appropriated for broadband access for rural areas, low-income families, and tribal communities; and \$14 billion of the total is designated for helping reduce internet bills for low-income citizens. Most of the money will be made available through grants to states. States will have some discretion in designing their funding programs, so it will be important to coordinate with the respective state broadband offices.

From an infrastructure perspective, we do not expect that Norwood Light will be eligible since the Town is not unserved or underserved by the IIJA definitions. There may be, however, some opportunity for grants to subsidize low-income households or households with K-12 students.

The IIJA also provides potential grants for Norwood Light operations. The bill contains infrastructure for power including \$65 billion with which the IIJA creates a Grid Deployment Authority to oversee electricity grid upgrades and gives additional siting authority to the Federal Energy Regulatory Commission. Power grid infrastructure will see upgrades through the building of thousands of miles of new transmission lines that will enable the expansion of renewables and clean energy. The bill includes spending on nuclear power and carbon capture technology and provides funds to prevent hacking of the power grid. In addition, \$7.5 billion is authorized for electric vehicle charging stations as part of reaching the administration’s goal of building a nationwide network of 500,000 EV chargers.

We recommend that Norwood Light monitor the unfolding IIJA and the Commonwealth broadband and electric grant application guidelines.

3 Sales and Marketing Considerations

Delivering broadband and cable television is a competitive business, and businesses and households in the Town do have choices. While broadband has become an essential service, as a competitive business, it differs significantly from the positioning of an electric utility in the marketplace.

Broadband competition comes not only from Comcast and Verizon. First, some households might choose not to acquire a broadband service. It's also important not to dismiss substitute products that might also serve as a form of competition. For example, 5G wireless providers are offering fixed broadband services. In addition, many consumers are satisfied with lower-end broadband service, even under the pandemic response; not all consumers have school-age children or work at home.

Comcast and Verizon are repositioning themselves as an internet and mobile wireless provider. Norwood Light will need to consider market strategies for positioning against this bundle.

Private entities have cost advantages (economies of scale) in regard to the majority of operating costs, vendor maintenance contracts, network electric prices, programming fees, and leverage of contractors. In addition, many private providers have stood up a contracting business to reduce cost of infrastructure deployments.

Municipal electrics do have an advantage in regard to supporting long-term investments and the ability to operate on a break-even cash flow. However, this advantage is not sufficient to overcome the economies of scale of existing providers. The result is that the private sector has many cost advantages and operating efficiencies that make it difficult for a municipal electric to compete on price.

The following sales and marketing considerations will be important for Norwood Light:

- Norwood Light will need to stress areas where they have a clear advantage over existing providers. For example, with a FTTP network, Norwood Light can stress reliability and speed. By promoting benefits of fiber reliability and promoting applications that require higher speeds (1 Gbps and above), Norwood Light can increase the perceived value of more robust connections.
- Norwood Light will need to stress customer service and local representation. We have often seen municipal electric marketing efforts not only feature local service but cash flow as well. Norwood Light's theme of "Keep your money on Main Street, not on Wall Street" will continue to be an important message.
- Norwood Light will need to provide a competitively priced product, but not necessarily the lowest. By creating a demand (marketing) for a service that competitors will struggle to provide, market share gains could be realized. Also, showing consumers that they can eliminate service fees for cable can increase the value of an Norwood Light broadband connection. In other words, currently, NELP's marketing efforts are focused on consumers that are driven by price rather than performance. **In the future, marketing efforts need to**

focus on why consumers need a Gbps broadband connection. Demand must be created.

3.1 Suite of Services – How to Deliver Video Programming

Today, Norwood Light offers a set of “triple play” services (internet, cable television, and telephone) that residential customers have grown accustomed to having in their homes.

- **Internet** subscribers are increasing. and margins are strong.
- **Cable television** subscribers are in decline. Cable television margins have disappeared and are quickly becoming in the red. Margins (revenues less programming expenses) have eroded due to increasing programming fees and the fact that competitors’ (Comcast and Verizon) programming expenses⁴ are substantially lower than Norwood Light’s.
- **Telephone** subscribers are in decline. However, margins are strong. Norwood Light resells an over-the-top (OTT)⁵ service. Given this we recommend that Norwood Light continue to offer the existing telephone service.

The challenge Norwood Light faces is whether to continue offering traditional cable television services or move to alternative video programming.

Allowing customers access to television programming does not mean that Norwood Light must continue to directly provide cable television services. Internet applications have evolved, network speeds have increased, and OTT video services (as a substitute for cable television) have become available as applications delivered by hundreds of providers over broadband connection. Norwood Light can enable these services over a robust broadband network.

An example of available OTT video services is shown in Table 13.

Norwood Light can enable residential and small business customers to purchase voice, video, and other OTT services by providing them with unfettered,⁶ reliable broadband access. In other words, Norwood Light would become a data network provider and would enable its consumers to purchase services. Questions to consider:

1. If Norwood Light does drop traditional cable television services, will Norwood Light customers stay with Norwood Light and adopt alternative OTT video programming?

⁴ The economies of scale (volume) that Comcast and Verizon hold allow them to acquire cable programming at more than 25 percent lower than Norwood Light (even with Norwood Light acquiring a portion of programming NCTC). In addition, Comcast owns or controls (via stock holdings) a substantial percentage of cable television content.

⁵ Over-the-top (OTT) content is delivered over the Internet by a third-party application or service. The broadband provider does not provide the content (typically video and voice) but provides the Internet connection over which the content is delivered.

⁶ Meaning that access to websites offering over-the-top (OTT) services is not blocked, restricted, or rate limited.

2. How should Norwood Light be positioned in the marketplace in order to maintain relevancy?

This report does not answer the above questions, but provides data and information to assist Norwood Light in the development of strategies.

As indicated, the availability of OTT services has expanded over the past few years and now provides local and sports programming that was previously only available from traditional cable television providers. The purchasing power of the OTT providers has increased to the point that they can often offer service pricing well below that of smaller local providers such as Norwood Light.

With the expansion off OTT servicers, potential consumers can easily become confused and frustrated with the options, costs, and understanding how to use the services. Operators that promote OTT, such as Norwood Light, can leverage resources such as MyBundle to assist in educating consumers about OTT options. With some education, existing cable subscribers can find a service that meets their viewing desires, often at a lower price than what they pay for cable television today. This consumer education process is critical for Norwood Light.

Table 13: Available OTT Video Programming Services (Partial List)

OTT Programing Examples (Partial)									
Provider		Classification	Web Site	Advertised Price (monthly)	Online DVR Adder (monthly)	Local Channels	Channels	Streams (per household)	Theme
Amazon	Prime Video	Selected programs and movies	https://www.amazon.com	Free to \$9	na	na	na	na	
Fubo TV	Starter	TV channel bundle	https://www.fubo.tv	\$ 65	\$ -	Yes, with restrictions	115	3	Stream Live TV & Sports - on any device, anytime, anywhere
	Pro	TV channel bundle		\$ 70	\$ -	Yes, with restrictions	115	10	
	Elite	TV channel bundle		\$ 80	\$ -	Yes, with restrictions	162	10	
	Latino	TV channel bundle		\$ 33	\$ -	Yes, with restrictions	33	2	
Hulu + Live TV		TV channel bundle	https://www.hulu.com/Live-tv	\$ 65	\$ 10	Yes	65+	2	All the TV you love
MyBundle		Manages streaming options	https://mybundle.tv	na	na	na	na	na	We make streaming TV easy
Netflix		Selected programs and movies	https://www.netflix.com	\$9 to \$18	na	na	na	na	
Peacock		Selected programs and movies	https://www.peacocktv.com	Free to \$10	na	na	na	na	
Sling	Orange	TV channel bundle	https://www.sling.com	\$ 35	\$ -	No	32	1	Sling TV is better than cable - affordable, simple, flexible
	Blue	TV channel bundle		\$ 35	\$ -	Fox & NBC	43	3	
	Orange and Blue	TV channel bundle		\$ 50	\$ -	Fox & NBC	51	3	
	Free	Selected programs and movies		\$ -	na	No	na	na	
Tubi		Selected programs and movies	https://tubitv.com	\$ -	na	limited- select markets	na	na	Thousands of movies and TV shows. Always Free. 100% Legal.
YouTube		TV channel bundle	https://tv.youtube.com	\$ 65	\$ -	Yes	85+	3	Cut the cord and save \$500 per year

3.2 Norwood Light Customers Want Cable Television – Today

3.2.1 Service Pricing Comparison – Internet

Norwood Light is positioned as a cable television provider that provides moderately priced internet services. This is highlighted when comparing Norwood Light residential and business internet rates (see the tables below) and reviewing the market research results.

The pricing in the tables include service fees, router rental,^{7,8} and discounts.

Competition comes not only from Comcast and Verizon FiOS, but also from T-Mobile, Verizon, and other 5G providers. 5G providers have begun offer fixed wireless broadband services for households starting at \$50 per month for 300 Mbps services. These offerings could easily erode Norwood Light internet consumer base.

Satellite services such as StarLink have received considerable press. For Norwood Light, StarLink and other satellite services are not a competitive threat. StarLink is likely a great option for rural areas that do not have cable modem or FTTP-based services available. StarLink uses advanced satellites in a low orbit and enables video calls, online gaming, streaming, and other activities that historically have not been possible with satellite internet. Users can expect to see download speeds between 100 Mbps and 200 Mbps and latency as low as 20ms in most locations, but at a cost of \$100 per month. With the FTTP migration, Norwood Light can offer a 1 Gbps service at a lower price.

In addition, both Comcast and Verizon offer mobile wireless service and promote as another offering in their service bundle.

⁷ For residential - Norwood Light router is \$3.95 per month, Verizon router is \$15 per month for services under 1 Gbps, and both Comcast and Verizon offer a \$10.00 per month discount (for agreement and for auto pay respectfully).

⁸ For business - Norwood Light router is \$3.95 per month, Comcast equipment fee is \$18.45 per month, and Verizon equipment fee is \$15 per month.

Table 14: Residential Internet Services

Norwood		Comcast (xfinity)			Verizon	
Internet Package (Residential)	Monthly Cost - With Router	Internet Package (Residential)	Monthly Cost (Year 1/2) - With Agreement Discount (\$10) With Router	Monthly Cost (Regular Rate, With Discount (\$10) With Router	Internet Package (Residential)	Monthly Cost , Regular Rate, With Discount(\$10) With Router
Internet Lite (10 Mbps download x 1 Mbps upload)	\$ 28.90					
High-Speed Internet (100 Mbps download x 30 Mbps upload)	\$ 43.90	Performance Starter Internet (50 Mbps download speed)	\$ 55.00	\$ 55.00		
Extreme High-Speed Internet (200 Mbps download x 30 Mbps upload)	\$ 53.90	Performance Pro Internet (download speeds up to 200 Mbps)	\$ 49.99	\$ 85.95	200/200Mbps Internet plan	\$ 54.99
Wicked Fast Internet (300 Mbps download x 30 Mbps upload)	\$ 63.90	Blast!® Internet (download speeds up to 400 Mbps)	\$ 69.99	\$ 90.95	400/400Mbps Internet plan.	\$ 79.99
		Extreme Pro Internet (download speeds up to 800 Mbps)	\$ 79.99	\$ 95.95		
		Gigabit (download speeds up to 1200 Mbps)	\$ 89.99	\$ 100.95	Gigabit (940/download-880/Upload) Internet plan	\$ 89.99

Table 15: Business Internet Services

Norwood		Comcast			Verizon Fios Internet		
Internet Package (Business)	Monthly Cost - With Router	Internet Package (Business)	Monthly Cost (Year 1 (2-Year Contract) With Equipment Fee	Monthly Cost (Year 2) With Equipment Fee	Internet Package (Business)	Monthly Cost (Year 1 (2-Year Contract) With Equipment Fee	Monthly Cost (Year 2) With Equipment Fee
Lite (5M/1M)	\$ 33.90						
Basic (10M/5M)	\$ 43.90						
Standard (100M/15M)	\$ 53.90	Business Internet 100 & Security Solution (Up to 100Mbps downloads)	\$ 126.89	\$ 136.89	Fios 100Mbps	\$ 84.00	\$ 94.00
Extreme (200M/30M)	\$ 93.90	Business Internet 200 & Security Solution (Up to 200Mbps downloads)	\$ 156.89	\$ 166.89			
Extra (300M/30M)	\$ 118.90	Business Internet 300 & Security Solution (Up to 300Mbps downloads)	\$ 196.89	\$ 206.89	Fios 300Mbps	\$ 144.00	\$ 154.00
Wicked Fast (400M/30M)	\$ 163.90						
Enterprise (500M/30M)	\$ 193.90	Business Internet 600 & Security Solution (Up to 600Mbps downloads)	\$ 226.89	\$ 236.89			
		Business Internet 1 Gig & Security Solution (Up to 1Gbps downloads)	\$ 276.89	\$ 286.89	Fios Gigabit (Up to 940/880 Mbps)	\$ 264.00	\$ 15.00

3.2.2 Service Pricing Comparison – Cable Television

Cable television comparisons are a bit more complex than internet. Each provider provides a different mix of programming, number of programs, vertical features, and equipment options. A comparison of the cable offerings is shown in the table on the next page.

The monthly fees do not include equipment fees⁹ or term discounts offered by Comcast and Verizon.

As seen in Table 16, Norwood Light tends to have higher prices for cable television services compared to its competitors. However, it is not in a position to lower cable prices without going below the cost of cable television programming. As programming fees continue to rise, it will become more difficult for Norwood Light to compete in the cable television market without losing money on the service.

⁹ Norwood Light HD set top box is \$4.95 per month, DVT is \$9.95 per month, and remote control is \$.30 per month. Comcast set-top box is \$7.50 per month and Verizon's DVR is \$12 per month.

Table 16: Residential Cable Television Services

Norwood		Comcast (xfinity)		Verizon Fios TV	
Cable TV (Residential)	Monthly Cost	Cable TV (Residential)	Monthly Cost No Term Agreement No Discounts	Cable TV (Residential)	Monthly Cost
Basic HD Cable TV (44 HD channels & 50 Music Choice Channels)	\$ 29.95	10+ Channels Choice Limited	\$ 30.00	Local TV (60 local channels)	\$ 55.00
Expanded on Demand HD Cable TV (all most popular HD cable and network channels, video-on demand, 50 music choice channels, and interactive guide)	\$ 104.95	10+ Channels Limited Basic	\$ 46.95	Your Fios TV (125+ channels)	\$ 65.00
Digital Deluxe HD Cable TV (Over 200 digital cable & HD network channels, including Encore movie channels, video-on demand, music choice, & interactive program guide)	\$ 119.95	140+ Channels	\$ 67.27	Mundo TV (210+ channels)	\$ 85.00
Digital Plus tier added to Basic or Expanded	\$ 17.95	220+ Channels	\$ 79.99	Mundo Total TV (255+ channels)	\$ 105.00
Digital Plus tier added to Basic, Expanded or Digital Deluxe	\$ 4.95	260+ Channels	\$ 99.99	More Fios TV (325+ channels)	\$ 85.00
				The Most Fios TV (486+ channels)	\$ 105.00

3.2.3 Importance of Cable Television to Norwood Light Customers

As discussed above, cable television margins have eroded and there is no end in sight in the year-by-year increases in programming costs. Norwood Light will find it more difficult to compete in cable television giving the cost advantages that Comcast and Verizon. However, today, Norwood Light customers want Norwood Light to offer traditional cable television.

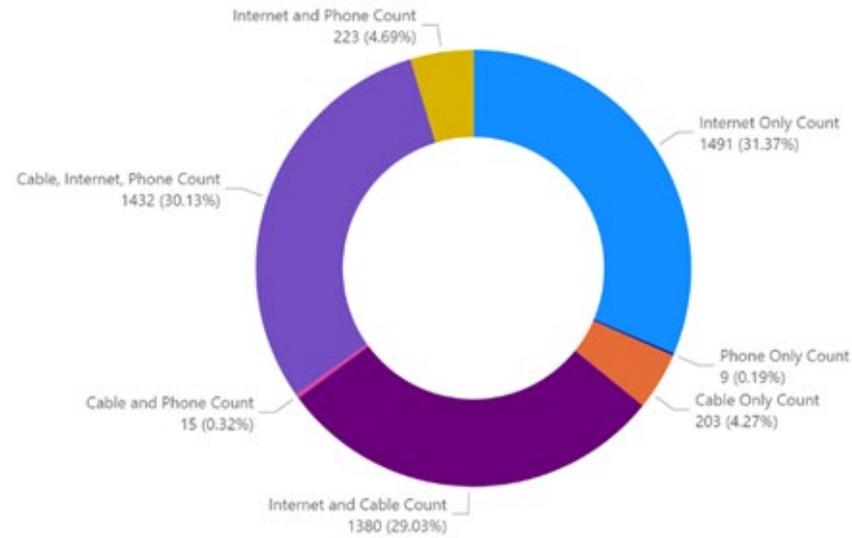
Figure 1 shows the breakdown of services received by Norwood Light customers and the percentage of households with each age group. As seen, Norwood Light customers appear to be older than average and older individuals tend to make purchase decisions based on traditional cable television rather than internet performance.

Figure 2 shows households with each age group by service bundle. Again, this data shows the younger households' emphasis on internet and older households' emphasis on cable television.

Figure 1: Norwood Light Service by Households with Each Age Group

Services by Households	
Phone Only Count	Phone Only %
9	0.19%
Cable Only Count	Cable Only %
203	4.27%
Internet Only Count	Internet Only %
1491	31.37%
Cable and Phone Count	Cable and Phone %
15	0.32%
Internet and Cable Count	Internet and Cable %
1380	29.03%
Internet and Phone Count	Internet and Phone %
223	4.69%
Cable, Internet, Phone Count	Cable, Internet, Phone %
1432	30.13%

Services by Household



Households with Cable

3030
63.75%

Households without Cable

1807
36.25%

Households with Each Age Group

	Households 17-29	Households 30-39	Households 40-49	Households 50-59	Households 60-69	Households 70-79	Households 80-89	Households 90-older	Total Households
	870	1098	793	1025	1186	824	500	191	4837
% to Total	17.99%	32.19%	21.58%	27.56%	31.28%	20.98%	12.34%	4.18%	

Figure 2: Norwood Light Service Bundle by Households with Each Age Group

Cable Only Count	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
203	15	16	12	21	64	50	46	23
4.27%	7.39%	7.88%	5.91%	10.34%	31.53%	24.63%	22.66%	11.33%
Internet Only Count	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
1491	305	569	318	245	217	102	17	14
31.37%	20.46%	38.16%	21.33%	16.43%	14.55%	6.84%	1.14%	0.94%
Phone Only Count	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
9	2	1		1	4	3		1
0.19%	22.22%	11.11%		11.11%	44.44%	33.33%		11.11%
Cable and Phone Count	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
15		1	2	2	4	3	7	1
0.32%		6.67%	13.33%	13.33%	26.67%	20.00%	46.67%	6.67%
Internet and Cable Count	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
1380	258	319	253	354	374	222	73	30
29.03%	18.70%	23.12%	18.33%	25.65%	27.10%	16.09%	5.29%	2.17%
Internet and Phone Count	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
223	33	28	42	51	55	34	28	15
4.69%	14.80%	12.56%	18.83%	22.87%	24.66%	15.25%	12.56%	6.73%
Cable, Internet, Phone Count	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
1432	242	147	152	334	453	402	327	105
30.13%	16.90%	10.27%	10.61%	23.32%	31.63%	28.07%	22.84%	7.33%

The residential market survey asked Norwood Light customers about the importance of and satisfaction in regard to the ability to bundle internet with cable television and phone. Results are shown in Figure 3 and Figure 4.

As shown, over 74 percent of Norwood Light customers indicated that is extremely, very, or moderately important to bundle cable television and telephone with their internet service.

Figure 3: Importance in Bundling Internet with Cable and Phone

**Question 26: How IMPORTANT are the following aspects of home internet service:
(E) Ability to "bundle" with TV and Phone**

74.42%

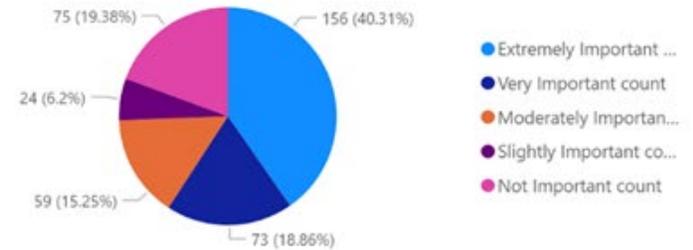
Total % For Responses That Were Extremely, Very or Moderately Important

Extremely Important count	Very Important count	Moderately Important count	Slightly Important count	Not Important count	No response	Response Total
156	73	59	24	75	48	387

Response By Age Group (Excluding No Responses)

	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
Extremely Important %	40.31%	12.18%	8.97%	5.77%	13.46%	30.13%	18.59%	9.62%
Very Important %	18.86%	30.14%	17.81%	8.22%	16.44%	30.14%	12.33%	9.59%
Moderately Important %	15.25%	5.08%	16.95%	16.95%	13.56%	15.25%	10.17%	5.08%
Slightly Important %	6.20%	4.17%	37.50%	4.17%	12.50%	20.83%	4.17%	8.33%
Not Important %	19.38%	10.67%	40.00%	22.67%	5.33%	18.67%	8.00%	1.33%

Count of Responses by Category (Excluding no response)



Count of Responses by Category

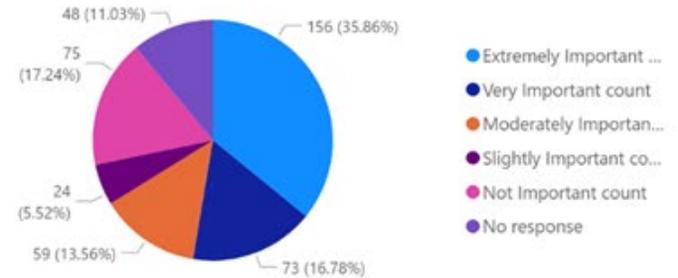


Figure 4: Satisfaction with Ability to Bundle Internet with Cable and Phone

Question 27: How SATISFIED are you with the following aspects of your current home internet service:
(E) Ability to "bundle" with TV and Phone

88.40%

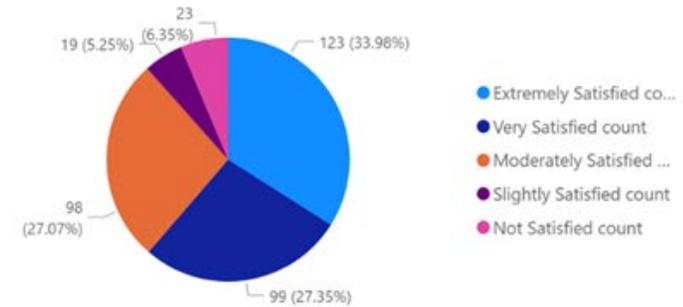
Total % For Responses That Were Extremely, Very or Moderately Satisfied

Extremely Important count	Very Important count	Moderately Important count	Slightly Important count	Not Important count	Response Total	No Response
123	99	98	19	23	362	73

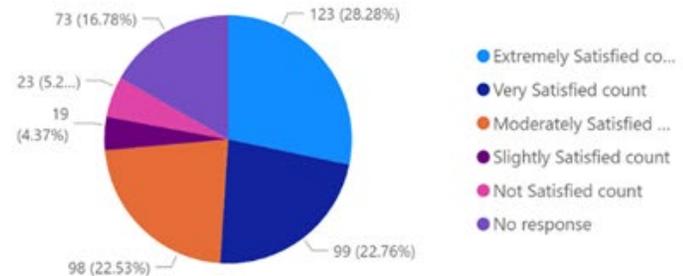
Response By Age Group

	17-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over
Extremely Satisfied %	33.98%	8.94%	10.90%	6.50%	8.13%	26.83%	21.95%	13.01%
Very Satisfied %	27.35%	25.25%	17.17%	10.10%	22.22%	24.24%	6.06%	2.02%
Moderately Satisfied %	27.07%	11.22%	20.41%	13.27%	12.24%	23.47%	13.27%	5.10%
Slightly Satisfied %	5.25%	10.53%	21.05%	15.79%	5.26%	21.05%	10.53%	5.26%
Not Satisfied %	6.35%	8.70%	13.04%	17.39%	13.04%	30.43%	13.04%	0.00%

Count by Category (Excluding No Response)



Count by Category



3.3 Broadband Service Considerations

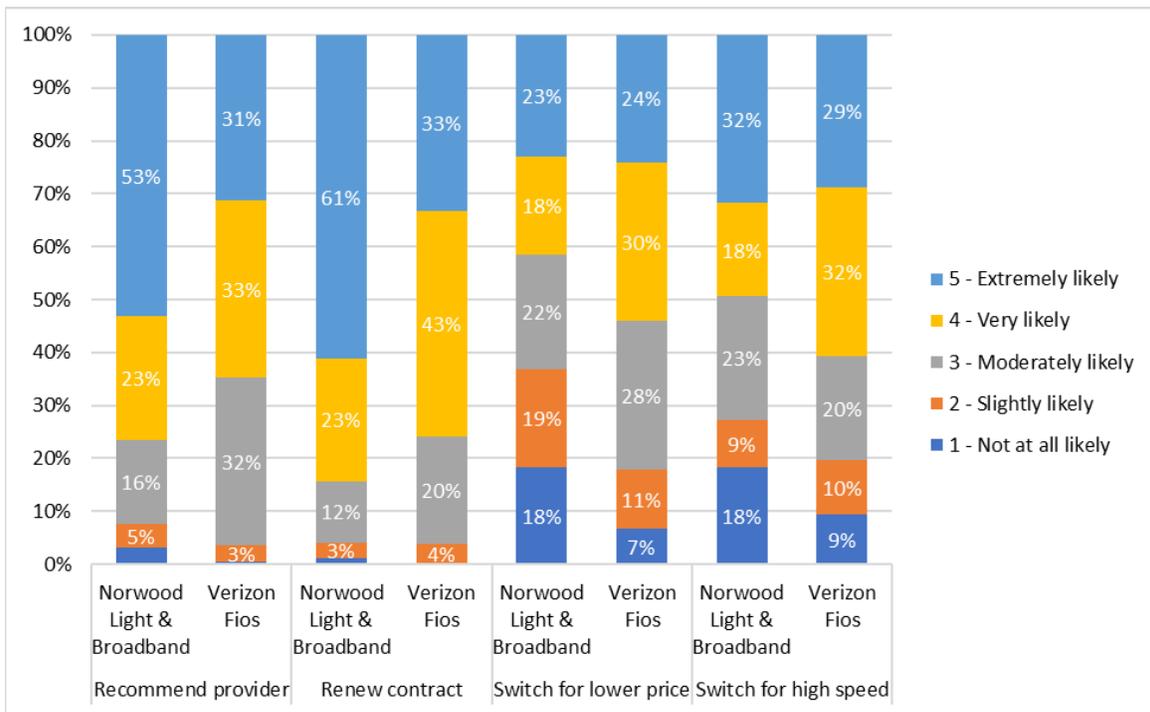
The market research indicated that most internet subscribers are relatively loyal to their service provider. More than three-fourths would be very or extremely likely to renew their contract, and seven in 10 would be very or extremely likely to recommend their provider.

At the same time, 53 percent of subscribers would be very or extremely likely to switch providers for a faster connection speed at the same price, and 47 percent would be very or extremely likely to switch providers for a lower price for the same connection speed.

These results suggest that while many customers may be satisfied with their service, they could be motivated to switch services for the right price or perceived value.

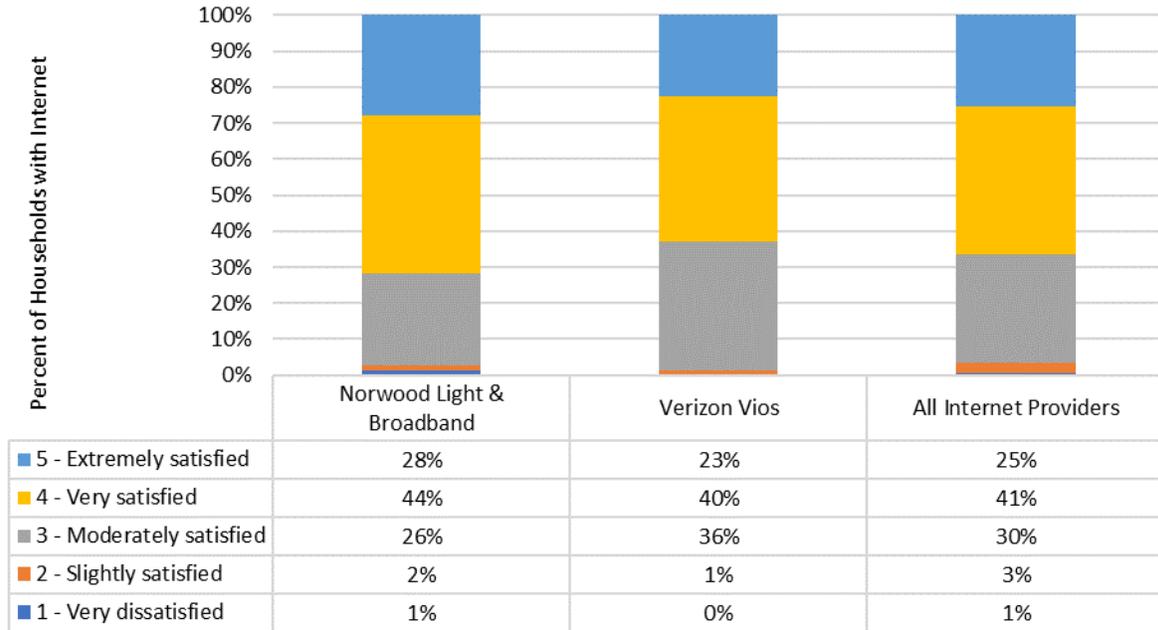
Figure 5 shows the likelihood given to each aspect by connection type. Norwood Light customers appear to be more loyal to their provider, compared with Verizon Fios customers. More than one-half (53%) of Norwood Light internet subscribers would recommend their provider, compared with 31 percent of Verizon Fios customers. Just one-third (33%) of Verizon Fios customers would be very likely to renew their contract, compared to 61 percent of Norwood Light customers.

Figure 5: Likelihood of Recommending, Renewing, or Switching Internet by Provider



Respondents were also asked to evaluate their overall satisfaction with their primary home internet provider. No statistically significant differences in satisfaction level between Norwood Light and Verizon Fios were found. Figure 6 highlights the overall satisfaction level, with one-fourth of customers saying they are extremely satisfied and four in 10 saying they are very satisfied.

Figure 6: Overall Satisfaction with Primary Home Internet Provider by Connection



3.3.1 Importance and Satisfaction of Service Attributes

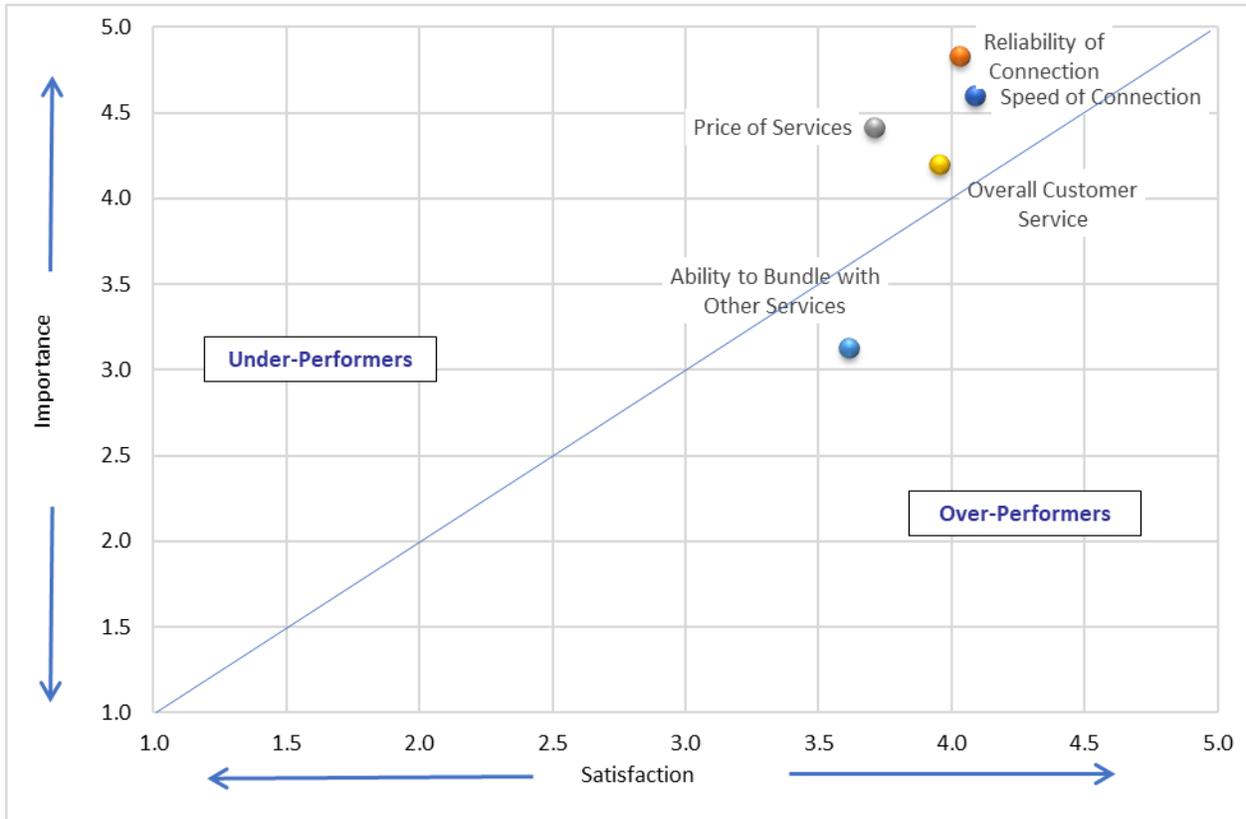
To assist in understanding how Norwood Light might expand their broadband market share, the market survey posed a series of questions related to the importance of and satisfaction with performance attributes. We then measured to see any statistical significance between importance and satisfaction of these attributes. The “gap” then gives an indication of areas that Norwood Light can concentrate on to capture or retain market share.

As seen in Table 17 and Figure 7 below, the largest gap is reliability of service, followed by price, speed, and customer service.

Table 17: Gap Between Satisfaction and Importance Ratings

	<u>Mean Satisfaction</u>	<u>Mean Importance</u>	<u>GAP < = ></u>	<u>Customer Expectations</u>
Speed of Connection	4.1	4.6	-0.5	Not Met
Reliability of Connection	4.0	4.8	-0.8	Not Met
Price of Services	3.7	4.4	-0.7	Not Met
Overall Customer Service	4.0	4.2	-0.2	Not Met
Ability to Bundle Services	3.6	3.1	0.5	Exceeded

Figure 7: Gap Between Satisfaction and Importance Ratings



As seen in Table 18, Norwood Light ranks substantially higher in customer service and price compared to Verizon. The overall ISP average is lower for connection speed and reliability.

Table 18: Gap Index Score by Connection

	Satisfaction / Importance Gap Index*				
	Connection Speed	Connection Reliability	Price of Service	Customer Service	Ability to Bundle
Norwood Broadband & Light	87%	81%	91%	102%	119%
Verizon Fios	93%	90%	74%	83%	114%
ISP Average	89%	83%	84%	94%	115%

*Percent of expectations met = Satisfaction / Importance

3.3.3 Broadband Service Prices and Projected Broadband Take Rates

The survey also asked a series of questions regarding a respondent’s willingness to switch to a 300 Mbps or a 1 Gbps service at a given price level. The results are shown in Table 19 for respondents that are Norwood Light customers, Verizon Customers, and all respondents.

Table 19: Willingness to Purchase Broadbands Service by Location

Willingness to Purchase Broadband Service							
Monthly Fee	Willingness to Purchase Service	300 Mbps			1 Gbps		
		Norwood Customers	Verizon Customers	Total Respondents	Norwood Customers	Verizon Customers	Total Respondents
\$ 50	Extremely Willing	40.23%	33.01%	38.53%	47.51%	56.74%	50.19%
	Mean	3.4	3.3	3.4	3.6	3.8	3.6
\$ 60	Extremely Willing	19.20%	9.02%	18.31%	30.77%	26.22%	30.93%
	Mean	2.5	2.5	2.6	2.9	3.1	3.0
\$ 70	Extremely Willing	9.10%	3.59%	9.78%	16.84%	15.12%	18.19%
	Mean	1.8	1.9	2.0	2.2	2.6	2.4
\$ 80	Extremely Willing	5.81%	0.84%	4.38%	9.14%	7.79%	8.96%
	Mean	1.6	1.7	1.7	1.8	2.1	1.9
\$ 90	Extremely Willing	1.59%	0.00%	0.95%	1.34%	1.34%	4.93%
	Mean	1.4	1.4	1.4	1.5	1.6	1.6
\$ 100	Extremely Willing	1.60%	0.00%	1.09%	3.37%	1.34%	3.18%
	Mean	1.3	1.3	1.3	1.4	1.5	1.4

Scale: 1- Not at all willing 5- Extremely willing

As expected, we do see 1) a significant difference in consumer willingness to switch to a 300 Mbps or a 1 Gbps service, and 2) a high sensitivity to the willingness to purchase a given service to the service price. In addition, we see that Norwood Light customers have a lower interest in a 300 Mbps or 1Gbps than Verizon customers and the total respondents.

A challenge with surveys is that the responses are based on a particular moment in time. Actions and perceptions will change over time, and respondents sometimes take an action that doesn’t match their survey response. Based on experience, we have developed weighting factors to apply to survey responses. These factors are shown in Table 20.

Table 20: Estimated Take Range Weighting Factors

Estimated Take Rate by Category		
Willingness to Purchase Service	Take Rate of Category (Base)	Take Rate of Category (High)
1 - Not at all willing	0.00%	0.00%
2 - Slightly willing	1.00%	10.00%
3 - Moderately willing	10.00%	20.00%
4 - Very willing	60.00%	75.00%
5 - Extremely willing	90.00%	95.00%

The resultant take-rate estimates for a 300 Mbps or a 1 Gbps service are shown in the tables and figures below.

If Norwood Light desires to be a high-value data provider, it will be critical for marketing efforts to focus on increasing demand for Gbps services, increasing the willingness to pay a higher price (shift curve up), and providing a service that incumbents may struggle to meet without network upgrades. Of particular note is that, for a 1 Gbps service, a substantially higher percentage of Verizon customers are willing to switch to a service priced between \$50 per month and \$80 per month than Norwood Light customers (see Figure 10 and Figure 11).

Table 21: Estimated Take Rate (Base) for 300Mbps Service

Projected 300 Mbps Broadband Service Take Rate (Base)						
Location	Monthly Fee					
	\$ 50	\$ 60	\$ 70	\$ 80	\$ 90	\$ 100
Norwood Customers	45.41%	26.48%	11.35%	8.13%	3.45%	2.43%
Verizon Customers	45.49%	25.40%	9.95%	5.58%	1.82%	2.52%
All Respondents	45.45%	27.79%	13.46%	8.28%	3.17%	2.43%

Figure 8: Estimated Take Rate (Base) for 300Mbps Service

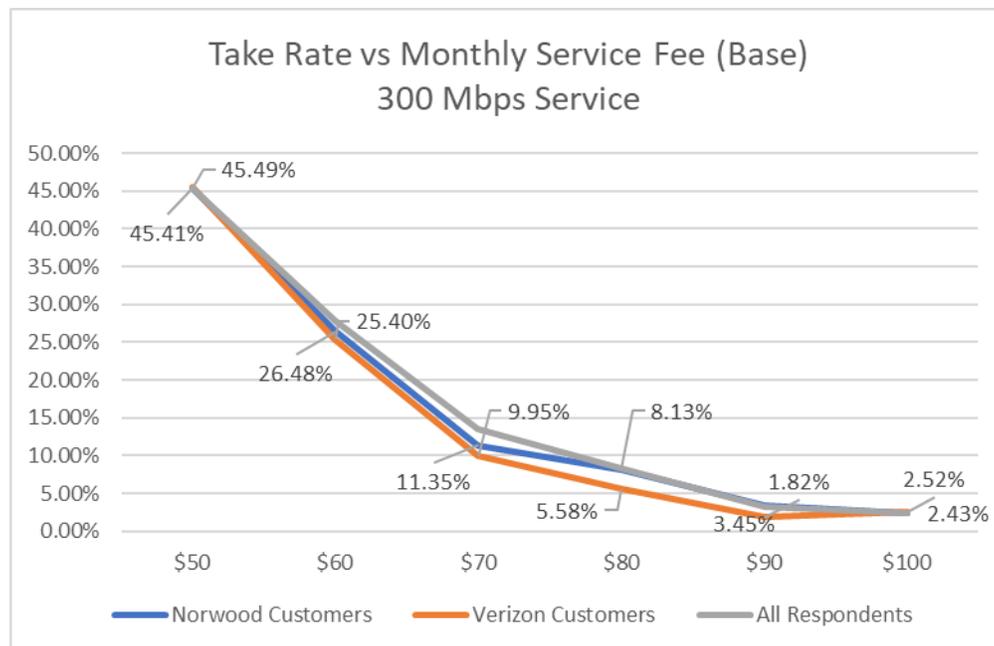


Table 22: Estimated Take Rate (High) for 300Mbps Service

Projected 300 Mbps Broadband Service Take Rate (High)						
Location	Monthly Fee					
	\$ 50	\$ 60	\$ 70	\$ 80	\$ 90	\$ 100
Norwood Customers	51.83%	31.66%	14.72%	10.64%	5.35%	3.83%
Verizon Customers	52.25%	31.92%	14.45%	9.74%	4.42%	4.43%
All Respondents	51.81%	33.31%	17.24%	11.59%	5.45%	4.14%

Figure 9: Estimated Take Rate (High) for 200Mbps Service

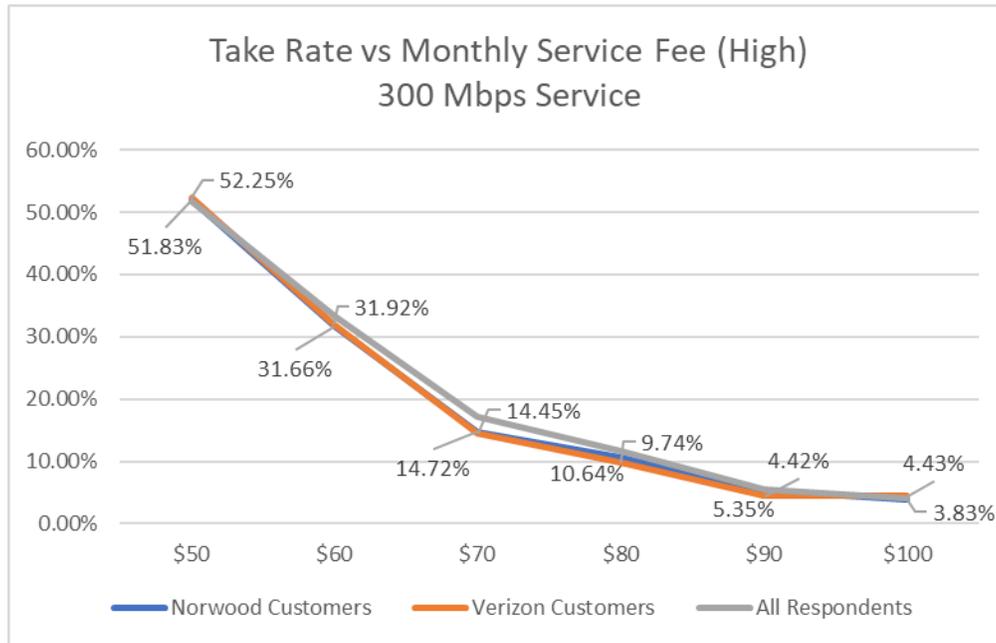


Table 23: Estimated Take Rate (Base) for 1 Gbps Service

Projected 1 Gbps Broadband Service Take Rate (Base)						
Location	Monthly Fee					
	\$ 50	\$ 60	\$ 70	\$ 80	\$ 90	\$ 100
Norwood Customers	50.20%	35.23%	19.61%	11.73%	7.11%	4.09%
Verizon Customers	60.40%	41.02%	26.62%	14.90%	6.71%	4.31%
All Respondents	53.13%	38.16%	23.86%	13.86%	7.51%	4.53%

Figure 10: Estimated Take Rate (Base) for 1 Gbps Service

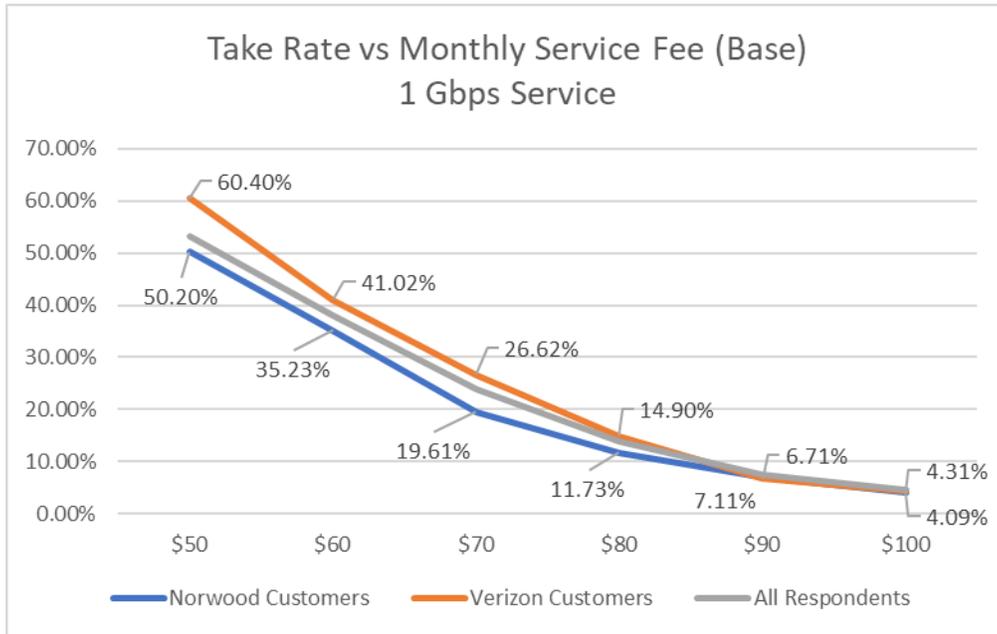
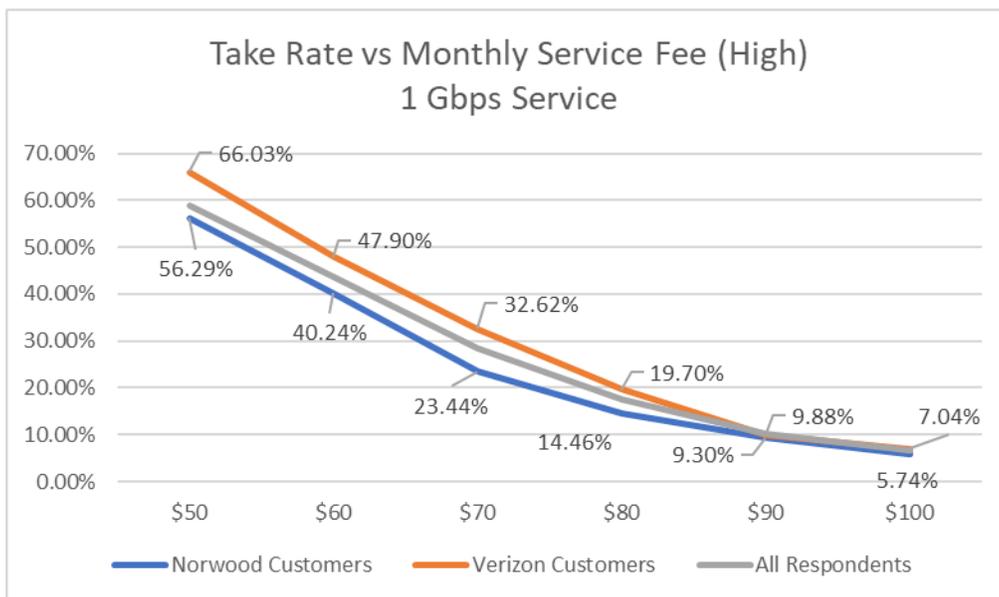


Table 24: Estimated Take Rate (High) for 1 Gbps Service

Projected 1 Gbps Broadband Service Take Rate (High)						
Location	Monthly Fee					
	\$ 50	\$ 60	\$ 70	\$ 80	\$ 90	\$ 100
Norwood Customers	56.29%	40.24%	23.44%	14.46%	9.30%	5.74%
Verizon Customers	66.03%	47.90%	32.62%	19.70%	9.88%	7.04%
All Respondents	59.00%	43.71%	28.48%	17.50%	10.21%	6.65%

Figure 11: Estimated Take Rate (High) for 1Gbps Service



4 Network Upgrade Alternatives and Costs

4.1 Existing Norwood Light Network

Norwood Light built a fiber-deep hybrid fiber coaxial network (HFC) that enabled Norwood Light to sustain the rapid rise of broadband adoption that occurred over the last twenty years. Where many other HFC networks, such as Comcast, had 400 to 500 homes and businesses (i.e., passings) which required multiple amplifiers to reach homes, Norwood Light built a fiber optic forward network, called a node plus zero design (N+0), that required no amplifiers to reach each passing in Norwood. This results in roughly 70 passings per node. This gives Norwood Light a distinct advantage to migrate to FTTP over other HFC providers who would have to construct miles of additional fiber to reach each passing.

Norwood Light has also invested in their existing data communications systems so that subscribers are able to achieve their subscribed internet package at peak times during the day. The existing cable modem termination system (CMTS) can support the next generation of data communications over HFC (DOCSIS) and has capacity to support the current users. This infrastructure must be updated every five to seven years to keep up with bandwidth demands from users. The existing HFC active equipment in the field has reached end of life. For example, new cellular antennas have added interference to the HFC system as the optical nodes were not designed to handle the interference in that frequency band.

Norwood Light has reached a point in the equipment lifecycle where upgrades will be needed whether Norwood Light elects to continue operating the HFC network or migrate to an FTTP network.

4.2 Upgrade HFC Network

If Norwood Light chooses to upgrade the HFC network, we would recommend upgrading the CMTS to DOCSIS 3.1, which is currently the latest standard of DOCSIS. DOCSIS 3.1 supports up to 1.2 GHz of bandwidth over the coaxial system and a 204 MHz high-split return frequency. The standard provides additional bandwidth downstream while also dramatically increasing the upstream bandwidth so that Norwood Light can provide higher internet bandwidth options to more users.

In order to take advantage of the new DOCSIS 3.1 standard, all of the active and passive device in the HFC network must be replaced. This includes the optical transmitters, nodes, line extenders, taps, and splitters. Our cost estimate assumes that the existing coaxial system can be reused, although there may be portions of the coaxial system that needs to be replaced to support the new bandwidth levels.

Every five years, the CMTS will need to be replaced to support the latest DOCSIS standard. DOCSIS 4.0 is the developing standard that will eventually replace DOCSIS 3.1. DOCSIS 4.0 supports up to 1.8 GHz of bandwidth. When Norwood Light upgrades to DOCSIS 4.0, the entire active and passive devices on the coaxial system will need to be replaced to support the additional

bandwidth. This requires replacing all devices at the headend and field every five years, which becomes labor and capital intensive.

Upgrading the coaxial system will cause outages on the network. While Norwood Light has done a good job of minimizing these outages for subscribers in the past, there is no way to eliminate outages during each upgrade cycle.

In order to offer video services and leverage the bandwidth advantages of DOCSIS 3.1, Norwood Light will have to migrate to an IP video service. IP video will allow Norwood Light to free up bandwidth in the downstream to provide more internet capacity to support higher bandwidth services and IP video. IP video requires minimum upfront costs to set up the service and then a monthly service fee for each video subscriber. IP video will also eliminate some of Norwood Light's headend costs but will still require Norwood Light to negotiate content licensing and to pay content fees.

Table 25 and

Table 26 show the capital costs necessary to support the HFC upgrade over 20 years.

Table 25: HFC Upgrade 20 Year Capital Costs – Years 1 to 10

Year	1	2	3	4	5	6	7	8	9	10
a. Connectivity Implementation Costs										
MDU Cabling Upgrades (20 year depreciation)	\$ -	\$ 300,000	\$ 500,000	\$ 200,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Drops (15 year depreciation)	250,000	-	-	-	45,300	71,100	73,800	76,800	44,700	-
CMTS (5 year depreciation)	1,500,000	-	-	-	-	2,500,000	-	-	-	-
Network Equipment (10 year depreciation)	972,000	1,761,600	-	-	-	-	-	-	-	-
Customer Equipment (6 year depreciation)	1,111,200	-	-	-	30,200	47,400	1,160,400	51,200	29,800	-
Total	\$ 3,833,200	\$ 2,061,600	\$ 500,000	\$ 200,000	\$ 75,500	\$ 2,618,500	\$ 1,234,200	\$ 128,000	\$ 74,500	\$ -
b. Support Equipment (5 year depreciation)										
Vehicle (7-year)	\$ -	\$ 40,000	\$ -	\$ 80,000	\$ -	\$ -	\$ 48,000	\$ -	\$ 96,000	\$ -
Bucket Truck (7 year)	150,000	150,000	300,000	-	-	180,000	180,000	360,000	-	-
Total	\$ 150,000	\$ 190,000	\$ 300,000	\$ 80,000	\$ -	\$ 180,000	\$ 228,000	\$ 360,000	\$ 96,000	\$ -
c. Construction and Fiber OSP										
Construction (20-Year Depreciation)	-	150,000	-	-	-	-	-	-	-	-
	\$ -	\$ 150,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 3,983,200	\$ 2,401,600	\$ 800,000	\$ 280,000	\$ 75,500	\$ 2,798,500	\$ 1,462,200	\$ 488,000	\$ 170,500	\$ -

Table 26: HFC Upgrade 20 Year Capital Costs – Years 11 to 20

Year	11	12	13	14	15	16	17	18	19	20
a. Connectivity Implementation Costs										
MDU Cabling Upgrades (20 year depreciation)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Drops (15 year depreciation)	1,416,800	-	-	-	-	125,000	-	-	-	22,700
CMTS (5 year depreciation)	2,500,000	-	-	-	-	2,500,000	-	-	-	-
Network Equipment (10 year depreciation)	972,000	1,761,600	-	-	-	-	-	-	-	-
Customer Equipment (6 year depreciation)	30,200	47,400	1,160,400	51,200	29,800	-	30,200	47,400	1,160,400	51,200
Total	\$ 4,919,000	\$ 1,809,000	\$ 1,160,400	\$ 51,200	\$ 29,800	\$ 2,625,000	\$ 30,200	\$ 47,400	\$ 1,160,400	\$ 73,900
b. Support Equipment (5 year depreciation)										
Vehicle (7-year)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Bucket Truck (7 year)	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
c. Construction and Fiber OSP										
Construction (20-Year Depreciation)	-	-	-	-	-	-	-	-	-	-
	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 4,919,000	\$ 1,809,000	\$ 1,160,400	\$ 51,200	\$ 29,800	\$ 2,625,000	\$ 30,200	\$ 47,400	\$ 1,160,400	\$ 73,900

4.3 FTTP Migration

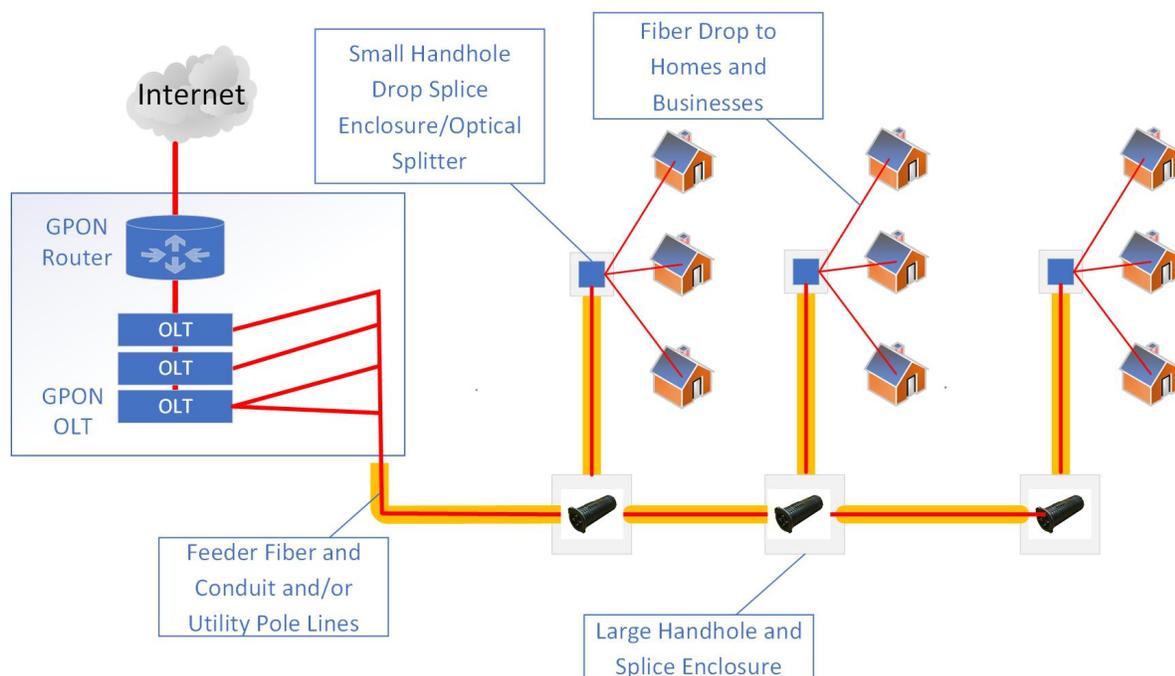
Norwood Light is in an ideal situation to upgrade to FTTP at much lower costs than other coaxial cable operators. The small node sizes minimize the fiber construction needed to connect every home and business to fiber. Each node has four spare fibers so that FTTP can be deployed while maintaining the HFC system. This would allow Norwood Light to deploy FTTP in a slower and more methodical manner, while converting customers over to the new FTTP system as the network is deployed. This migration plan would eliminate any outages experienced by customers.

In a FTTP architecture, fiber would be constructed from each node to optical taps outside each home and business. At the nodes, optical splitters will be installed to aggregate the subscriber connections back to the headend. At the headend, optical line terminals (OLT) would replace the CMTS as the connection to the Norwood Light IP network.

The optical taps would allow a connectorized drop to be installed from the tap to each home. The drop cable connects outside of the home or business to a network interface device (NID). The NID provides a clean demarcation between the home and the network and allows a fiber technician to test the fiber from outside the home to determine where potential outages are located and to troubleshoot some network issues without gaining access to the home.

From the NID, inside wiring fiber optics are installed to the preferred location of the GPON optical network terminal (ONT). Inside wiring fiber optic cables are durable and allow bending to facilitate construction. The ONT provides ethernet ports and Wi-Fi to connect to devices within the home or business for voice, video, or data services. Wi-Fi allows the customer to connect devices throughout the facility without additional internal wiring.

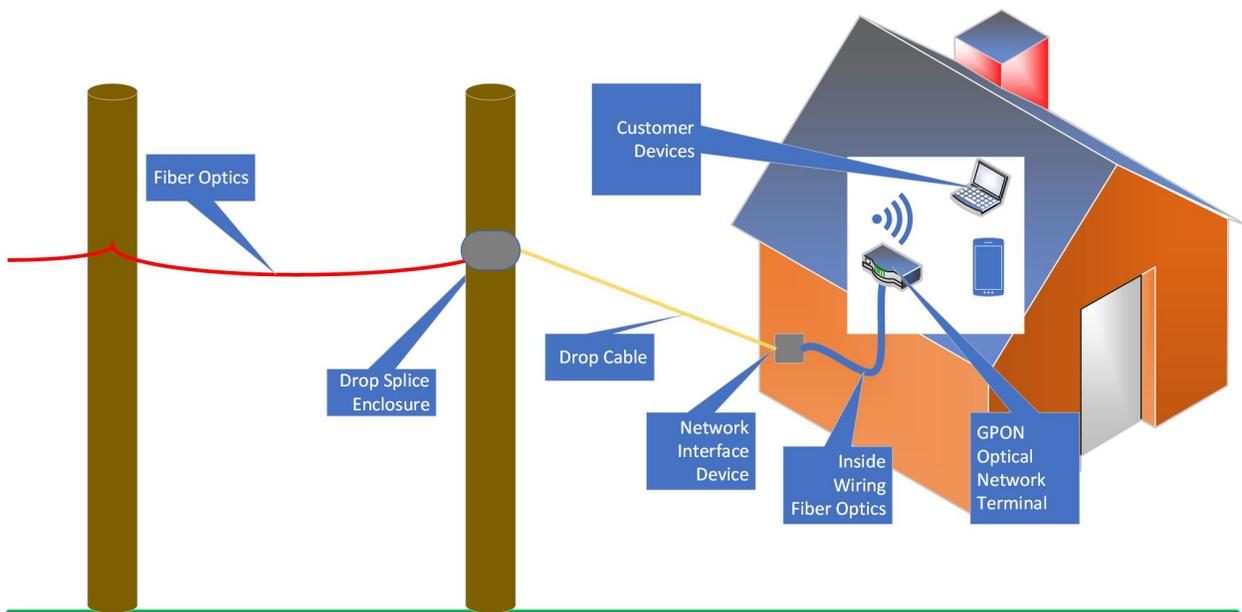
Figure 12: FTTP Architecture Diagram



Most FTTP networks use Gigabit Passive Optical Network (GPON) technology. GPON is a passive network, meaning there are no active, or powered, devices between the hub where the core network electronics are housed and the customer premises electronics at the home and business.

The outside plant portion of a FTTP network is the most expensive yet longest lasting, the equivalent of constructing transmission or distribution lines for the electric utility. When designing the FTTP network, it is important to take into consideration that the outside plant can provide service for 30 plus years and that future proofing is key to getting the most out of the network investment.

Figure 13: Customer Premises FTTP Installation Diagram



The drop cable connects outside of the home or business to a network interface device (NID). The NID provides a clean demarcation between the home and the network and allows a fiber technician to test the fiber from outside the home to determine where potential outages are located and to troubleshoot some network issues without gaining access to the home.

From the NID, inside wiring fiber optics are installed to the preferred location of the GPON ONT. Inside wiring fiber optic cables are durable and allow bending to facilitate construction. The ONT provides ethernet ports and Wi-Fi to connect to devices within the home or business. Wi-Fi allows the customer to connect devices throughout the facility without additional internal wiring.

For video services, Norwood Light has two options if choosing to still support video. Norwood Light could continue running the HFC network, keeping video customers connected to the HFC network or Norwood Light can invest in an IP video system to operate over the FTTP network. By migrating customers to the FTTP network, the HFC network would have less users so that video customers could still receive higher bandwidth data services.

Table 27 and Table 28 on the following page shows the capital costs necessary to support the FTTP migration over 20 years.

Table 27: FTTP Migration 20 Year Capital Costs – Years 1 to 10

Year	1	2	3	4	5	6	7	8	9	10
a. Connectivity Implementation Costs										
Fiber (30 year depreciation)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
MDU Cabling Upgrades (20 year depreciation)	-	450,000	750,000	300,000	-	-	-	-	-	-
Drops (15 year depreciation)	314,500	1,257,900	1,257,900	314,500	85,500	134,100	139,200	144,900	84,300	-
Fiber (10 year depreciation)	-	-	-	-	-	-	-	-	-	-
Fiber (7 year depreciation)	-	-	-	-	-	-	-	-	-	-
Fiber (6 year depreciation)	-	-	-	-	-	-	-	-	-	-
Fiber (5 year depreciation)	-	-	-	-	-	-	-	-	-	-
Network Equipment (10 year depreciation)	190,000	773,800	773,800	203,800	13,800	13,800	13,800	13,800	-	-
Network Equipment (7 year depreciation)	-	-	-	-	-	-	-	-	-	-
Set Top Boxes (6 year depreciation)	-	-	-	-	-	-	-	-	-	-
Network Equipment (5 year depreciation)	-	-	-	-	-	-	-	-	-	-
Customer Equipment (6 year depreciation)	194,500	777,800	777,800	194,500	52,900	83,000	280,600	867,400	830,000	194,500
Customer Equipment (5 year depreciation)	-	-	-	-	-	-	-	-	-	-
Total	\$ 699,000	\$ 3,259,500	\$ 3,559,500	\$ 1,012,800	\$ 152,200	\$ 230,900	\$ 433,600	\$ 1,026,100	\$ 914,300	\$ 194,500

Table 28: FTTP Migration 20 Year Capital Costs – Years 11 to 20

Year	11	12	13	14	15	16	17	18	19	20
a. Connectivity Implementation Costs										
Fiber (30 year depreciation)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
MDU Cabling Upgrades (20 year depreciation)	-	-	-	-	-	-	-	-	-	-
Drops (15 year depreciation)	-	-	-	-	-	78,600	314,500	314,500	78,600	21,400
Fiber (10 year depreciation)	-	-	-	-	-	-	-	-	-	-
Fiber (7 year depreciation)	-	-	-	-	-	-	-	-	-	-
Fiber (6 year depreciation)	-	-	-	-	-	-	-	-	-	-
Fiber (5 year depreciation)	-	-	-	-	-	-	-	-	-	-
Network Equipment (10 year depreciation)	190,000	773,800	773,800	203,800	13,800	13,800	13,800	13,800	-	-
Network Equipment (7 year depreciation)	-	-	-	-	-	-	-	-	-	-
Set Top Boxes (6 year depreciation)	-	-	-	-	-	-	-	-	-	-
Network Equipment (5 year depreciation)	-	-	-	-	-	-	-	-	-	-
Customer Equipment (6 year depreciation)	52,900	83,000	280,600	867,400	830,000	194,500	52,900	83,000	280,600	867,400
Customer Equipment (5 year depreciation)	-	-	-	-	-	-	-	-	-	-
Total	\$ 242,900	\$ 856,800	\$ 1,054,400	\$ 1,071,200	\$ 843,800	\$ 286,900	\$ 381,200	\$ 411,300	\$ 359,200	\$ 888,800

4.4 Total Cost of Ownership Comparison

We examined the total cost of ownership for the FTTP Migration and HFC upgrade options. The total cost of ownership looks at not only the initial implementation costs, but capital replenishments and operating costs as well.

The total cost of ownership comparison is shown in the following four tables. For the comparison, we show the total non-discounted costs and the net present value (NPV) using a four percent discount rate. The operating costs include all Norwood Light's operating costs, not just network-specific costs. The operating costs for the FTTP migration include \$1.53 million for decommissioning the HFC network. Comparisons are shown for 20-year and 10-year terms.

Table 29: 20-Year NPV Comparison

Description	HFC Upgrade	FTTP Migration	Delta
Capital Additions (NPV)	\$ 18,525,200	\$ 19,531,700	\$ (1,006,500)
Operating Expenses (NPV)	65,398,900	66,363,000	(964,100)
Total (NPV)	\$ 83,924,100	\$ 85,894,700	\$ (1,970,600)

Table 30: 10-Year NPV Comparison

Description	HFC Upgrade	FTTP Migration	Delta
Capital Additions (NPV)	\$ 10,814,400	\$ 15,372,700	\$ (4,558,300)
Operating Expenses (NPV)	42,529,600	43,665,100	(1,135,500)
Total (NPV)	\$ 53,344,000	\$ 59,037,800	\$ (5,693,800)

Table 31: 20-Year Total Comparison

Description	HFC Upgrade	FTTP Migration	Delta
Capital Additions (Total)	\$ 25,501,800	\$ 25,273,900	\$ 227,900
Operating Expenses (Total)	92,823,000	94,000,000	(1,177,000)
Total (Total)	\$ 118,324,800	\$ 119,273,900	\$ (949,100)

Table 32: 10-Year Total Comparison

Description	HFC Upgrade	FTTP Migration	Delta
Capital Additions (Total)	\$ 12,443,500	\$ 17,725,400	\$ (5,281,900)
Operating Expenses (Total)	50,897,100	52,387,800	(1,490,700)
Total (Total)	\$ 63,340,600	\$ 70,113,200	\$ (6,772,600)

The 20-year costs are quite close, both in total costs and NPV. The 10-year costs for capital are, however, quite different. This is due to the condition that the FTTP migration capital costs are more front loaded, with lower capital replenishment requirements than the HFC upgrade. The HFC upgrade replenishment requirements are substantially higher than the FTTP migration.

Given that the FTTP migration costs are more upfront, the borrowing requirements are higher, thus increasing the financial risk. On the other hand, the FTTP migration better positions Norwood Light for a higher performing and reliable internet service. With a higher performing and reliable internet service, the FTTP migration is better positioned to attract and retain customers.

5 Financial Analysis

This section presents and compares Norwood Light financial projections for:

1. Fiber-to-the-premises (FTTP) migration.
2. Hybrid Fiber Coaxial (HFC) upgrade.

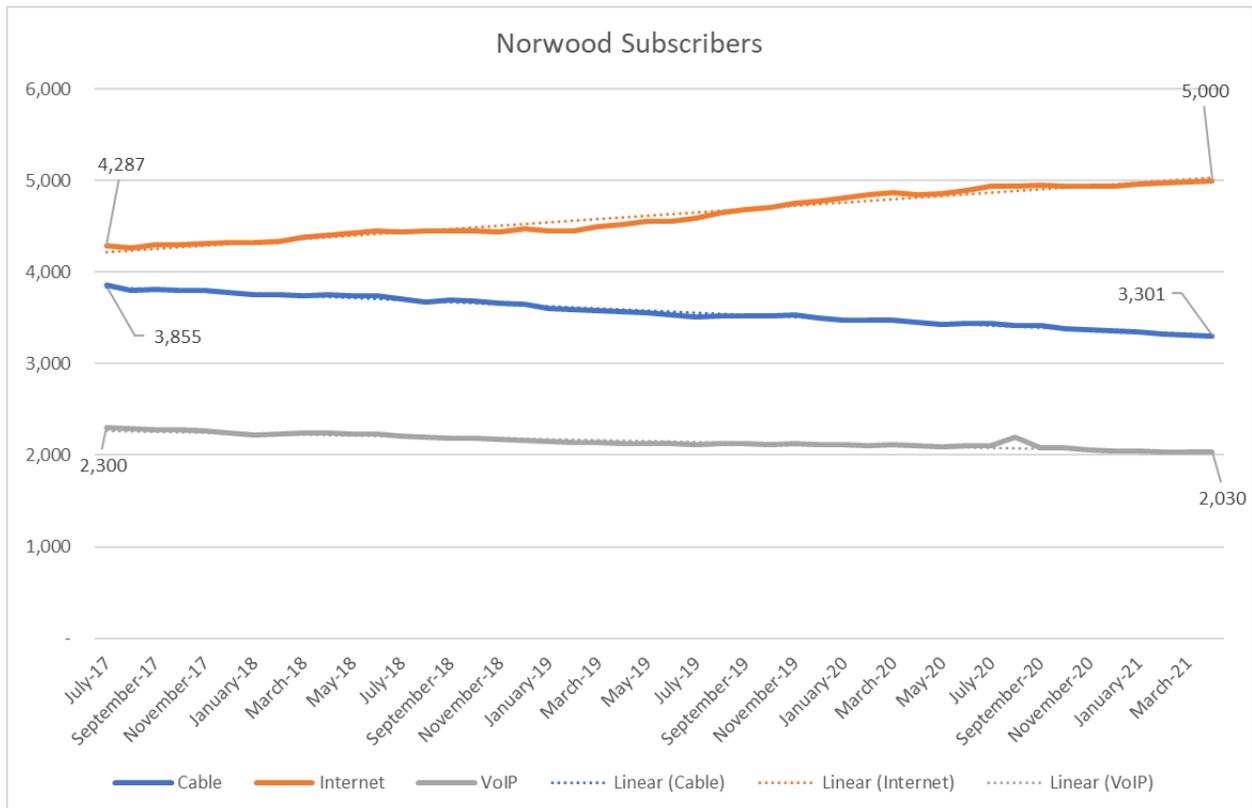
For each model, we present a 20-year income statement and cash flow statement.

The FTTP migration is more dependent upon the need to grow and expand the internet business than the HFC upgrade. The subscriber and revenue projections used in the analysis allow a comparison between the FTTP migration and the HFC upgrade options. Decisions on Norwood Light market positioning and strategies will greatly impact subscriber levels and resulting financial projections.

5.1 Subscriber Projections

Figure 14 shows the Norwood Light subscribers since July 2017. Both cable television and telephone (VoIP) show a steady decline, while internet subscribers are increasing. In total, Norwood Light serves 5,556 households and businesses today out of a total potential of 13,500, or 41 percent of potential customers.

Figure 14: Norwood Subscribers - Historic



Based on the above changes in subscribers, each projection assumes that:

- Subscribership for internet services (data) will continue to show a moderate ramp up of 4 percent per year until it reaches a ceiling of 6,789 subscribers (50 percent of potential customers), and then remain steady.
- In Section 5.5.4, we show the impact of obtaining a higher market share for the FTTP migration.
- Subscribership for telephone (VoIP) will decline at 5 percent per year, then hit a floor of 812 customers.
- Subscribership for cable television will decline at 5 percent per year before Norwood Light discontinues the service in year 5.
- We also show the projection of Norwood Light continuing in the cable television business, with the total subscribers hitting a floor of 1,320.

5.2 Subscriber Fees and Cost of Goods Sold

In the financial projections, we started with the March 2021 average revenue per subscriber and average expense (cost of goods sold) per subscriber. These are summarized below.

- Average revenue per subscriber
 - Telephone: \$ 28.99
 - Cable television: \$101.74
 - Internet: \$ 57.92
- Average expenses (cost of goods sold) per subscriber
 - Telephone: \$ 11.94
 - Cable television: \$ 90.60
 - Internet: \$ 3.97

These average revenues and expenses are subject to the escalations presented in the next section.

5.3 Annual Escalations

Please note that we have applied an inflation factor to the models to account for increases in salaries, expenses, and revenues. We assume the following:

- Salaries increase by 2.0 percent annually¹⁰.
- Operating and maintenance expenses (not including cost of goods sold or TiVo¹¹ expenses) increase by 1.0 percent annually.
- Cost of goods sold increases vary from service to service:
 - Internet cost of goods increases by 2 percent per year
 - Cable television cost of goods increases by 3 percent per year
 - Telephone cost of goods increases by 2 percent every three years
- Revenue increases/decreases vary from service to service:
 - Internet average revenues increase by 5 percent in year 3 and year 6, then 2 percent every three years thereafter
 - Combination of shifting to a higher performance internet package and increases to match increased operational expenses
 - Cable television average revenues increase by 5 percent every three years
 - Telephone average revenues decrease by 1/2 percent every three years

Please note, we take caution in applying an inflation factor to a long-term, capital-intensive project such as fiber deployment. Applying the same inflation factors to revenues and expenses can project substantial net revenues (revenues less expenses) in year seven and beyond, showing net revenues that are neither possible nor realistic. Net revenues should remain relatively flat after applying inflation factors.

5.4 TiVo Conversion Option

Today, Norwood Light operates and maintains a cable television headend. An alternative is to convert to a cloud-based solution such as TiVo Managed PayTV Video Service. The TiVo solution provides a cloud-based service for live linear TV, video on demand, and other cable television support. It replaces an Norwood Light onsite headend.

Estimated costs of converting to TiVo include:

- \$200,000 for managing the transition
- \$40,000 for the integration service fee
- \$60,000 in onsite hardware
- \$19,200 for local channel support

Estimated operating costs for TiVo include:

¹⁰ With the anticipated inflation in the USA, we possibly we see higher maintenance and salary increases, these will however in return will see higher rate increases. The assumptions used in the financial model keep net revenues relatively flat over the 20-year analysis.

¹¹ TiVo Managed PayTV Video Service – provides a cloud-based service for live linear TV, video on demand, and other cable television support. It replaces a Norwood Light on-site headend.

- \$18,000 per year for data center circuit charge
 - (escalates by 3 percent per year starting in year 4)
- Two percent of fees paid to NCTC by Norwood Light per month
- \$2,800 per year for local channel support
 - (escalates by 3 percent per year starting in year 4)
- \$8.25 per subscriber per month
 - (escalates by 3 percent per year starting in year 4)

Converting to TiVo reduces existing expenses by approximately \$106,000 per year but adds approximately \$360,000 per year in expenses (reduces as cable television subscribers decline) plus the conversion expenses. The TiVo conversion also eliminates periodic capital upgrades of the cable television headend.

If Norwood Light transitions to alternative video programming cable in the next five years, the cost of converting to TiVo far exceed the costs of continuing as-is with the onsite cable television headend. **If Norwood Light continues in the traditional cable television business, the TiVo conversion is likely required to meet market demand of remote streaming and other features.** The conversion would also eliminate headend equipment hardware replenishments and upgrades.

5.5 FTTP Migration

The FTTP migration model deployment assumes that Norwood Light will be able to deploy the network at the mid-range cost estimate. The estimate assumes that with the subscriber levels presented above, over a 20-year period, the total implementation and replenishment cost is \$25.27 million (\$19.53 million net present value (NPV) at a 4 percent discount rate).

The capital additions (depreciation) requirements for the 20-year analysis are shown in the tables on the following pages.

In addition to the capital additions, the FTTP migration includes \$1.53 million in expenses to decommission the HFC plan over 5 years starting in year 5.

Table 33: FTTP Migration Capital Additions – Years 1 to 10

Year	1	2	3	4	5	6	7	8	9	10
a. Connectivity Implementation Costs										
MDU Cabling Upgrades (20 year depreciation)	\$ -	\$ 450,000	\$ 750,000	\$ 300,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Drops (15 year depreciation)	314,500	1,257,900	1,257,900	314,500	85,500	134,100	139,200	144,900	84,300	-
CMTS (5 year depreciation)	-	-	-	-	-	-	-	-	-	-
Network Equipment (10 year depreciation)	190,000	773,800	773,800	203,800	13,800	13,800	13,800	13,800	-	-
Customer Equipment (6 year depreciation)	194,500	777,800	777,800	194,500	52,900	83,000	280,600	867,400	830,000	194,500
Total	\$ 699,000	\$ 3,259,500	\$ 3,559,500	\$ 1,012,800	\$ 152,200	\$ 230,900	\$ 433,600	\$ 1,026,100	\$ 914,300	\$ 194,500
b. Support Equipment (5 year depreciation)										
Vehicle (7-year)	\$ -	\$ 40,000	\$ -	\$ 80,000	\$ -	\$ -	\$ 48,000	\$ -	\$ 96,000	\$ -
Bucket Truck (7 year)	150,000	150,000	300,000	-	-	180,000	180,000	360,000	-	-
Total	\$ 150,000	\$ 190,000	\$ 300,000	\$ 80,000	\$ -	\$ 180,000	\$ 228,000	\$ 360,000	\$ 96,000	\$ -
c. Construction and Fiber OSP										
Construction (20-Year Depreciation)	452,600	1,959,900	1,809,900	452,600	-	-	-	-	-	-
	\$ 452,600	\$ 1,959,900	\$ 1,809,900	\$ 452,600	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 1,301,600	\$ 5,409,400	\$ 5,669,400	\$ 1,545,400	\$ 152,200	\$ 410,900	\$ 661,600	\$ 1,386,100	\$ 1,010,300	\$ 194,500

Table 34: FTTP Migration Capital Additions – Years 11 to 20

Year	11	12	13	14	15	16	17	18	19	20
a. Connectivity Implementation Costs										
MDU Cabling Upgrades (20 year depreciation)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Drops (15 year depreciation)	-	-	-	-	-	78,600	314,500	314,500	78,600	21,400
CMTS (5 year depreciation)	-	-	-	-	-	-	-	-	-	-
Network Equipment (10 year depreciation)	190,000	773,800	773,800	203,800	13,800	13,800	13,800	13,800	-	-
Customer Equipment (6 year depreciation)	52,900	83,000	280,600	867,400	830,000	194,500	52,900	83,000	280,600	867,400
Total	\$ 242,900	\$ 856,800	\$ 1,054,400	\$ 1,071,200	\$ 843,800	\$ 286,900	\$ 381,200	\$ 411,300	\$ 359,200	\$ 888,800
b. Support Equipment (5 year depreciation)										
Vehicle (7-year)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Bucket Truck (7 year)	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
c. Construction and Fiber OSP										
Construction (20-Year Depreciation)	-	-	-	-	-	-	-	-	-	-
	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 242,900	\$ 856,800	\$ 1,054,400	\$ 1,071,200	\$ 843,800	\$ 286,900	\$ 381,200	\$ 411,300	\$ 359,200	\$ 888,800

5.5.1 FTTP Migration Required Financing

The initial years of the FTTP migration will be capital-intensive (\$14.08 million in years 1 to year 4), well beyond what beginning cash and subscriber revenues can directly support. This analysis projects that Norwood Light will cover the FTTP migration costs by pursuing a series of 20-year bonds, totaling \$9.52 million and using \$2.10 million from cash reserves.

We assumed that the interest rate would be 2.5 percent. Principal repayment on the loan will start in the second year after issuance.¹²

After all bonds are issued, the total principal and interest (P&I) payment is \$635,600 per year, compared the \$757,275 P&I payment that will be retired this year.

5.5.2 FTTP Migration– Financial Projections

The model assumes a straight-line depreciation of assets, and that the fiber outside plant will have a 20-year life span while the network equipment will need to be replaced after ten years. Miscellaneous implementation costs will occur every five years, vehicles and bucket trucks every seven years, and customer electronics will need to be replaced every six years. The model plans for a depreciation reserve account, starting in year four, to fund future electronics replacements and upgrades.

The model also includes replacement of all coaxial drops with fiber in the first four years.

¹² The scope of work for this report does not include a review of Norwood Light's borrowing capacity.

The tables below show the projected income statement for years one to 10 and 11 to 20.

Table 35: FTTP Migration – Income Statement - Years 1 to 10

Year	1	2	3	4	5	6	7	8	9	10
a. Revenues (see sheet "Revenues" for breakdown)										
Telephone Revenues	\$ 671,100	\$ 637,700	\$ 603,100	\$ 573,000	\$ 544,600	\$ 514,900	\$ 489,400	\$ 464,900	\$ 439,700	\$ 417,800
Cable Revenues	3,828,700	3,638,200	3,629,200	3,448,500	-	-	-	-	-	-
Internet Revenues	3,505,100	3,645,500	3,981,300	4,141,100	4,306,800	4,705,900	4,894,500	5,090,800	5,308,500	5,308,500
Transport Revenues	-	-	-	-	-	-	-	-	-	-
Dark Fiber Revenues	-	-	-	-	-	-	-	-	-	-
Total	\$ 8,004,900	\$ 7,921,400	\$ 8,213,600	\$ 8,162,600	\$ 4,851,400	\$ 5,220,800	\$ 5,383,900	\$ 5,555,700	\$ 5,748,200	\$ 5,726,300
b. Operating Expenses - Cash (not including fees and taxes in line h)										
Cost of Good Sold - Telephone	\$ 276,400	\$ 262,600	\$ 254,600	\$ 241,900	\$ 229,900	\$ 222,800	\$ 211,800	\$ 201,200	\$ 195,100	\$ 185,300
Cost of Good Sold - Cable	3,423,500	3,351,600	3,280,300	3,211,500	-	-	-	-	-	-
Cost of Good Sold - Internet	240,200	254,900	270,300	286,700	303,800	322,600	342,400	363,300	378,800	386,200
Maintenace Expenses - Cable	91,200	92,100	93,000	94,000	-	-	-	-	-	-
Maintenace Expenses - Internet	35,600	35,900	36,300	36,600	37,000	37,400	37,700	38,100	38,400	38,800
Customer Service Expenses	202,500	204,500	206,500	208,500	252,700	255,100	257,500	260,000	262,400	264,800
Sales Expenses	470,900	475,600	480,300	485,000	489,700	442,000	446,200	450,400	454,600	458,800
Administrative & General Expenses	322,100	274,800	246,900	249,300	168,600	170,200	171,800	173,500	175,100	176,700
Operational Expense	305,100	308,200	311,100	314,100	635,600	641,800	647,800	654,100	660,100	332,400
Discretionary Support	-	-	-	-	208,000	210,000	212,000	214,000	216,000	218,000
Franchise Fee	242,400	232,600	234,300	224,800	-	-	-	-	-	-
Salaries	1,538,500	1,569,200	1,600,000	1,630,800	1,661,400	1,692,100	1,723,100	1,753,700	1,784,500	1,815,300
Total	\$ 7,148,400	\$ 7,062,000	\$ 7,013,600	\$ 6,983,200	\$ 3,986,700	\$ 3,994,000	\$ 4,050,300	\$ 4,108,300	\$ 4,165,000	\$ 3,876,300
c. Revenues less Cash Operating Expenses										
EBITDA (a-b)	\$ 856,500	\$ 859,400	\$ 1,200,000	\$ 1,179,400	\$ 864,700	\$ 1,226,800	\$ 1,333,600	\$ 1,447,400	\$ 1,583,200	\$ 1,850,000
d. Operating Expenses - Non-Cash										
Depreciation	\$ 1,316,400	\$ 1,155,000	\$ 1,316,700	\$ 1,439,500	\$ 1,455,400	\$ 1,291,000	\$ 1,216,000	\$ 1,246,200	\$ 1,266,000	\$ 1,274,600
e. Operating Income (d-c)										
	\$ (459,900)	\$ (295,600)	\$ (116,700)	\$ (260,100)	\$ (590,700)	\$ (64,200)	\$ 117,600	\$ 201,200	\$ 317,200	\$ 575,400
f. Non-Operating Income										
Interest Expense (all)	\$ (28,700)	\$ (107,300)	\$ (229,800)	\$ (246,500)	\$ (233,500)	\$ (219,200)	\$ (204,700)	\$ (193,900)	\$ (182,900)	\$ (171,600)
Misc Income	-	-	-	-	-	-	-	-	-	-
Total	\$ (28,700)	\$ (107,300)	\$ (229,800)	\$ (246,500)	\$ (233,500)	\$ (219,200)	\$ (204,700)	\$ (193,900)	\$ (182,900)	\$ (171,600)
g. Net Income (e+f)										
	\$ (488,600)	\$ (402,900)	\$ (346,500)	\$ (506,600)	\$ (824,200)	\$ (283,400)	\$ (87,100)	\$ 7,300	\$ 134,300	\$ 403,800
h. Taxes and Fees										
Revenue Fee	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CIAC (one-time) Fee	-	-	-	-	-	-	-	-	-	-
Taxes (allocated)	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
i. Net Income after Fees (g+h)										
	\$ (488,600)	\$ (402,900)	\$ (346,500)	\$ (506,600)	\$ (824,200)	\$ (283,400)	\$ (87,100)	\$ 7,300	\$ 134,300	\$ 403,800

Table 36: FTTP Migration – Income Statement - Years 11 to 20

Year	11	12	13	14	15	16	17	18	19	20
a. Revenues (see sheet "Revenues" for breakdown)										
Telephone Revenues	\$ 397,200	\$ 375,700	\$ 356,900	\$ 339,200	\$ 320,900	\$ 305,000	\$ 290,100	\$ 274,300	\$ 274,000	\$ 274,000
Cable Revenues	-	-	-	-	-	-	-	-	-	-
Internet Revenues	5,308,500	5,416,800	5,416,800	5,416,800	5,525,200	5,525,200	5,525,200	5,634,300	5,634,300	5,634,300
Transport Revenues	-	-	-	-	-	-	-	-	-	-
Dark Fiber Revenues	-	-	-	-	-	-	-	-	-	-
Total	\$ 5,705,700	\$ 5,792,500	\$ 5,773,700	\$ 5,756,000	\$ 5,846,100	\$ 5,830,200	\$ 5,815,300	\$ 5,908,600	\$ 5,908,300	\$ 5,908,300
b. Operating Expenses - Cash (not including fees and taxes in line h)										
Cost of Good Sold - Telephone	\$ 176,200	\$ 170,900	\$ 162,300	\$ 154,300	\$ 149,600	\$ 142,200	\$ 135,200	\$ 131,100	\$ 131,000	\$ 131,000
Cost of Good Sold - Cable	-	-	-	-	-	-	-	-	-	-
Cost of Good Sold - Internet	394,300	401,600	409,800	417,900	426,100	435,000	443,200	452,100	461,100	470,900
Maintenace Expenses - Cable	-	-	-	-	-	-	-	-	-	-
Maintenace Expenses - Internet	39,100	39,400	39,900	40,200	40,600	40,900	41,200	41,600	42,000	42,400
Customer Service Expenses	267,300	269,700	272,100	274,500	277,000	279,400	281,800	284,300	286,700	289,100
Sales Expenses	463,000	467,200	471,400	475,700	479,900	484,100	488,300	492,500	496,700	500,900
Administrative & General Expenses	178,300	179,900	181,500	183,100	184,800	186,500	188,000	189,700	191,300	192,900
Operational Expense	335,500	338,500	341,700	344,600	347,800	350,900	353,900	357,100	359,900	363,000
Discretionary Support	220,000	222,000	224,000	226,000	228,000	230,000	232,000	234,000	236,000	238,000
Franchise Fee	-	-	-	-	-	-	-	-	-	-
Salaries	1,846,100	1,876,800	1,907,700	1,938,500	1,984,500	2,030,600	2,076,900	2,123,000	2,169,200	2,215,300
Total	\$ 3,919,800	\$ 3,966,000	\$ 4,010,400	\$ 4,054,800	\$ 4,118,300	\$ 4,179,600	\$ 4,240,500	\$ 4,305,400	\$ 4,373,900	\$ 4,443,500
c. Revenues less Cash Operating Expenses										
EBITDA (a-b)	\$ 1,785,900	\$ 1,826,500	\$ 1,763,300	\$ 1,701,200	\$ 1,727,800	\$ 1,650,600	\$ 1,574,800	\$ 1,603,200	\$ 1,534,400	\$ 1,464,800
d. Operating Expenses - Non-Cash										
Depreciation	\$ 1,276,900	\$ 1,276,900	\$ 1,279,100	\$ 1,279,100	\$ 1,279,100	\$ 1,263,400	\$ 1,200,500	\$ 1,137,600	\$ 1,121,900	\$ 1,116,200
e. Operating Income (d-c)										
	\$ 509,000	\$ 549,600	\$ 484,200	\$ 422,100	\$ 448,700	\$ 387,200	\$ 374,300	\$ 465,600	\$ 412,500	\$ 348,600
f. Non-Operating Income										
Interest Expense (all)	\$ (160,000)	\$ (148,100)	\$ (135,900)	\$ (123,400)	\$ (110,600)	\$ (97,500)	\$ (84,000)	\$ (70,200)	\$ (56,100)	\$ (41,600)
Misc Income	-	-	-	-	-	-	-	-	-	-
Total	\$ (160,000)	\$ (148,100)	\$ (135,900)	\$ (123,400)	\$ (110,600)	\$ (97,500)	\$ (84,000)	\$ (70,200)	\$ (56,100)	\$ (41,600)
g. Net Income (e+f)										
	\$ 349,000	\$ 401,500	\$ 348,300	\$ 298,700	\$ 338,100	\$ 289,700	\$ 290,300	\$ 395,400	\$ 356,400	\$ 307,000
h. Taxes and Fees										
Revenue Fee	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CIAC (one-time) Fee	-	-	-	-	-	-	-	-	-	-
Taxes (allocated)	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
i. Net Income after Fees (g+h)										
	\$ 349,000	\$ 401,500	\$ 348,300	\$ 298,700	\$ 338,100	\$ 289,700	\$ 290,300	\$ 395,400	\$ 356,400	\$ 307,000

The tables below show the cash flow statement for years one to 10 and 11 to 20.

Table 37: FTTP Migration – Cash Flow Statement – Years 1 to 10

Year	1	2	3	4	5	6	7	8	9	10
a. Net Income (From Income Statement)	\$ (488,600)	\$ (402,900)	\$ (346,500)	\$ (506,600)	\$ (824,200)	\$ (283,400)	\$ (87,100)	\$ 7,300	\$ 134,300	\$ 403,800
b. Cash Outflows										
Debt Service Reserve	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	(756,700)	(774,800)	(798,300)	(814,700)	(824,600)
Capital Lease	-	-	-	-	-	-	-	-	-	-
Issuance Cost (Financing)	-	(34,000)	(51,200)	(10,000)	-	-	-	-	-	-
Capital Expenditures	\$ (1,301,600)	\$ (5,409,400)	\$ (5,669,400)	\$ (1,545,400)	\$ (152,200)	\$ (310,900)	\$ (433,600)	\$ (1,206,100)	\$ (1,142,300)	\$ (554,500)
Total	\$ (1,301,600)	\$ (5,443,400)	\$ (5,720,600)	\$ (1,555,400)	\$ (152,200)	\$ (1,067,600)	\$ (1,208,400)	\$ (2,004,400)	\$ (1,957,000)	\$ (1,379,100)
c. Cash Inflows										
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	310,900	433,600	1,206,100	1,142,300	554,500
Debt Service Reserve	-	-	-	-	-	-	-	-	-	-
Source A	-	-	-	-	-	-	-	-	-	-
Source B	\$ -	\$ 3,400,000	\$ 5,120,000	\$ 1,000,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ -	\$ 3,400,000	\$ 5,120,000	\$ 1,000,000	\$ -	\$ 310,900	\$ 433,600	\$ 1,206,100	\$ 1,142,300	\$ 554,500
d. Total Cash Outflows and Inflows (b+c)	\$ (1,301,600)	\$ (2,043,400)	\$ (600,600)	\$ (555,400)	\$ (152,200)	\$ (756,700)	\$ (774,800)	\$ (798,300)	\$ (814,700)	\$ (824,600)
e. Non-Cash Expenses - Depreciation	\$ 1,316,400	\$ 1,155,000	\$ 1,316,700	\$ 1,439,500	\$ 1,455,400	\$ 1,291,000	\$ 1,216,000	\$ 1,246,200	\$ 1,266,000	\$ 1,274,600
f. Adjustments (Proceeds from)										
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Source A	-	-	-	-	-	-	-	-	-	-
Source B	-	(3,400,000)	(5,120,000)	(1,000,000)	-	-	-	-	-	-
Total	\$ -	\$ (3,400,000)	\$ (5,120,000)	\$ (1,000,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
g. Adjusted Available Net Revenue	\$ (473,800)	\$ (4,691,300)	\$ (4,750,400)	\$ (622,500)	\$ 479,000	\$ 250,900	\$ 354,100	\$ 455,200	\$ 585,600	\$ 853,800
h. Principal Payments on Debt										
Principal Payment (all)	\$ 160,000	\$ 158,000	\$ 300,000	\$ 439,400	\$ 490,100	\$ 500,300	\$ 430,900	\$ 441,600	\$ 452,700	\$ 464,000
Total	\$ 160,000	\$ 158,000	\$ 300,000	\$ 439,400	\$ 490,100	\$ 500,300	\$ 430,900	\$ 441,600	\$ 452,700	\$ 464,000
i. Net Cash (before adjustment)	\$ (633,800)	\$ (1,449,300)	\$ 69,600	\$ (61,900)	\$ (11,100)	\$ (249,400)	\$ (76,800)	\$ 13,600	\$ 132,900	\$ 389,800
Net Cash	\$ (633,800)	\$ (1,449,300)	\$ 69,600	\$ (61,900)	\$ (11,100)	\$ (249,400)	\$ (76,800)	\$ 13,600	\$ 132,900	\$ 389,800
j. Fee Adjustment (end of term)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fee Adjustment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
k. Net Cash (after adjustment)	\$ (633,800)	\$ (1,449,300)	\$ 69,600	\$ (61,900)	\$ (11,100)	\$ (249,400)	\$ (76,800)	\$ 13,600	\$ 132,900	\$ 389,800
Net Cash	\$ (633,800)	\$ (1,449,300)	\$ 69,600	\$ (61,900)	\$ (11,100)	\$ (249,400)	\$ (76,800)	\$ 13,600	\$ 132,900	\$ 389,800
l. Beginning Cash	\$ 2,100,000									
Beginning Cash	\$ 2,100,000									
Cash Balance (with beginning cash)										
Unrestricted Cash Balance	\$ 1,466,200	\$ 16,900	\$ 86,500	\$ 24,600	\$ 13,500	\$ (235,900)	\$ (312,700)	\$ (299,100)	\$ (166,200)	\$ 223,600
Fee Adjustment (end of term)	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	445,800	787,000	379,200	51,600	321,700
Debt Service Reserve	-	-	-	-	-	-	-	-	-	-
Total Cash Balance	\$ 1,466,200	\$ 16,900	\$ 86,500	\$ 24,600	\$ 13,500	\$ 209,900	\$ 474,300	\$ 80,100	\$ (114,600)	\$ 545,300

Table 38: FTTP Migration – Cash Flow Statement – Years 11 to 20

Year	11	12	13	14	15	16	17	18	19	20
a. Net Income (From Income Statement)	\$ 349,000	\$ 401,500	\$ 348,300	\$ 298,700	\$ 338,100	\$ 289,700	\$ 290,300	\$ 395,400	\$ 356,400	\$ 307,000
b. Cash Outflows										
Debt Service Reserve	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	(827,200)	(827,200)	(829,700)	(829,700)	(829,700)	(829,700)	(829,700)	(829,700)	(829,700)	(829,700)
Capital Lease	-	-	-	-	-	-	-	-	-	-
Issuance Cost (Financing)	-	-	-	-	-	-	-	-	-	-
Capital Expenditures	\$ (338,900)	\$ (856,800)	\$ (1,150,400)	\$ (1,071,200)	\$ (1,023,800)	\$ (514,900)	\$ (741,200)	\$ (507,300)	\$ (359,200)	\$ (984,800)
Total	\$ (1,166,100)	\$ (1,684,000)	\$ (1,980,100)	\$ (1,900,900)	\$ (1,853,500)	\$ (1,344,600)	\$ (1,570,900)	\$ (1,337,000)	\$ (1,188,900)	\$ (1,814,500)
c. Cash Inflows										
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	338,900	856,800	1,150,400	1,071,200	1,023,800	514,900	741,200	507,300	359,200	984,800
Debt Service Reserve	-	-	-	-	-	-	-	-	-	-
Source A	-	-	-	-	-	-	-	-	-	-
Source B	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 338,900	\$ 856,800	\$ 1,150,400	\$ 1,071,200	\$ 1,023,800	\$ 514,900	\$ 741,200	\$ 507,300	\$ 359,200	\$ 984,800
d. Total Cash Outflows and Inflows (b+c)	\$ (827,200)	\$ (827,200)	\$ (829,700)	\$ (829,700)	\$ (829,700)	\$ (829,700)	\$ (829,700)	\$ (829,700)	\$ (829,700)	\$ (829,700)
e. Non-Cash Expenses - Depreciation	\$ 1,276,900	\$ 1,276,900	\$ 1,279,100	\$ 1,279,100	\$ 1,279,100	\$ 1,263,400	\$ 1,200,500	\$ 1,137,600	\$ 1,121,900	\$ 1,116,200
f. Adjustments (Proceeds from)										
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Source A	-	-	-	-	-	-	-	-	-	-
Source B	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
g. Adjusted Available Net Revenue	\$ 798,700	\$ 851,200	\$ 797,700	\$ 748,100	\$ 787,500	\$ 723,400	\$ 661,100	\$ 703,300	\$ 648,600	\$ 593,500
h. Principal Payments on Debt										
Principal Payment (all)	\$ 475,600	\$ 487,500	\$ 499,700	\$ 512,200	\$ 525,000	\$ 538,100	\$ 551,500	\$ 565,300	\$ 579,500	\$ 593,900
Total	\$ 475,600	\$ 487,500	\$ 499,700	\$ 512,200	\$ 525,000	\$ 538,100	\$ 551,500	\$ 565,300	\$ 579,500	\$ 593,900
i. Net Cash (before adjustment)	\$ 323,100	\$ 363,700	\$ 298,000	\$ 235,900	\$ 262,500	\$ 185,300	\$ 109,600	\$ 138,000	\$ 69,100	\$ (400)
Net Cash	\$ 323,100	\$ 363,700	\$ 298,000	\$ 235,900	\$ 262,500	\$ 185,300	\$ 109,600	\$ 138,000	\$ 69,100	\$ (400)
j. Fee Adjustment (end of term)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fee Adjustment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
k. Net Cash (after adjustment)	\$ 323,100	\$ 363,700	\$ 298,000	\$ 235,900	\$ 262,500	\$ 185,300	\$ 109,600	\$ 138,000	\$ 69,100	\$ (400)
Net Cash	\$ 323,100	\$ 363,700	\$ 298,000	\$ 235,900	\$ 262,500	\$ 185,300	\$ 109,600	\$ 138,000	\$ 69,100	\$ (400)
l. Beginning Cash										
Beginning Cash										
Cash Balance (with beginning cash)										
Unrestricted Cash Balance	\$ 546,700	\$ 910,400	\$ 1,208,400	\$ 1,444,300	\$ 1,706,800	\$ 1,892,100	\$ 2,001,700	\$ 2,139,700	\$ 2,208,800	\$ 2,208,400
Fee Adjustment (end of term)	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	810,000	780,400	459,700	218,200	24,100	338,900	427,400	749,800	1,220,300	1,065,200
Debt Service Reserve	-	-	-	-	-	-	-	-	-	-
Total Cash Balance	\$ 1,356,700	\$ 1,690,800	\$ 1,668,100	\$ 1,662,500	\$ 1,730,900	\$ 2,231,000	\$ 2,429,100	\$ 2,889,500	\$ 3,429,100	\$ 3,273,600

5.5.3 FTTP Migration – Staffing and Operating Expenses

Staffing levels assume that the initial fiber outside construction and customer installs are done by contractors and that cable television is dropped in year 5. Staffing levels also assume the ability to leverage the Light Department’s human resources, accounting, customer service, record keeping (GIS for example), and other resources.

Table 39: FTTP Migration – Staffing

Position	Year					Base Salary per Person (Year 1)
	1	2	3	4	5	
Managers	2.00	2.00	2.00	2.00	2.00	\$ 130,545
Customer Service	2.00	2.00	2.00	2.00	2.00	\$ 62,505
Phone and Network Engineers	2.00	2.00	2.00	2.00	2.00	\$ 110,272
Video/Plant Engineer	1.00	1.00	1.00	1.00	1.00	\$ 112,266
Admin Sale	1.00	1.00	1.00	1.00	1.00	\$ 148,000
Technicians	4.00	4.00	4.00	4.00	4.00	\$ 90,330
Total	12.00	12.00	12.00	12.00	12.00	

Including benefits, the Broadband department’s labor expenses will total roughly \$1.54 million in year one, \$1.57 million in year two, \$1.60 million in year three, \$1.63 million in year four, and \$1.66 million in year 5. These expenses will increase at 2 percent annually thereafter.

Additional key operating and maintenance assumptions include:

- Pole attachment fees are estimated at \$18,000 per year.
- Cable television franchise fee is \$242,400 in year 1, based on 6.33 percent of cable revenues, with a minimum fee of \$200,000 if cable television is offered.
- We assumed a discretionary support \$208,000 payment starting in year 5 after cable television migrated to OTT video.
- Cable television expenses, beyond programming, include:
 - Local origination video — \$12,000 per year
 - Other events — \$2,000 per year
 - Headend and server support (multiple line items) — \$86,200 per year
 - Headend power — \$4,500 per year
 - Dish power — \$500 per year
- Internet expenses, beyond programming, include:
 - Cisco support — \$11,600 per year
 - Plume support — \$24,000 per year

- General expenses include:
 - Customer records and collections — \$121,100 per year
 - Help desk — \$202,500 per year
 - Network support — \$96,000 per year
 - FTTP to HFC transition expenses — \$30,000 in year 1 and \$80,000 per year thereafter until FTTP build and video reprogramming completed
 - Uncollectable accounts — \$7,000 per year
 - Marketing and advertising are estimated at — \$369,700 per year
 - Website support — \$1,200 per year
 - Office supplies — \$4,000 per year
 - Legal — \$30,000 per year
 - HVAC maintenance — \$24,000 per year
 - Phone support — \$3,800 per year
 - Transport (fuel) — \$50,400 per year
 - Power supply service — \$7,600 per year
 - Equipment repairs — \$20,000 per year
 - Distribution expense — \$33,400 per year
 - Rental and cleaning \$14,300 per year
 - Underground line maintenance — \$7,000 per year
 - Overhead line maintenance — \$18,000 per year
 - Meter maintenance — \$4,000 per year
 - Consumer Education — \$100,000 per year for 6 years, reducing to \$50,000 per year thereafter
 - Customer communication — \$30,000 in year 1 and \$30,000 in year 2

These above expenses are summarized in the income statement (Table 35) and are subject to the escalations described in Section 5.3 . The cost of goods sold (programming and other direct expenses) for each service is presented in Section 5.2 .

5.5.4 FTTP Migration – Sensitivity Examples

In the table below we show the impact of take rates and service prices to net income and cash flow projections. As shown in the table, a slight increase or decrease in take rates or service pricing has a substantial impact on cash flow projections.

The scenarios presented are:

- A. FTTP Migration Base Case - assumes that a transition to alternative video programming is done in year 5.
- B. Interest Rate - increased by 1 percent (to 3.5%), reduces year 20 cash balance by \$1.11 million.
- C. Implement TiVo: Convert to TiVo in year 1 and transition to alternative video programming in year 5, reduces year 20 cash balance by \$1.91 million.
- D. Keep Cable Television: Convert to TiVo in year 1 and keep traditional cable television, reduces year 20 cash balance by \$6.96 million.
- E. Increase Internet Subscribers: Increase internet subscriber growth, adding 485 more internet customers, increases year 20 cash balance by \$3.32 million.

Table 40: FTTP Migration Sensitivity Examples

Scenario A: FTTP Migration Base Case - Transition to Alternative Video Programming in Year 5

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (488,600)	\$ (402,900)	\$ (346,500)	\$ (506,600)	\$ (824,200)	\$ 403,800	\$ 307,000
Cash Balance							
Unrestricted Cash Balance	\$ 1,466,200	\$ 16,900	\$ 86,500	\$ 24,600	\$ 13,500	\$ 223,600	\$ 2,208,400
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	321,700	1,065,200
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 1,466,200	\$ 16,900	\$ 86,500	\$ 24,600	\$ 13,500	\$ 545,300	\$ 3,273,600

Scenario B: FTTP Migration - Interest Rate Increased by 1 Percent (to 3.5 %)

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (488,600)	\$ (436,900)	\$ (431,700)	\$ (600,800)	\$ (915,900)	\$ 329,000	\$ 286,100
Cash Balance							
Unrestricted Cash Balance	\$ 1,466,200	\$ (17,100)	\$ (19,700)	\$ (144,200)	\$ (214,100)	\$ (298,100)	\$ 1,098,700
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	321,700	1,065,200
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 1,466,200	\$ (17,100)	\$ (19,700)	\$ (144,200)	\$ (214,100)	\$ 23,600	\$ 2,163,900

Scenario C: FTTP Migration - Transition to Alternative Video Programming in Year 5 and TiVo Implemented

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (1,077,300)	\$ (757,700)	\$ (684,700)	\$ (837,400)	\$ (912,700)	\$ 397,800	\$ 301,000
Cash Balance							
Unrestricted Cash Balance	\$ 617,200	\$ (1,346,000)	\$ (1,526,100)	\$ (1,830,300)	\$ (1,841,400)	\$ (1,808,200)	\$ 107,600
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	498,600	1,251,100
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 617,200	\$ (1,346,000)	\$ (1,526,100)	\$ (1,830,300)	\$ (1,841,400)	\$ (1,309,600)	\$ 1,358,700

Scenario D: FTTP Migration - Traditional Cable Television Maintained and TiVo Implemented

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (977,300)	\$ (656,700)	\$ (582,700)	\$ (734,400)	\$ (972,100)	\$ 109,900	\$ (253,900)
Cash Balance							
Unrestricted Cash Balance	\$ 717,200	\$ (1,145,000)	\$ (1,223,100)	\$ (1,424,300)	\$ (1,494,800)	\$ (2,503,000)	\$ (4,734,700)
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	335,300	1,046,900
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 717,200	\$ (1,145,000)	\$ (1,223,100)	\$ (1,424,300)	\$ (1,494,800)	\$ (2,167,700)	\$ (3,687,800)

Scenario E: Increase Internet Subscriber Growth (40 percent to 50 percent) - Add 485 More Internet Customers

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (488,600)	\$ (402,900)	\$ (346,500)	\$ (506,600)	\$ (824,200)	\$ 648,800	\$ 626,500
Cash Balance							
Unrestricted Cash Balance	\$ 1,466,200	\$ 16,900	\$ 86,500	\$ 24,600	\$ 13,500	\$ 555,100	\$ 5,806,000
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	(28,000)	792,300
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 1,466,200	\$ 16,900	\$ 86,500	\$ 24,600	\$ 13,500	\$ 527,100	\$ 6,598,300

5.7 HFC Upgrade

The HFC upgrade estimate assumes that with the subscriber levels presented above over a 20-year period the total implementation and replenishment cost is \$25.50 million (\$18.53 million net present value (NPV) at a 4 percent discount rate).

The capital additions (depreciation) requirements for the 20-year analysis are shown in the tables on the following pages.

One key difference from the FTTP migration is that the initial capital is much lower with the HFC upgrade, but the ongoing replenishments are substantially higher.

Table 41: HFC Upgrade Capital Additions – Years 1 to 10

Year	1	2	3	4	5	6	7	8	9	10
a. Connectivity Implementation Costs										
MDU Cabling Upgrades (20 year depreciation)	\$ -	\$ 300,000	\$ 500,000	\$ 200,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Drops (15 year depreciation)	250,000	-	-	-	45,300	71,100	73,800	76,800	44,700	-
CMTS (5 year depreciation)	1,500,000	-	-	-	-	2,500,000	-	-	-	-
Network Equipment (10 year depreciation)	972,000	1,761,600	-	-	-	-	-	-	-	-
Customer Equipment (6 year depreciation)	1,111,200	-	-	-	30,200	47,400	1,160,400	51,200	29,800	-
Total	\$ 3,833,200	\$ 2,061,600	\$ 500,000	\$ 200,000	\$ 75,500	\$ 2,618,500	\$ 1,234,200	\$ 128,000	\$ 74,500	\$ -
b. Support Equipment (5 year depreciation)										
Vehicle (7-year)	\$ -	\$ 40,000	\$ -	\$ 80,000	\$ -	\$ -	\$ 48,000	\$ -	\$ 96,000	\$ -
Bucket Truck (7 year)	150,000	150,000	300,000	-	-	180,000	180,000	360,000	-	-
Total	\$ 150,000	\$ 190,000	\$ 300,000	\$ 80,000	\$ -	\$ 180,000	\$ 228,000	\$ 360,000	\$ 96,000	\$ -
c. Construction and Fiber OSP										
Construction (20-Year Depreciation)	-	150,000	-	-	-	-	-	-	-	-
	\$ -	\$ 150,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 3,983,200	\$ 2,401,600	\$ 800,000	\$ 280,000	\$ 75,500	\$ 2,798,500	\$ 1,462,200	\$ 488,000	\$ 170,500	\$ -

Table 42: HFC Upgrade Capital Additions – Years 11 to 20

Year	11	12	13	14	15	16	17	18	19	20
a. Connectivity Implementation Costs										
MDU Cabling Upgrades (20 year depreciation)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Drops (15 year depreciation)	1,416,800	-	-	-	-	125,000	-	-	-	22,700
CMTS (5 year depreciation)	2,500,000	-	-	-	-	2,500,000	-	-	-	-
Network Equipment (10 year depreciation)	972,000	1,761,600	-	-	-	-	-	-	-	-
Customer Equipment (6 year depreciation)	30,200	47,400	1,160,400	51,200	29,800	-	30,200	47,400	1,160,400	51,200
Total	\$ 4,919,000	\$ 1,809,000	\$ 1,160,400	\$ 51,200	\$ 29,800	\$ 2,625,000	\$ 30,200	\$ 47,400	\$ 1,160,400	\$ 73,900
b. Support Equipment (5 year depreciation)										
Vehicle (7-year)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Bucket Truck (7 year)	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
c. Construction and Fiber OSP										
Construction (20-Year Depreciation)	-	-	-	-	-	-	-	-	-	-
	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 4,919,000	\$ 1,809,000	\$ 1,160,400	\$ 51,200	\$ 29,800	\$ 2,625,000	\$ 30,200	\$ 47,400	\$ 1,160,400	\$ 73,900

5.7.1 HFC Upgrade Required Financing

The initial years of the HFC upgrade will be moderately capital-intensive (\$7.54 million in years 1 to year 4), but lower than the FTTP migration (\$14.08 million in years 1 to year 4). The lower initial capital reduces the required borrowing. This analysis projects that Norwood Light will cover the HFC upgrade costs by pursuing 20-year bonds in year 1 and year 2, totaling \$3.25 million and using \$2.10 million from cash reserves.

We assumed that the interest rate would be 2.5 percent. Principal repayment on the loan will start in the second year after issuance.¹³

After all bonds are issued, the total principal and interest (P&I) payment is \$217,000 per year, compared the \$757,275 P&I payment that will be retired this year.

It is important to note that the capabilities of the network are different. With a FTTP migration, Norwood Light is better positioned to offer high-end data services and promote reliability enhancements versus with an HFC upgrade.

5.7.2 HFC Upgrade – Financial Projections

The model assumes a straight-line depreciation of assets, and that the fiber outside plant will have a 20-year life span while the network equipment will need to be replaced after ten years. Miscellaneous implementation costs will occur every five years, CMTS upgrades occur every five years, vehicles and bucket trucks every seven years, and customer electronics will need to be replaced every six years. The model plans for a depreciation reserve account, starting in year four to fund future electronics replacements and upgrades.

The estimate also assumes that 15 percent of the coaxial drops are replaced in year 1 and the remaining drops (85%) replaced in year 11.

The HFC upgrade model assumes the same revenue as with the FTTP migration. This assumption, however, is aggressive since the performance of the HFC upgrade is considerably lower, especially for high-end residential users and business customers.

¹³ The scope of work for this report does not include a review of Norwood Light's borrowing capacity.

The tables below show the projected income statement for years one to 10, and 11 to 20.

Table 43: HFC Upgrade – Income Statement – Years 1 to 10

Year	1	2	3	4	5	6	7	8	9	10
a. Revenues (see sheet "Revenues" for breakdown)										
Telephone Revenues	\$ 671,100	\$ 637,700	\$ 603,100	\$ 573,000	\$ 544,600	\$ 514,900	\$ 489,400	\$ 464,900	\$ 439,700	\$ 417,800
Cable Revenues	3,828,700	3,638,200	3,629,200	3,448,500	-	-	-	-	-	-
Internet Revenues	3,505,100	3,645,500	3,981,300	4,141,100	4,306,800	4,705,900	4,894,500	5,090,800	5,308,500	5,308,500
Transport Revenues	-	-	-	-	-	-	-	-	-	-
Dark Fiber Revenues	-	-	-	-	-	-	-	-	-	-
Total	\$ 8,004,900	\$ 7,921,400	\$ 8,213,600	\$ 8,162,600	\$ 4,851,400	\$ 5,220,800	\$ 5,383,900	\$ 5,555,700	\$ 5,748,200	\$ 5,726,300
b. Operating Expenses - Cash (not including fees and taxes in line h)										
Cost of Good Sold - Telephone	\$ 276,400	\$ 262,600	\$ 254,600	\$ 241,900	\$ 229,900	\$ 222,800	\$ 211,800	\$ 201,200	\$ 195,100	\$ 185,300
Cost of Good Sold - Cable	3,423,500	3,351,600	3,280,300	3,211,500	-	-	-	-	-	-
Cost of Good Sold - Internet	240,200	254,900	270,300	286,700	303,800	322,600	342,400	363,300	378,800	386,200
Maintenance Expenses - Cable	91,200	92,100	93,000	94,000	-	-	-	-	-	-
Maintenance Expenses - Internet	35,600	35,900	36,300	36,600	37,000	37,400	37,700	38,100	38,400	38,800
Customer Service Expenses	202,500	204,500	206,500	208,500	252,700	255,100	257,500	260,000	262,400	264,800
Sales Expenses	470,900	475,600	480,300	485,000	489,700	442,000	446,200	450,400	454,600	458,800
Administrative & General Expenses	352,100	254,600	165,300	166,900	168,600	170,200	171,800	173,500	175,100	176,700
Operational Expense	332,500	335,900	339,000	342,300	345,700	349,100	352,200	355,800	359,000	362,300
Discretionary Support	-	-	-	-	208,000	210,000	212,000	214,000	216,000	218,000
Franchise Fee	242,400	232,600	234,300	224,800	-	-	-	-	-	-
Salaries	1,538,500	1,569,200	1,600,000	1,630,800	1,661,400	1,692,100	1,723,100	1,753,700	1,784,500	1,815,300
Total	\$ 7,205,800	\$ 7,069,500	\$ 6,959,900	\$ 6,929,000	\$ 3,696,800	\$ 3,701,300	\$ 3,754,700	\$ 3,810,000	\$ 3,863,900	\$ 3,906,200
c. Revenues less Cash Operating Expenses										
EBITDA (a-b)	\$ 799,100	\$ 851,900	\$ 1,253,700	\$ 1,233,600	\$ 1,154,600	\$ 1,519,500	\$ 1,629,200	\$ 1,745,700	\$ 1,884,300	\$ 1,820,100
d. Operating Expenses - Non-Cash										
Depreciation	\$ 1,820,500	\$ 1,446,300	\$ 1,214,200	\$ 1,235,600	\$ 1,243,600	\$ 1,267,700	\$ 1,180,800	\$ 1,198,800	\$ 1,212,100	\$ 1,220,700
e. Operating Income (d-c)										
	\$ (1,021,400)	\$ (594,400)	\$ 39,500	\$ (2,000)	\$ (89,000)	\$ 251,800	\$ 448,400	\$ 546,900	\$ 672,200	\$ 599,400
f. Non-Operating Income										
Interest Expense (all)	\$ (63,700)	\$ (103,600)	\$ (96,600)	\$ (88,400)	\$ (80,800)	\$ (73,200)	\$ (65,500)	\$ (61,800)	\$ (57,900)	\$ (53,900)
Misc Income	-	-	-	-	-	-	-	-	-	-
Total	\$ (63,700)	\$ (103,600)	\$ (96,600)	\$ (88,400)	\$ (80,800)	\$ (73,200)	\$ (65,500)	\$ (61,800)	\$ (57,900)	\$ (53,900)
g. Net Income (e+f)										
	\$ (1,085,100)	\$ (698,000)	\$ (57,100)	\$ (90,400)	\$ (169,800)	\$ 178,600	\$ 382,900	\$ 485,100	\$ 614,300	\$ 545,500
h. Taxes and Fees										
Revenue Fee	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CIAC (one-time) Fee	-	-	-	-	-	-	-	-	-	-
Taxes (allocated)	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
i. Net Income after Fees (g+h)										
	\$ (1,085,100)	\$ (698,000)	\$ (57,100)	\$ (90,400)	\$ (169,800)	\$ 178,600	\$ 382,900	\$ 485,100	\$ 614,300	\$ 545,500

Table 44: HFC Upgrade – Income Statement – Years 11 to 20

Year	11	12	13	14	15	16	17	18	19	20
a. Revenues (see sheet "Revenues" for breakdown)										
Telephone Revenues	\$ 397,200	\$ 375,700	\$ 356,900	\$ 339,200	\$ 320,900	\$ 305,000	\$ 290,100	\$ 274,300	\$ 274,000	\$ 274,000
Cable Revenues	-	-	-	-	-	-	-	-	-	-
Internet Revenues	5,308,500	5,416,800	5,416,800	5,416,800	5,525,200	5,525,200	5,525,200	5,634,300	5,634,300	5,634,300
Transport Revenues	-	-	-	-	-	-	-	-	-	-
Dark Fiber Revenues	-	-	-	-	-	-	-	-	-	-
Total	\$ 5,705,700	\$ 5,792,500	\$ 5,773,700	\$ 5,756,000	\$ 5,846,100	\$ 5,830,200	\$ 5,815,300	\$ 5,908,600	\$ 5,908,300	\$ 5,908,300
b. Operating Expenses - Cash (not including fees and taxes in line h)										
Cost of Good Sold - Telephone	\$ 176,200	\$ 170,900	\$ 162,300	\$ 154,300	\$ 149,600	\$ 142,200	\$ 135,200	\$ 131,100	\$ 131,000	\$ 131,000
Cost of Good Sold - Cable	-	-	-	-	-	-	-	-	-	-
Cost of Good Sold - Internet	394,300	401,600	409,800	417,900	426,100	435,000	443,200	452,100	461,100	470,900
Maintenace Expenses - Cable	-	-	-	-	-	-	-	-	-	-
Maintenace Expenses - Internet	39,100	39,400	39,900	40,200	40,600	40,900	41,200	41,600	42,000	42,400
Customer Service Expenses	267,300	269,700	272,100	274,500	277,000	279,400	281,800	284,300	286,700	289,100
Sales Expenses	463,000	467,200	471,400	475,700	479,900	484,100	488,300	492,500	496,700	500,900
Administrative & General Expenses	178,300	179,900	181,500	183,100	184,800	186,500	188,000	189,700	191,300	192,900
Operational Expense	365,600	368,900	372,400	375,600	379,000	382,400	385,700	389,200	392,200	395,600
Discretionary Support	220,000	222,000	224,000	226,000	228,000	230,000	232,000	234,000	236,000	238,000
Franchise Fee	-	-	-	-	-	-	-	-	-	-
Salaries	1,846,100	1,876,800	1,907,700	1,938,500	1,984,500	2,030,600	2,076,900	2,123,000	2,169,200	2,215,300
Total	\$ 3,949,900	\$ 3,996,400	\$ 4,041,100	\$ 4,085,800	\$ 4,149,500	\$ 4,211,100	\$ 4,272,300	\$ 4,337,500	\$ 4,406,200	\$ 4,476,100
c. Revenues less Cash Operating Expenses										
EBITDA (a-b)	\$ 1,755,800	\$ 1,796,100	\$ 1,732,600	\$ 1,670,200	\$ 1,696,600	\$ 1,619,100	\$ 1,543,000	\$ 1,571,100	\$ 1,502,100	\$ 1,432,200
d. Operating Expenses - Non-Cash										
Depreciation	\$ 1,317,500	\$ 1,317,500	\$ 1,319,700	\$ 1,319,700	\$ 1,319,700	\$ 1,311,400	\$ 1,311,400	\$ 1,311,400	\$ 1,311,400	\$ 1,308,400
e. Operating Income (d-c)										
	\$ 438,300	\$ 478,600	\$ 412,900	\$ 350,500	\$ 376,900	\$ 307,700	\$ 231,600	\$ 259,700	\$ 190,700	\$ 123,800
f. Non-Operating Income										
Interest Expense (all)	\$ (49,800)	\$ (45,600)	\$ (41,400)	\$ (37,000)	\$ (32,500)	\$ (27,900)	\$ (23,100)	\$ (18,300)	\$ (13,300)	\$ (8,200)
Misc Income	-	-	-	-	-	-	-	-	-	-
Total	\$ (49,800)	\$ (45,600)	\$ (41,400)	\$ (37,000)	\$ (32,500)	\$ (27,900)	\$ (23,100)	\$ (18,300)	\$ (13,300)	\$ (8,200)
g. Net Income (e+f)										
	\$ 388,500	\$ 433,000	\$ 371,500	\$ 313,500	\$ 344,400	\$ 279,800	\$ 208,500	\$ 241,400	\$ 177,400	\$ 115,600
h. Taxes and Fees										
Revenue Fee	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CIAC (one-time) Fee	-	-	-	-	-	-	-	-	-	-
Taxes (allocated)	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
i. Net Income after Fees (g+h)										
	\$ 388,500	\$ 433,000	\$ 371,500	\$ 313,500	\$ 344,400	\$ 279,800	\$ 208,500	\$ 241,400	\$ 177,400	\$ 115,600

The tables below show the cash flow statement for years one to 10, and 11 to 20.

Table 45: HFC Upgrade – Cash Flow Statement Years 1 to 10

Year	1	2	3	4	5	6	7	8	9	10
a. Net Income (From Income Statement)	\$ (1,085,100)	\$ (698,000)	\$ (57,100)	\$ (90,400)	\$ (169,800)	\$ 178,600	\$ 382,900	\$ 485,100	\$ 614,300	\$ 545,500
b. Cash Outflows										
Debt Service Reserve	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	(1,126,300)	(1,411,500)	(1,422,200)	(1,438,800)	(1,452,400)	(1,463,500)
Capital Lease	-	-	-	-	-	-	-	-	-	-
Issuance Cost (Financing)	(14,000)	(18,500)	-	-	-	-	-	-	-	-
Capital Expenditures	\$ (3,983,200)	\$ (2,401,600)	\$ (800,000)	\$ (280,000)	\$ (75,500)	\$ (2,698,500)	\$ (1,234,200)	\$ (308,000)	\$ (302,500)	\$ (360,000)
Total	\$ (3,997,200)	\$ (2,420,100)	\$ (800,000)	\$ (280,000)	\$ (1,201,800)	\$ (4,110,000)	\$ (2,656,400)	\$ (1,746,800)	\$ (1,754,900)	\$ (1,823,500)
c. Cash Inflows										
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	-	2,698,500	1,234,200	308,000	302,500	360,000
Debt Service Reserve	-	-	-	-	-	-	-	-	-	-
Source A	-	-	-	-	-	-	-	-	-	-
Source B	1,400,000	1,850,000	-	-	-	-	-	-	-	-
Total	\$ 1,400,000	\$ 1,850,000	\$ -	\$ -	\$ -	\$ 2,698,500	\$ 1,234,200	\$ 308,000	\$ 302,500	\$ 360,000
d. Total Cash Outflows and Inflows (b+c)	\$ (2,597,200)	\$ (570,100)	\$ (800,000)	\$ (280,000)	\$ (1,201,800)	\$ (1,411,500)	\$ (1,422,200)	\$ (1,438,800)	\$ (1,452,400)	\$ (1,463,500)
e. Non-Cash Expenses - Depreciation	\$ 1,820,500	\$ 1,446,300	\$ 1,214,200	\$ 1,235,600	\$ 1,243,600	\$ 1,267,700	\$ 1,180,800	\$ 1,198,800	\$ 1,212,100	\$ 1,220,700
f. Adjustments (Proceeds from)										
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Source A	-	-	-	-	-	-	-	-	-	-
Source B	(1,400,000)	(1,850,000)	-	-	-	-	-	-	-	-
Total	\$ (1,400,000)	\$ (1,850,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
g. Adjusted Available Net Revenue	\$ (3,261,800)	\$ (1,671,800)	\$ 357,100	\$ 865,200	\$ (128,000)	\$ 34,800	\$ 141,500	\$ 245,100	\$ 374,000	\$ 302,700
h. Principal Payments on Debt										
Principal Payment (all)	\$ 160,000	\$ 216,500	\$ 295,200	\$ 220,600	\$ 224,100	\$ 227,700	\$ 151,400	\$ 155,200	\$ 159,100	\$ 163,100
Total	\$ 160,000	\$ 216,500	\$ 295,200	\$ 220,600	\$ 224,100	\$ 227,700	\$ 151,400	\$ 155,200	\$ 159,100	\$ 163,100
i. Net Cash (before adjustment)	\$ (2,021,800)	\$ (38,300)	\$ 61,900	\$ 644,600	\$ (352,100)	\$ (192,900)	\$ (9,900)	\$ 89,900	\$ 214,900	\$ 139,600
Net Cash	\$ (2,021,800)	\$ (38,300)	\$ 61,900	\$ 644,600	\$ (352,100)	\$ (192,900)	\$ (9,900)	\$ 89,900	\$ 214,900	\$ 139,600
j. Fee Adjustment (end of term)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fee Adjustment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
k. Net Cash (after adjustment)	\$ (2,021,800)	\$ (38,300)	\$ 61,900	\$ 644,600	\$ (352,100)	\$ (192,900)	\$ (9,900)	\$ 89,900	\$ 214,900	\$ 139,600
Net Cash	\$ (2,021,800)	\$ (38,300)	\$ 61,900	\$ 644,600	\$ (352,100)	\$ (192,900)	\$ (9,900)	\$ 89,900	\$ 214,900	\$ 139,600
l. Beginning Cash	\$ 2,100,000									
Beginning Cash	\$ 2,100,000									
Cash Balance (with beginning cash)										
Unrestricted Cash Balance	\$ 78,200	\$ 39,900	\$ 101,800	\$ 746,400	\$ 394,300	\$ 201,400	\$ 191,500	\$ 281,400	\$ 496,300	\$ 635,900
Fee Adjustment (end of term)	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	1,126,300	(160,700)	27,300	1,158,100	2,308,000	3,411,500
Debt Service Reserve	-	-	-	-	-	-	-	-	-	-
Total Cash Balance	\$ 78,200	\$ 39,900	\$ 101,800	\$ 746,400	\$ 1,520,600	\$ 40,700	\$ 218,800	\$ 1,439,500	\$ 2,804,300	\$ 4,047,400

Table 46: HFC Upgrade – Cash Flow Statement Years 11 to 20

Year	11	12	13	14	15	16	17	18	19	20
a. Net Income (From Income Statement)	\$ 388,500	\$ 433,000	\$ 371,500	\$ 313,500	\$ 344,400	\$ 279,800	\$ 208,500	\$ 241,400	\$ 177,400	\$ 115,600
b. Cash Outflows										
Debt Service Reserve	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	(1,466,500)	(1,466,500)	(1,469,400)	(1,469,400)	(1,469,400)	(1,469,400)	(791,200)	(791,200)	(791,200)	(791,300)
Capital Lease	-	-	-	-	-	-	-	-	-	-
Issuance Cost (Financing)	-	-	-	-	-	-	-	-	-	-
Capital Expenditures	\$ (5,015,000)	\$ (1,809,000)	\$ (1,256,400)	\$ (51,200)	\$ (209,800)	\$ (2,853,000)	\$ (390,200)	\$ (143,400)	\$ (1,160,400)	\$ (169,900)
Total	\$ (6,481,500)	\$ (3,275,500)	\$ (2,725,800)	\$ (1,520,600)	\$ (1,679,200)	\$ (4,322,400)	\$ (1,181,400)	\$ (934,600)	\$ (1,951,600)	\$ (961,200)
c. Cash Inflows										
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Reserve	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	5,015,000	1,809,000	1,256,400	51,200	209,800	2,853,000	390,200	143,400	1,160,400	169,900
Debt Service Reserve	-	-	-	-	-	-	-	-	-	-
Source A	-	-	-	-	-	-	-	-	-	-
Source B	-	-	-	-	-	-	-	-	-	-
Total	\$ 5,015,000	\$ 1,809,000	\$ 1,256,400	\$ 51,200	\$ 209,800	\$ 2,853,000	\$ 390,200	\$ 143,400	\$ 1,160,400	\$ 169,900
d. Total Cash Outflows and Inflows (b+c)	\$ (1,466,500)	\$ (1,466,500)	\$ (1,469,400)	\$ (1,469,400)	\$ (1,469,400)	\$ (1,469,400)	\$ (791,200)	\$ (791,200)	\$ (791,200)	\$ (791,300)
e. Non-Cash Expenses - Depreciation	\$ 1,317,500	\$ 1,317,500	\$ 1,319,700	\$ 1,319,700	\$ 1,319,700	\$ 1,311,400	\$ 1,311,400	\$ 1,311,400	\$ 1,311,400	\$ 1,308,400
f. Adjustments (Proceeds from)										
Utility Contributions	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Source A	-	-	-	-	-	-	-	-	-	-
Source B	-	-	-	-	-	-	-	-	-	-
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
g. Adjusted Available Net Revenue	\$ 239,500	\$ 284,000	\$ 221,800	\$ 163,800	\$ 194,700	\$ 121,800	\$ 728,700	\$ 761,600	\$ 697,600	\$ 632,700
h. Principal Payments on Debt										
Principal Payment (all)	\$ 167,100	\$ 171,300	\$ 175,600	\$ 180,000	\$ 184,500	\$ 189,100	\$ 193,800	\$ 198,700	\$ 203,600	\$ 208,700
Total	\$ 167,100	\$ 171,300	\$ 175,600	\$ 180,000	\$ 184,500	\$ 189,100	\$ 193,800	\$ 198,700	\$ 203,600	\$ 208,700
i. Net Cash (before adjustment)	\$ 72,400	\$ 112,700	\$ 46,200	\$ (16,200)	\$ 10,200	\$ (67,300)	\$ 534,900	\$ 562,900	\$ 494,000	\$ 424,000
Net Cash	\$ 72,400	\$ 112,700	\$ 46,200	\$ (16,200)	\$ 10,200	\$ (67,300)	\$ 534,900	\$ 562,900	\$ 494,000	\$ 424,000
j. Fee Adjustment (end of term)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fee Adjustment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
k. Net Cash (after adjustment)	\$ 72,400	\$ 112,700	\$ 46,200	\$ (16,200)	\$ 10,200	\$ (67,300)	\$ 534,900	\$ 562,900	\$ 494,000	\$ 424,000
Net Cash	\$ 72,400	\$ 112,700	\$ 46,200	\$ (16,200)	\$ 10,200	\$ (67,300)	\$ 534,900	\$ 562,900	\$ 494,000	\$ 424,000
l. Beginning Cash										
Beginning Cash										
Cash Balance (with beginning cash)										
Unrestricted Cash Balance	\$ 708,300	\$ 821,000	\$ 867,200	\$ 851,000	\$ 861,200	\$ 793,900	\$ 1,328,800	\$ 1,891,700	\$ 2,385,700	\$ 2,809,700
Fee Adjustment (end of term)	-	-	-	-	-	-	-	-	-	-
Depreciation Operating Reserve	(137,000)	(479,500)	(266,500)	1,151,700	2,411,300	1,027,700	1,428,700	2,076,500	1,707,300	2,328,700
Debt Service Reserve	-	-	-	-	-	-	-	-	-	-
Total Cash Balance	\$ 571,300	\$ 341,500	\$ 600,700	\$ 2,002,700	\$ 3,272,500	\$ 1,821,600	\$ 2,757,500	\$ 3,968,200	\$ 4,093,000	\$ 5,138,400

5.7.3 HFC Upgrade – Staffing and Operating Expenses

Staffing levels assume that the initial fiber outside construction and customer installs are done by contractors and that cable television is dropped in year 5. Staffing levels also assume the ability to leverage the Light Department’s human resources, accounting, customer service, record keeping (GIS for example), and other resources.

Table 47: HFC Upgrade – Staffing

Position	Year					Base Salary per FTE (Year 1)
	1	2	3	4	5	
Managers	2.00	2.00	2.00	2.00	2.00	\$ 130,545
Customer Service	2.00	2.00	2.00	2.00	2.00	\$ 62,505
Phone and Network Engineers	2.00	2.00	2.00	2.00	2.00	\$ 110,272
Video/Plant Engineer	1.00	1.00	1.00	1.00	1.00	\$ 112,266
Admin Sale	1.00	1.00	1.00	1.00	1.00	\$ 148,000
Technicians	4.00	4.00	4.00	4.00	4.00	\$ 90,330
Total	12.00	12.00	12.00	12.00	12.00	

Including benefits, the Broadband department’s labor expenses will total roughly \$1.54 million in year one, \$1.57 million in year two, \$1.60 million in year three, \$1.63 million in year four, and \$1.66 million in year 5. These expenses will increase at 2 percent annually thereafter.

Additional key operating and maintenance assumptions include:

- Pole attachment fees are estimated at \$18,000 per year
- Cable television franchise fee is \$242,400 in year 1, based on 6.33 percent of cable revenues, with a minimum fee of \$200,000 if cable television is offered.
- We assumed a discretionary support \$208,000 payment starting in year 5 after cable television migrated to OTT video.
- Cable television expenses, beyond programming, include:
 - Local origination video — \$12,000 per year
 - Other events — \$2,000 per year
 - Headend and server support (multiple line items) — \$86,200 per year
 - Headend power — \$4,500 per year
 - Dish power — \$500 per year
- Internet expenses, beyond programming, include:
 - Cisco support — \$11,600 per year
 - Plume support — \$24,000 per year

- General expenses include:
 - Customer records and collections — \$121,100 per year
 - Help desk — \$202,500 per year
 - Network support — \$96,000 per year
 - CMTS support — \$27,400 per year
 - Uncollectable accounts — \$7,000 per year
 - Marketing and advertising are estimated at — \$369,700 per year
 - Website support — \$1,200 per year
 - Office supplies — \$4,000 per year
 - Legal — \$30,000 per year
 - HVAC maintenance — \$24,000 per year
 - Phone support — \$3,800 per year
 - Transport (fuel) — \$50,400 per year
 - Power supply service — \$7,600 per year
 - Equipment repairs — \$20,000 per year
 - Distribution expense — \$33,400 per year
 - Rental and cleaning — \$14,300 per year
 - Underground line maintenance — \$7,000 per year
 - Overhead line maintenance — \$18,000 per year
 - Meter maintenance — \$4,000 per year
 - Consumer Education — \$100,000 per year for 6 years, reducing to \$50,000 per year thereafter
 - Customer communication — \$90,000 in year 1 and \$90,000 in year 2 (will have outages during migration)

These above expenses are summarized in the income statement (Table 35) and are subject to the escalations described in Section 5.3 . The cost of goods sold for each service is presented in Section 5.2 .

5.7.4 HFC Upgrade – Sensitivity Examples

In the table below we show the impact of take rates and service prices to net income and cash flow projections. As shown in the table, a slight increase or decrease in take rates or service pricing has a substantial impact on cash flow projections.

The scenarios presented are:

- A. HFC Upgrade Base Case: assumes a transition to alternative video programming in year 5.

- B. Interest Rate: increased by 1 percent (to 3.5%), reduces year 20 cash balance by \$402,900.
- C. Implement TiVo: Convert to TiVo in year 1 and transition to alternative video programming in year 5, reduces year 20 cash balance by \$1.94 million.
- D. Keep Cable Television: Convert to TiVo in year 1 and keep traditional cable television, reduces year 20 cash balance by \$7.05 million

We did not show a sensitivity with increased internet subscribers as done in the FTTP migration since the HFC upgrade will struggle to support the market needs to reach the baseline projection.

Table 48: HFC Upgrade Sensitivity Examples

Scenario A: HFC Upgrade Base Case - Transition to Alternative Video Programming in Year 5

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (1,085,100)	\$ (698,000)	\$ (57,100)	\$ (90,400)	\$ (169,800)	\$ 545,500	\$ 115,600
Cash Balance							
Unrestricted Cash Balance	\$ 78,200	\$ 39,900	\$ 101,800	\$ 746,400	\$ 394,300	\$ 635,900	\$ 2,809,700
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	1,126,300	3,411,500	2,328,700
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 78,200	\$ 39,900	\$ 101,800	\$ 746,400	\$ 1,520,600	\$ 4,047,400	\$ 5,138,400

Scenario B: HFC Upgrade - Interest Rate Increased by 1 Percent (to 3.5 %)

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (1,099,100)	\$ (730,500)	\$ (89,200)	\$ (121,500)	\$ (200,000)	\$ 521,600	\$ 111,400
Cash Balance							
Unrestricted Cash Balance	\$ 64,200	\$ (1,200)	\$ 40,600	\$ 665,200	\$ 292,900	\$ 434,000	\$ 2,406,800
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	1,126,300	3,411,500	2,328,700
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ 64,200	\$ (1,200)	\$ 40,600	\$ 665,200	\$ 1,419,200	\$ 3,845,500	\$ 4,735,500

Scenario C: HFC Upgrade - Transition to Alternative Video Programming in Year 5 and TiVo Implemented

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (1,693,000)	\$ (1,055,700)	\$ (398,200)	\$ (424,200)	\$ (258,400)	\$ 539,500	\$ 109,600
Cash Balance							
Unrestricted Cash Balance	\$ (790,000)	\$ (1,345,100)	\$ (1,535,800)	\$ (1,136,500)	\$ (1,603,800)	\$ (1,562,200)	\$ 548,000
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	1,241,500	3,726,700	2,647,500
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ (790,000)	\$ (1,345,100)	\$ (1,535,800)	\$ (1,136,500)	\$ (362,300)	\$ 2,164,500	\$ 3,195,500

Scenario D: HFC Upgrade - Traditional Cable Television Maintained and TiVo Implemented

Year	1	2	3	4	5	10	20
Net Income (From Income Statement)	\$ (1,593,000)	\$ (954,700)	\$ (296,200)	\$ (321,200)	\$ (320,800)	\$ 248,000	\$ (450,000)
Cash Balance							
Unrestricted Cash Balance	\$ (690,000)	\$ (1,144,100)	\$ (1,232,800)	\$ (730,500)	\$ (1,260,200)	\$ (2,320,600)	\$ (4,325,200)
Fee Adjustment (end of term)	-	-	-	-	-	-	-
Depreciation Operating Reserve	-	-	-	-	1,241,500	3,607,100	2,412,600
Debt Service Reserve	-	-	-	-	-	-	-
Total Cash Balance	\$ (690,000)	\$ (1,144,100)	\$ (1,232,800)	\$ (730,500)	\$ (18,700)	\$ 1,286,500	\$ (1,912,600)

Exhibit A – An Overview of Broadband Provisions in the Infrastructure Bill (as of July 30, 2021)



BEYOND TELECOM LAW BLOG

LEGAL AND REGULATORY UPDATES FOR THE TELECOM INDUSTRY

An Overview of Broadband Provisions in the Infrastructure Bill (as of July 30, 2021)

By Casey Lide on August 2, 2021



On Wednesday, July 28, the U.S. Senate voted to move forward on a bipartisan infrastructure bill (the “Infrastructure Investment and Jobs Act”) that includes \$65 billion to support broadband deployment and adoption. While a variety of procedural and political hurdles remain, we are cautiously optimistic about its prospects for enactment.

This blog entry highlights some of the key broadband-related provisions in the bill, derived from a draft copy of the bill that we obtained several days ago. The bill was publicly released on Sunday, August 1, and is [**available here**](#).

This summary is based upon legislation that has not yet passed either the Senate or the House. It will almost certainly change prior to adoption, perhaps in significant ways. Even so, the draft bill provides a clear indication of how this once-in-a-generation investment in broadband infrastructure and adoption could play out.

We intend to provide a much more detailed analysis if and when the bill is enacted, likely over the course of several blog entries. For now, the key aspects of the broadband provisions

of the draft bill may be summarized as follows. (The remainder of this post discusses each in greater detail):

- **“Broadband Equity, Access and Deployment Program” (\$42 billion):** The centerpiece of the overall broadband investment, this massive program contemplates grants being made to States. Significant local coordination would be required. States would use grant funds to competitively award subgrants for qualifying broadband infrastructure, mapping, and adoption projects. It would be administered by NTIA.
- **“Enabling Middle Mile Broadband Infrastructure” (\$1 billion):** Directs NTIA to make available grants for “construction, improvement or acquisition of middle mile infrastructure.”
- **“Digital Equity Act of 2021” (\$1.3 billion):** Funds State-level digital equity planning and establishes a competitive digital equity grant program available to a wide range of public-sector and not-for-profit entities.
- **“Broadband Affordability”:** The bill includes several initiatives relating to affordable broadband:
 - Extension and modification of the existing **Emergency Broadband Benefit** program, (including renaming it as the “Affordable Connectivity Program”);
 - Adoption of a **“consumer broadband label”** requirement, originally put forth by the FCC in 2016;
 - **Digital discrimination.** The bill would require the FCC to adopt rules within two years to address digital discrimination (i.e., redlining).

1. **BROADBAND EQUITY, ACCESS AND DEPLOYMENT PROGRAM (TITLE I, Section 801102)** (\$42 billion grant program, NTIA)

The centerpiece of the overall broadband funding initiative, the “Broadband Equity, Access and Deployment Program” tasks NTIA to administer a \$40 billion grant program for which “eligible entity” is defined as “a State.”^[1] It directs NTIA to issue a Notice of Funding Opportunity within 180 days after the bill is enacted, establishing a process for States to submit a letter of intent, a single initial proposal, and a single final proposal for funding.

Funding Allocation. Each State would receive a minimum of \$100 million. The remainder of the \$40 billion would be allocated in accordance with a formula that considers the number of unserved and high-cost locations in the State, as compared to other States. Twenty percent of the allocated amount would be released upon approval of the State’s

initial proposal, with the remaining 80 percent released upon approval of the State's final proposal. *Sec. (e)(3), (4)*. Funding is available to States for planning and administrative expenses. *Sec. (e)(1)(C)*.

If a State fails to submit an application for funds by the applicable deadline, a political subdivision or consortium of political subdivisions may submit an application in its place. *Sec. (c)(5)(B)*.

Local Coordination Requirements. The bill calls for significant local coordination on the part of the State. A State must submit a "5-year action plan" as part of its initial proposal, which "shall be informed by collaboration with local and regional entities." *Sec. (e)(1)(D)*.

An initial proposal must, among other things, "identif[y], and outline[] steps to support, local and regional broadband planning processes or ongoing efforts to deploy broadband or close the digital divide" and "describe[] coordination with local governments, along with local and regional broadband planning processes." *Sec. (e)(3)(A)*. In addition, NTIA "shall establish local coordination requirements for eligible entities to follow, to the greatest extent practicable." *Sec. (e)(3)(A)(ii)*. States must allow an opportunity for political subdivisions to submit plans for consideration by the State, and to comment on the State's initial and final proposals. *Sec. (e)(4)(A)*.

In awarding subgrants, States "may not exclude cooperatives, nonprofit organizations, public-private partnerships, private companies, public or private utilities, public utility districts, or local governments from eligibility for such grant funds." *Sec. (h)(1)(A)*.

Use of Funds. (*Sec. (f)*) A State may use grant funds "to competitively award subgrants" for:

- Unserved service projects and underserved service projects.
 - I. An "unserved location" lacks access to reliable broadband service offered with speed of not less than 25Mbps/3Mbps. "Unserved service projects" are projects serving areas in which not less than 80% of locations are unserved. (*a*).
 - II. An "underserved location" lacks access to reliable broadband service offered with speed of not less than 100Mbps/25Mbps. "Underserved service projects" serve areas in which not less than 80% of locations are underserved. (*a*).
- Connecting eligible community anchor institutions. An "eligible" community anchor institution is defined as one that lacks access to gigabit service. (*a*)(E).

I. Notably, the definition of “community anchor institution” includes “public housing organization or community support organization...” (a)(E). This suggests that support could be available for some urban areas that lack gigabit connectivity.

- Data collection, broadband mapping, and planning;
- Installing broadband infrastructure or providing reduced-cost service within a multi-family residential building, with priority given to a building that “has a substantial share” of unserved households or that is in a designated poverty area; and
- Broadband adoption, including programs to provide affordable devices.

Funding Prioritization. Subgrant awards are to be funded in accordance with the following prioritization (Sec. (h)(1)):

- Unserved service projects;
- Underserved service projects (after the State certifies that it will ensure universal coverage of all unserved locations); and
- Eligible community anchor institutions (after prioritizing underserved service projects).

As another element of prioritization, a State “shall give priority to projects based on” deployment of a broadband network to persistent poverty counties or high-poverty areas; the speeds of the proposed broadband service; and the expediency of project completion. Sec. (h)(1).

Broadband Service Standards. A subgrantee for the deployment of a broadband network must provide broadband service at a speed of not less than **100Mbps/20Mbps**, with sufficiently low latency “to allow reasonably foreseeable, real-time, interactive applications.” Sec. (h)(4).

Funded broadband networks must offer at least one low-cost broadband service option for eligible subscribers (as described in Sec. (h)(5)).

The network must be deployed and service commenced no later than four years after the date of the subgrant. Sec. (h).

Subgrants. The program authorizes a State to *only* use grant funds to competitively award subgrants involving a permitted use of the funds (in addition to planning and administrative expenses). States are directed to ensure that subgrantees have the financial, managerial, technical and operational capability to carry out the activities contemplated in the

subgrant. *Sec. (g)(2)(A)*. Subgrantees must also comply with various obligations, including quality-of-service and broadband reliability and resilience “best practices,” as defined by NTIA. *Sec. (g)*.

Matching Requirement. A State must provide, or must require a subgrantee to provide, a matching contribution equivalent to at least 25 percent of project costs, *Sec. (h)(3)*. NTIA may waive the matching contribution requirement and the match requirement does not apply in high-cost areas.

In general, the match must be derived from non-Federal funds. However, the Act specifically provides that matching funds *may* come from a Federal regional commission or authority, as well as the CARES Act, the Consolidated Appropriations Act of 2021, or the American Rescue Plan Act of 2021, if the funds were for the purpose of deployment of broadband service. *Sec. (h)(3)(B)(iii)*.

The match “may include in-kind contributions.” *Sec. (h)(3)(B)(ii)*.

Relation to Other Public Funding. The Act explicitly *allows* a subgrant to be made to “an entity that has received amounts from the Federal Government or a State or local government for the purpose of expanding access to broadband service.” *Sec. (k)*. Grant funds made available to States must “supplement, and not supplant,” amounts that the State would otherwise make available for broadband purposes. *Sec. (l)*.

Report on Future of Universal Service Fund (Sec. 801104). Title I of the Act also directs the FCC to commence a proceeding within 30 days, and provide a report within 270 days, evaluating the implications of the Act on how the FCC “should achieve universal service goals for broadband.” *Sec. 004*. Notably, the term “universal service fund” is not used in Section 004 other than in the section title.

2. **ENABLING MIDDLE MILE BROADBAND INFRASTRUCTURE (TITLE IV, Sec. 80401 et seq.)** (\$1 billion for fiscal years 2022 through 2026, NTIA)

Title IV of the bill would establish a much smaller grant program to support the development of middle-mile infrastructure. The bill directs NTIA to make grants available “on a technology-neutral, competitive basis to eligible entities for the construction, improvement, or acquisition of middle mile infrastructure.” *Sec. (b)*.

The program has two stated purposes (*Sec. (b)*):

- “to encourage expansion of middle mile infrastructure to reduce the cost of connecting unserved and underserved areas to the backbone of the internet (commonly referred to as the ‘last mile’) and
- “to promote broadband connection resiliency through the creation of alternative network connection paths that can be designed to prevent single points of failure on a broadband network.”

“Middle Mile Infrastructure.” The term “middle mile infrastructure” (Sec. (a)):

- “means any broadband infrastructure that does not connect directly to an end-user location, including an anchor institution; and
- includes –
- leased dark fiber, interoffice transport, backhaul, carrier-neutral internet exchange facilities, carrier-neutral submarine cable landing stations, undersea cables, transport connectivity to data centers, special access transport, and other similar services; and
- wired or private wireless infrastructure, including microwave capacity, radio tower access, and other services or infrastructure for a private wireless broadband network, such as towers, fiber, and microwave links.”

Eligible Entities. For the middle mile grant program, an “eligible entity” includes “a State, political subdivision of a State, Tribal government, technology company, electric utility, utility cooperative, public utility district, telecommunications company, telecommunications cooperative, nonprofit foundation, nonprofit corporation, nonprofit institution, nonprofit association, regional planning counsel [sic], Native entity, or economic development authority”; or a partnership of two or more such entities. Sec. (a)(4).

Prioritization. An eligible entity must agree to prioritize (A) “connecting middle mile infrastructure to last mile infrastructure that provide or plan to provide broadband service to households in unserved areas; (B) connecting non-contiguous trust lands, or [sic] (C) the offering of wholesale broadband service at reasonable rates on a carrier neutral basis.” Sec. (e)(7).

Buildout must be completed within five years, although an extension may be available. Sec. (e)(2).

Interconnection and Nondiscrimination Requirement. An entity that receives a middle mile grant using fiber optic technology “shall offer interconnection in perpetuity, where

technically feasible without exceeding current or reasonably anticipated capacity limitations, on reasonable rates and terms to be negotiated with requesting parties.” Sec. (e)(3)(D).

Federal Share Limited to 70 Percent. The amount of a middle mile grant may not exceed 70% of the total project cost.

3. **DIGITAL EQUITY ACT OF 2021 (Title III, Sec. 80301 et seq.)** (\$1.3 billion over five years)

On the adoption side, the legislation includes the “Digital Equity Act of 2021.” The Digital Equity Act creates a “State Digital Equity Capacity Grant Program” and a “Digital Equity Competitive Grant Program.”

The State Digital Equity Capacity Grant Program authorizes \$60 million for planning grants to be made available to States for the development of State Digital Equity Plans, and \$650 million over five years for grants to States to support the implementation of State Digital Equity Plans and digital inclusion activities.

The Digital Equity Competitive Grant Program makes available \$650 million over five years for grants to a wide variety of public-sector and not-for-profit entities. Sec. (b). Funds may be used for a range of digital inclusion and broadband adoption activities. Sec. (d)(2).

4. **BROADBAND AFFORDABILITY (TITLE V, Sec. 80501 et seq.)**

Extension and Modification of Emergency Broadband Benefit (Sec. 80502). Title V of the bill would indefinitely extend the **Emergency Broadband Benefit** Program, originally adopted as a COVID-relief measure. It renames the program the “Affordable Connectivity Program,” and implements a variety of other changes.

Adoption of Consumer Broadband Labels (Sec. 80504). The legislation would require the display of “consumer broadband labels,” **as described by the FCC in April 2016**. Sec. 004.

Digital Discrimination (Sec. 80506) The bill includes a brief provision relating to “digital discrimination” (i.e., “redlining”). It requires the FCC to adopt rules within two years “to facilitate equal access to broadband internet access service, taking into account the issues of technical and economic feasibility presented by that objective, including (1) preventing digital discrimination of access based on income level, race, ethnicity, color, religion or national origin and (2) identifying necessary steps for the [FCC] to take to eliminate such

discrimination.” Sec. (b). It also directs the FCC to develop “model policies and best practices” for States and localities to prevent digital discrimination

[1] The term “State” is defined with reference to 47 U.S.C. 942, which defines “State” as “any State of the United States, the District of Columbia, Puerto Rico, American Samoa, Guam, the United States Virgin Islands, the Northern Mariana Islands, and any other territory or possession of the United States,” but excludes the phrase “any other territory or possession of the United States.”

Beyond Telecom Law Blog

Keller and Heckman LLP

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Exhibit B – Financial Analysis FTTP Migration

Attached separately as an Excel spreadsheet.

Exhibit C – Financial Analysis HFC Upgrade

Attached separately as an Excel spreadsheet.